EFFECTS OF AEROBIC DANCE EXERCISE PROGRAMME ON SELECTED HEALTH-RELATED FITNESS VARIABLES AND WORK PRODUCTIVITY OF BEVERAGE INDUSTRY WORKERS IN OYO AND OSUN STATES

BY

Racheal Bolanle, AJALA
B.Sc (Ed) Uyo; M. Ed. (Exercise Physiology), (Ibadan)
Matric No: 147523

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CERTIFICATION

I certify that this thesis was carried out by **Racheal Bolanle AJALA** under my supervision in the Department of Human Kinetics and Health Education, University of Ibadan, Ibadan, Nigeria.

Supervisor
DR. I.O OLADIPO
B. Ed (Hon), M.Ed, Ph.D (Ibadan)
Department of Human Kinetics and Health Education,
Faculty of Education, University of Ibadan,
Ibadan

DEDICATION

I dedicate this work to Almighty God, the Alpha and Omega of my life and the source of my strength and protection. Secondly, to my children Adedolapo Oluwapelumi Oyinkansola Ajala and Opeoluwa Olusola Temitayo Ajala. I pray that God will back you up in the journey of your destiny in Jesus name.

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ABSTRACT

Beverage industry workers are at risk of Musculoskeletal and Cardiovascular (MC) injuries which result in low productivity. Literature has shown that these injuries could be managed using the aerobic energy generating process. Previous studies have focused largely on body composition and safety precautions with less emphasis on ergonomics. This study, therefore, was designed to determine the effects of Aerobic Dance Exercise (ADE) programme on Health Related Fitness Variables (HRFV) (Weight, Percent Body Fat - PBF, Resting Heart Rate - RHR, Systolic Blood Pressure – SBP, Diastolic Blood Pressure - DBP, Hand Strength - HS and flexibility) and Work Productivity (WP) measures (Workplace Accident Rate - WAR, Factory Fault Product - FFP, absenteeism and Healthcare Cost - HC) of beverage industry workers in Oyo and Osun states. The moderating effects of age and gender were also examined.

The study adopted Labanotation Theory, while the pretest-posttest control group quasi-experimental design with 2x2x2 factorial matrix was used. Two beverage companies (International Brewery, Ilesa and Coca-cola, Asejire plants) with high records of workers with MC injuries were purposively selected. Workers with MC injury complaints, high annual healthcare cost, high rate of absenteeism, high factory fault products and high workplace accident rate were selected as participants. Participants were assigned to ADE (Ilesa-36) and control group (CG) (Asejire plants-36). Treatment lasted 12 weeks. Instruments used were Sphygmomanometer, Stethoscope, Skinfold Caliper, Flex Box, Hand Grip Dynamometer, Stadiometer, Weighing Scale, Heart Rate Monitor, Work Register, Clinic Case File and Productivity Measurements Scale (r=0.76). Data were analysed using descriptive statistics, Cochran Q test and Analysis of covariance at 0.05 level of significance.

The participants were males (64.0%) and females (36.0%) with mean age of 45.3$\pm$ 3.26 years. There were significant mean differences in baseline and post-treatment values of Weight - (79.56 $\pm$ 7.99; 76.67 $\pm$ 8.41); PBF - (27.04 $\pm$ 6.65; 24.39 $\pm$ 24.39); RHR - (84.03 $\pm$ 2.6; 80.14 $\pm$ 4.57); SBP - (125.96 $\pm$ 5.06; 120.61 $\pm$ 6.41); DBP - (82.92 $\pm$ 5.78; 80.01 $\pm$ 5.47); HS - (26.61 $\pm$ 10.87; 27.59 $\pm$ 11.07) and flexibility - (9.006 $\pm$ 5.92; 4.13 $\pm$ 7.59) respectively. There were also significant mean differences in baseline and post-treatment values in terms of WAR - (20.90 $\pm$ 3.81; 28.69 $\pm$ 6.36); FFP - (31.11 $\pm$ 7.90; 35.20 $\pm$ 10.39); absenteeism - (30.90 $\pm$ 9.38; 37.04 $\pm$ 9.66) and HC - (14.52 $\pm$ 3.6; 22.14 $\pm$ 8.86) respectively. The main effects of gender and age were not significant on HRFV and WP. There were two-way interaction effects of ADE and gender ($F_{(1,70)}$ = 40.5; partial η^2 = 0.70) and RHR ($F_{(1,70)}$ = 87.9; partial η^2 = 0.15) in favour of male participants. The three-way effect was only significant on HRFV ($F_{(1,70)}$ = 56.15; partial η^2=0.82) in favour of male participants from ADE group of age bracket 30-49 years but was not on WP.

The aerobic dance exercise programme improved health related fitness variables and increased the work productivity of the beverage industry workers in Oyo and Osun states. Management of Beverage companies should adopt aerobic dance exercise programme to improve the health variables and increase the productivity of the workers.

Keywords: Work productivity of beverage industry workers, Aerobics and work, Health related fitness variables

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CHAPTER ONE

INTRODUCTION

Background to the Study

Work productivity is the amount of goods and services that a worker produces in a given amount of time. Conversely, work ability is the result of the interaction between individual resources and work. According to llmarinen (2009), a person's individual resources include health, functional capacity, education, technical know-how and job satisfaction. A person realizes his/her resources at work and the result is influenced by the community and the work environment, as well as by the physical and mental stress demand of the work. Good resources do not transform into good work ability unless the content of the work, the community and the work environment provide the proper conditions. Work community or work environment that operate well cannot fully compensate for weakened resources. Physical activity (PA) is any bodily movement produced by a contraction of skeletal muscle that substantially increases energy expenditure. Physical activity is an umbrella term for leisure time activity, occupational type of activity (OPA) and commuting (Malkia, Impivaara, Heliovaar, Maatela, 2012; Howley 2014).

Research has shown that health-related variables were related to the onset of pain (sub-acute, acute and chronic). Stress, distress or anxiety, mood, emotions, cognitive functioning and pain behaviour were found to be significant factors for musculoskeletal symptoms. Personality factors produced inconclusive results (Linton, 2000). In a retrospective rested case-control study Finland, factors at work were found to be risk indicators for low back pain among both sexes. Low influence over working condition among women and poor social relation at work among men, in combination with other factors seems to be of high relevance for the occurrence of low back pain. Hide (2005) identifies risk factors that are related to work. These included high workload, high work pressure, diminished job control, inadequate employee training in the use of new technology, monotonous tasks, poor supervisory relations and fear over job security. In addition, new stressors that can be linked primarily to human-computer interaction have emerged. These include technology breakdowns, technology slowdowns and electronic performance monitoring. In the workplaces, the effects of these stressors are increased arousal, somatic complaints, particularly of the musculoskeletal system, mood disturbances, notably anxiety, fear and anger, and diminished quality of work life, such as reduced job satisfaction.(Baker, Jacob. Tickle-Degne,2007)

Eriksen (2002) found that subjects who were middle aged possessed more physiological troubles and disabilities. Beside the prevalence of subjective health complaint was high in the northern European countries, where 51% of workers used in researchers study complained about tiredness; 42% had headache; 37% reported worry; 35% had problem of low back pain; 3% complained of pain in the arm/shoulder; 32% reported neck pain; 25% had depressive mood; 22% reported pain in the upper back; 21% experienced pain in their feet; and 7% battled with migraine. The prevalence of multiple complaints was high; 23% had no complaint; 20% gave two complaints;15% had three complaints; and 17% gave four or more complaints. In addition women were three times as likely as men to have multiple complaints compared to a younger group (< 30 years). Individuals in the middle age (30-49 years) and oldest age group (> 50 years) were significantly less likely to complain about tiredness, depressive mood, headache or migraine. However, the older group was more likely to report low back pain, arm/shoulder pain and pain in the feet.

Regular physical activity, fitness, and exercise are important for the health and well-being of people of all ages. For old adults, mobility and functioning can be improved through physical activity (Butler, 2013). Physical exercise can be categorised into two, namely aerobic exercise and anaerobic exercise. Aerobic exercise (also known as cardiorespiratory exercise) is physical exercise of relatively low intensity that depends primarily on the aerobic energy-generating process. Aerobic refers to the use of oxygen to adequately meet energy demands during exercise through aerobic metabolism. Generally, light- to- moderate exercise can be performed for extended periods of time. The intensity should be between 60% and 80% of maximum heart rate. Examples of cardiovascular aerobic exercise are long distance running, jogging, swimming, dancing, cycling and walking. Conversely, anaerobic exercise of involves strength training and short distance running. The two types of exercise differ by the distance and intensity of muscular contraction involved, and how energy is generated within the muscle. In general, aerobic exercise is performed at a moderate level of intensity over a relatively long period of time. For example, running a long distance at a moderate pace is an aerobic exercise, but sprinting is not.

Anaerobic exercise is an exercise intense enough to trigger lactic acid formation. It is used by athletes in non- endurance sports to promote strength, speed and power; and by body builders to build muscle mass. Anaerobic exercise leads to greater performance in short duration, and high intensity, which lasts from few seconds to up to about two minutes. It comprises brief strength- based activities, such as sprinting or body building. Examples of anaerobic exercise are weight lifting, sprinting and jumping. In short, any exercise that consists of short exertion, high- intensity movement is an anaerobic exercise. (ACSM, 2008)

Regular aerobic exercise will produce beneficial effect for any age group provided the exercise is specific and appropriate to the level of fitness of the individual. Progressive exercise correctly performed will increase the level of fitness and improve health. It will also create a sense of well-being, produce greater energy and reduce the risk of developing some diseases. Exercise makes demands on the body system over and above normal everyday activities. As a result, the system adapts automatically and physiologically (Ronka, 2005). Any activity lasting longer than about two minutes has a large aerobic metabolic component, such as marathon running or long distance cycling and dancing.

Appropriate regular daily physical activity, along with a healthy diet and non-smoking, is a major component in preventing chronic disease. For individual, it is a powerful means of preventing chronic diseases. For nations, it can provide a cost-effective way of improving public health across the population. Experience and scientific evidence showed that regular physical activity provides people wide range of physical, social and mental health benefits (WHO, 2003). There is a relationship between fitness and productivity. If a person is fit, he\she will be able to handle more physically demanding tasks, such as carrying more weight, or working longer and harder without having to observe many break times. Productivity can be measured in both absenteeism and presenteeism. Absenteeism is the loss of productivity due to absence, while presenteeism is the loss of productivity while present. Presenteeism is a better measure of pure productivity, as it measures how productive someone is while working, as opposed to the loss of productivity from vacations, sick days and lateness. Kerr and Voss (2008) argue that health status and noticeable productivity could be increased through some aerobic exercise.

Engaging in physical activity everyday contributes to optimum health and quality of life styles, which can be changed to improve health and fitness through daily exercise. Aerobic exercise stimulates heart, lungs and all working groups of muscles. It also produces valuable changes in body and mind. Many physiological changes are determined by daily aerobic exercise (Howley, 2014).The development, improvement and maintenance of human physical functioning have been a primary goal of physical education programmes of which aerobic exercise is an integral part. This is because the physiological efficiency of the body is a very significant aspect of human life (Howley, 2014). It is achieved through a well-structured exercise programme (Foss and Keteyan, 2012).

Since regular physical activity prevents diseases and promotes health, it may actually decrease health care costs. Some scientists have estimated the economic consequences of physical inactivity for the national health care system. For example, the study of Bertera (2014) included only medical costs associated with the subset of conditions, while the Chenoweth's (2013) report included all medical costs related to inactivity. Many factors may contribute to an employee being afflicted with cumulative trauma disorders (CTD), including poorly designed equipment, fast- paced work, few or no rest break time, stress, poor posture, force and repletion , individual predisposition and poor physical condition. Employers are becoming more aware of the costliness of CTDs, which should lead to more care taken in the purchase of supplies. However expenses of specially made equipment to reduce CTDs prevents many companies from buying them. As more attention is given to the huge cost of CTDs, there will be even greater demand for specialized equipment, and fall in prices (Shepherd 2012).

In most industrialised economy, the age of the workforce is growing. The regular retirement age has been increasing in many countries, especially when the pension is financed by a pay-as -you- go system, as it is the case in many countries. Aging population can lead to budgetary problems, which can make governments increase the legal retirement age. Young workers often enter the labour market later as a consequence of longer education on unemployment (llmarinen, 2009).

There is evidence that people performance declines from a certain age. Old workers have accumulated experience and knowledge in their work life. There is a relationship between age and productivity and an aging workforce could potentially have severe consequences on the performance of the economy as a whole. It is, therefore, important to know the relationship between the age of the workforce and establishment's productivity (llmarinen, 2009).

Health-related physical fitness was defined to include cardiovascular endurance, abdominal muscle strength, endurance, lower back flexibility and body composition. Hockey (2003) identifies cardiorespiratory variables as essential indices of human physiological efficiency. Cardiorespiratory fitness is the foundation for total fitness. It increases the capacity of the body to sustain a given level of energy for a prolonged period of time. Thus, the body can work longer and at greater level at intensity. It is beneficial to everyone, including industrial workers. Cardiorespiratory or aerobic fitness has various variables; Akinbo and Giwa (2002) mention heart rate, systolic and diastolic blood pressure, vital capacity and maximum oxygen uptake ($MaxVo_2$). The efficiency of these variables is enhanced by cardiorespiratory or aerobic exercise (Chad, (2001) American Academy of Orthopaedic Surgeons (AAOS), 2002;). Aerobic exercise does this through continuous rhythmic activities of large muscles in the body to strengthen the heart and lungs. Cardiorespiratory exercise is performed for a period of 15 to 20 minutes or longer while maintaining the aerobic fitness zone. (Chad, 2001; Hockey, 2003).

Flexibility is the capacity of a joint to move freely through a full range of motion without undue strain. The amount of movement possible at a joint is usually determined by the length of the muscle ligaments or tendons and by the structure of the joint. When muscles are not used, they tend to become shorter and tighter and the range of motion at the specific joint reduces significantly. With limited flexibility, there is decrease in the efficiency with which one can perform everyday activities. This can be seen in the performance of such simple activities as walking and bending. People with poor flexibility tend to be accident-prone and to tine very quickly when performing simple task (Hockey, 2003).

Strength is the ability of a muscle or muscle group to exert force against a resistance. It is measured by determining the maximum one-time force that can be exerted. It would be impossible to carry out many of the simple everyday tasks or even maintaining an upright posture. In some cases, the development of strength of specific muscle reduces the incidence of joint injury such as well-developed abdominal muscles; and strong lower back muscles can contribute significantly to the reduction of many low back pain problems (Hockey, 2003).

There is a close relationship between muscular endurance and strength. For example one needs a certain level of strength to lift an object. The level of muscular endurance will determine how long one carries the object. If industrial workers constantly experiences sore or aching muscles, the need to improve the level of muscular endurance is indicated (Hockey 2003). Body composition refers to the relative amounts of fat and lean body weight (or fat-free mass) that comprise the body. Fat-free weight consists of all the tissues of the body other than fat. An excessive amount of fat can be classified as obesity. An obese person has an increased risk for several serious medical problems, such as various cardiovascular diseases and diabetes. In addition, excess fat limits the amount of work that can be performed and may contribute to decrease in the performance of various sports skills and work productivity (Hockey, 2003).

Meta-analysis done by Akinbo (2002) showed that individuals who trained aerobically have lower resting heart rate. It makes the heart muscle to become stronger and more efficient. These may result in the reduction of the resting heart rate. A stronger and efficient heart reduces the risk of cardiovascular diseases later in life. Evidence from previous studies Chad 2001, Hockey. 2003,Johannessen, 2006; Philip, 2008;) has shown that physical inactivity has positive association with clinical risk indicators, such as abnormal blood pressure and fasting plasma glucose. Furthermore, the decline in average daily energy expenditure is a likely underlying cause of cardiovascular disease. Both increased energy expenditure and improved cardiovascular fitness have been associated with lower risk for cardiovascular diseases and type 2 diabetes. The results of most of the above-stated studies revealed that regular physical activity has the benefit of maintaining a healthy weight. Adequate body composition is a critical component of the work requirements of industrial workers. However much of the evidence in the field of workplace physical exercise interventions currently available (Kesaniemi, Danforth, Jensen Kopelman, Lefebvre, Reeder, 2001) seem to be related to the effects of regular physical activity but not in relation to the mood, dose and response on health-related changes

Aerobic dance is becoming a popular fitness activity. Many fitness experts (Balbach, 2000; Heyward, 2002; AAOS, 2002; Hoeger and Hoeger, 2005).have used it to improve physiological efficiency of the human body. It is an exercise mode that is continuously and rhythmically performed to music. It combines the cardiovascular benefits of jogging with the joy of dancing.It increases flexibility and enhances body composition by aerobically burning calories and fat (Baibach, 2002; Hockey ,2003; Ronka, Kaikkonen, Virtanen, Laukkanen, Malkia, 2000). It can also increase aerobic power (Igbanugo,1984,Griffiths,2006;) assert that participating in aerobic dance training programme for 12 weeks can decreased resting heart rate, increased maximum oxygen uptake and physical work capacity in males and females. Participating in aerobic dance can bring a lot of enjoyment.The popular music and group camaraderie help prevent boredom and bring about motivation. These be done with no special equipment and can be adapted to almost any kind of music (Daniel, 2009).

Many industries in Nigeria, including beverage industries, are yet to include exercise programme as part of physical activity to enhance the health of their workers. It is in the light of this study investigated the effect of a twelve-week aerobic dance exercise programme on selected health-related variables and work productivity of beverage industry workers in Oyo and Osun States. The variables examined were body weight per cent, body fat, resting heart rate, flexibility, muscular strength, systolic blood pressure, diastolic blood pressure, health care cost, absenteeism, workplace accident and factory fault products.

Statement of the Problem

In any organisation, a new employee is expected to undergo medical tests and be certified fit for the job.(Mbada, Ayanniyi, Adedoyin, Johnson (2011) have shown that workers in Nigeria (beverage industry workers inclusive) reported cases of cardiovascular injuries in various hospitals and clinics within and outside the country. Beverage Industry Workers engage in both automated and manual industrial work all day and pay little attention to activities that can develop, improve and maintain their health. As evident in their clinic records, some beverage industry workers had regular low back pain resulting from lifting objects and poor flexibility, especially those in the packaging department.

The record at the clinic International Brewery Ilesa and CocaCola Asejire revealed that out of 80% reported health cases weekly by beverage industry workers, 50% were musculoskeletal injuries. It was also discovered that, for the past three (3) years, the productivity target was 2m hectolitre yearly. In the year 2014, only 1. 69m hectolitre was produced; in 2015, it was 1.4m hectolitre. This means that, in the last two years, the target was not met due to absenteeism resulting from health-related cases of tiredness, headache, low back pain, pain in the arm, and shoulder, neck pain, depressive mood and pain in upper back. In 2015 alone, 15.6% complained of neck pain, 13.3% complained of tiredness, 20% complained of headache, while 51% complained of low back pain. It is against this background that this study aims to examine the effect of a twelve-week aerobic dance exercise programme on selected health-related variables of the workers, with the intention of improving their work productivity.

Main Objective of the Study

The main objective of this study was to examine the main effect of a twelve-week graded aerobic dance exercise on selected health-related fitness variables and work productivity of beverage industry workers in Oyo and Osun States.

Specific Objectives of the Study

The specific objectives of the study were to:

1. ascertain how aerobic dance exercise programme improved worksite health promotion programme in the industry;
2. investigate how aerobic dance exercise programme improved the selected health conditions of workers;
3. examine the main effect of age on fitness health-related variables and work productivity among beverage industry workers in Oyo and Osun States;
4. analyse the main effect of gender on fitness health-related variables and work productivity among beverage industry workers in Oyo and Osun States;
5. establish the interaction effect of age and gender on fitness health-related variables and work productivity among beverage industry workers in Oyo and Osun States;
6. examine the main interaction effect of treatments, age and gender on fitness health-related variables and work productivity among beverage industry workers in Oyo and Osun States; and
7. establish the main interaction of treatment, age and gender on work productivity among beverage industry workers in Oyo and Osun States.

Research Questions

The study attempted to provide answers to the following questions:

1. What are the types of work site health promotion programme existing in the industry?
2. What are the common health complications of workers in the beverage industry?
3. What is the relationship between physical fitness and work productivity among beverage industry workers?

Hypotheses

The following hypotheses were tested:

1. There would be no significant main effect of treatment on health-related variables (flexibility, resting heart rate, resting systolic, resting blood pressure, percent body fat, muscular strength) of beverage industry workers in Oyo and Osun States.
2. There would be no significant main effect of treatment on work productivity (absenteeism, work place accident rate, health care cost, and factory fault product) of beverage industry workers in Oyo and Osun States.
3. There would be no significant main effect of age on health-related variables of beverage industry workers in Oyo and Osun States.
4. There would be no significant main effect of age on work productivity of beverage industry workers in Oyo and Osun States.
5. There would be no significant main effect of gender on health-related variables of beverage industry workers in Oyo and Osun States.
6. There would be no significant main effect of gender on work productivity of beverage industry workers in Oyo and Osun States.
7. There would be no significant interaction effect of treatment and age on health-related variables on beverage industry workers in Oyo and Osun States.
8. There would be no significant interaction effect of treatment and gender on health-related variables on beverage industry workers in Oyo and Osun States.
9. There would be no significant interaction effect of treatment and age on work productivity on beverage industry workers in Oyo and Osun States.
10. There would be no significant interaction effect of treatment and gender on work productivity on beverage industry workers in Oyo and Osun States.

11. There would be no significant interaction effect of age and gender on health-related variables on beverage industry workers in Oyo and Osun States
12. There would be no significant interaction effect of age and gender on work productivity on beverage industry workers in Oyo and Osun States
13. There would be no significant interaction effect of treatment, age and gender on health-related variables on beverage industry workers in Oyo and Osun States
14. There would be no significant interaction effect of treatment, age and gender on work productivity of beverage industry workers in Oyo and Osun States.

Delimitation of the study

This study was delimited to the following:

1 Pretest posttest control group quasi experimental design

2 CocaCola factory workers in Asejire in Oyo State, and International Brewery Ilesa, Osun States.

3 Seventy-two (72) participants who are factory workers

4 Twelve weeks of training

5 Purposive sampling technique to select participants

6 One experimental group and one control group

7 Palomino cardio-fitness audio cassette jam beat and rhythm was used for movement counts

8 Outfield (front of beverage industry clinic) was used for training.

9 Health-related profiles of percent body fat, resting heart rate, systolic blood pressure, diastolic blood pressure, flexibility, and muscular strength.

10 The following measurements were taken to assess participants' cardiovascular status.

- Skin fold measurement for per cent body fat.
- ➢ Total body weight using the bathroom weighing scale.
- ➢ Resting heart rate using stethoscope and stop watch.
- ➢ Systolic and diastolic blood pressure using stethoscope and sphygmomanometer.
- ➢ Flexibility using flexbox.

11) The use of following instruments:

- ➢ Skin fold callipers to measure body fat.
- ➢ Weighing scale (bathroom scale) was used to measure weight.
- ➢ Heart rate monitor was used to measure heart rate.

- Sphygmomanometer was used to measure blood pressure.
- Ink maker was used to mark the participants up.
- Stadiometer was used to measure height.
- Stopwatch for timing during the programme.
- Productivity scales were used to access the industrial staff work output.

12. The descriptive statistics of frequency count, mean and standard deviation to analyse the research questions; and inferential statistics of Cochran Q test and Analysis of Co-variance (ANCOVA) to test the hypotheses at 0.05 levels of significance.

Limitation of the study

In carrying out this study, certain limitations were encountered. The participants in the study were not kept in a confined environment for the period of the study. So the researcher did not have control over all the physical activities of the participants outside the training programme. Some of the participants got involved in other lifestyle behaviours (smoking and alcohol intake) before or after the training programme which interfered with the result of this study. However, the researcher made efforts to encourage the participants to avoid such lifestyle, behaviours and other structured exercises during the twelve-week training period. Also, the times for the participants to eat their food were not under the control of the researcher. However the researcher advised them to eat at least two hours before coming for each training session. This was because eating very close to the time for measurement and training may affect the measurements and their participation in the training, which may affect the results of the study. Despite that work productivity was moderated it is a fact that other extraneous factors of production (welfare of workers, availability of raw materials, condition of the production machines etc) where not within the control of the researcher which might have affected the dependent variable values. The researcher would have preferred use five (5) frequency per week for the training but the company for the experimental group approved only three (3) training sessions per week. The placebo used for the control group was designed to influence the life style of the participants after the training, the result might have been affected if any of them used the guideline to change his/her lifestyle during the researcher duration.

Significance of the study

This study is significant in many ways:

- The study would be helpful in designing exercise programme for the development of total fitness for beverage industry workers and other related populations.
- The study is useful to guide human kinetics and health education professionals and other exercise therapists, who are interested in improving resting heart rate, body mass index, resting blood pressure, body weight and percent body fat.
- The study documented the effects of aerobic dance therapy programme on the health related variables and work productivity.
- It can provide an exercise model for the development of aerobic fitness in beverage industry workers and related populations.
- It will help to sensitise companies and businesses on the need for workplace exercise programme to reduce health risks, medical care costs and increase overall work productivity.

Operational definitions of terms

The following terms are operationally defined as used in the study:

Aerobics Exercises: Physical exercise in the form of dance of relatively low intensity that depends primarily on the aerobic energy generating process.

Health Related Variables: Per cent body fat, resting heart rate, resting systolic and diastolic blood pressure, resting blood pressure, maximum oxygen uptake, flexibility and strength.

Beverage Industry Workers: These are the workers in bottling companies transforming raw materials into liquid product with help of machine.

Work productivity: This refers to staff performance as determined by the magnitude of the staff productivity variables, absenteeism, workplace accident rate as related to health care cost and factory fault products and daily turnover/ factory productivity level.

CHAPTER TWO

LITERATURE REVIEW

The review of related literature is discussed under the following sub-headings;

1) Conceptual framework for the study

2) **Theoretical review of literature**

a) Labanotation or Kinetography Laban Theory

b) Concept of aerobic dance

c) Benefit of aerobic dance

d) Beverage industry workers and Physical Activity

e) Health-related variables and dance exercise training

i) Cardiovascular endurance and aerobic dance exercise

ii) Flexibility and aerobic dance exercise

iii) Strength and aerobic dance exercise

a) Muscular and aerobic dance exercise

b) Body composition and aerobic exercise

3) Absenteeism and work productivity

a) General well-being and Work productivity

b) Worker's Health status and factory fault products.

c) Worker's Health status and workplace accidents.

4) Cardio respiratory indices:

a) Resting heart rate and aerobic dance exercise

b) Blood pressure- systolic blood pressure and diastolic blood pressure and Aerobic exercise.

7) Effect of aerobic dance exercise programme on:

a) total body weight.

b) body mass index.

c) Per cent body fat.

8) Factors guiding exercise training.

a) frequency of exercise training.

b) intensity of exercise training.

c) duration of exercise training.

d) mode of exercise training.

9) Dance and aerobic dance exercise as mode of exercise.

10) Appraisal of the literature reviewed.

CONCEPTUAL FRAME WORK OF THE STUDY EFFECT OF 12-WEEK AEROBIC DANCE EXERCISE PROGRAMME ON SELECTED HEALTH-RELATED VARIABLES AND WORK PRODUCTIVITY.

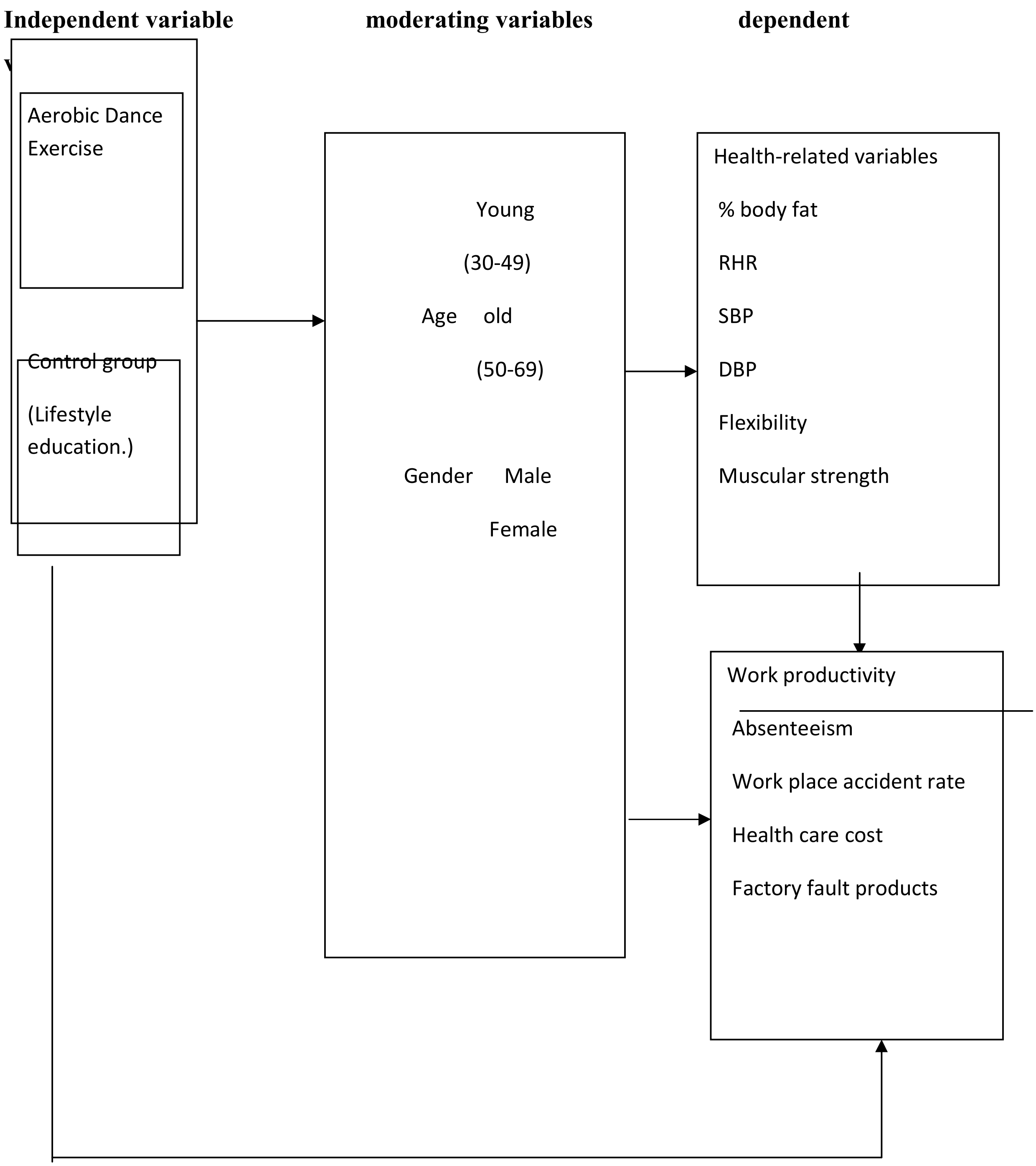


Figure 1: Conceptual framework for the study.

Source: Self-developed

The conceptual framework for the study was self-developed and designed to show the relationship between the independent variables (aerobic dance exercise) and the dependent variables (health-related variables: per cent body fat, resting heart rate, flexibility, muscular strength, muscular endurance, systolic and diastolic blood pressure and work productivity-variables; absenteeism, health care cost, work place accident rate, factory fault product). The relationship between the two variables is causal and effectual, whereby the training intervention (Aerobic dance) will provide evidence of change in the dependent variables (health-related and work productivity variables).Whatever changes in the dependent variables is presume to be caused by the independent variables, which means that dependent variables is a function of the condition of the independent variables.

The theory adopted for this study is Labanotation or Kinetography Laban established in the 1920s. It is a notation system for recording and analyzing human movement. It was derived from the work of Rudolf Laban, who described it in Schrifttanz (written dance) in 1928. It was developed and used to describe movement in terms of spatial models and concepts. It precisely and accurately portrays temporal patterns, actions, floor plans, body parts and a three-dimensional use of space. It is a principal concept which uses abstract symbols to portray the following;

- direction and level of movement
- part of the body involved in the movement
- duration of the movement and
- dynamic quality of the movement.

a. Concept of aerobic dance

Aerobic exercise is a form of physical exercise of relatively low intensity that depends primarily on the aerobic energy-generating process (Sharon, Plowman and Smith, 2011). Aerobic literally means “living in air”. Lancaster, Halson, Khan, Drysdale, Jeukendrop, Dryston and Gleeson (2012) discuss to the use of oxygen to adequately meet energy demand during exercise through aerobic metabolism. Aerobic exercise and fitness can be contrasted with anaerobic exercise. The two types of exercise differ by the duration and intensity of muscular contraction involved and by how energy is generated within the muscle (Bounch, Claude, Ping, Treva, James, Skinner, Jack, Wilmore Jaque, Louis, Arthus and Leon 2009). In most conditions, anaerobic exercise occurs simultaneously with aerobic exercise because the less efficient anaerobic metabolism must supplement demands that exceed the aerobic capacity. What is generally called aerobic exercise might be better termed “solely aerobic” because it is designed with low intensity enough not to generate lactate via pyruvate fermentalism, so that all carbohydrate is aerobically turned into energy (Rose, Jonathan and Moore, 2008).

Rose, Jonathan and Moore (2008) argue that aerobic capacity, either estimated from workload or measured directly, is perhaps the most frequently analysed variables. Initially, during increased exertion, muscle glycogen is broken down to produce glucose, which undergoes glycolysis, producing pyruvate, which then reacts with oxygen (Krebs cycle) to produce carbondioxide and water and releasing energy. If there is shortage of oxygen, carbohydrate is consumed more rapidly because the pyruvate ferments into lactate. As carbohydrate depletes, fat metabolism is increased so that it can fuel the aerobic pathway. The later is a slow process and is accompanied by a decline in performance level. This gradually switches to fat.

Aerobic exercise can be performed in different forms. In general, it is performed at a moderate level of intensity over a relatively long period of time. For example, running a long distance at moderate pace is an aerobic exercise.Playing single tennis with brief bursts of activity punctuated by more frequent break may not be predominantly aerobic (Hiukle, 2005).

Benefits of aerobic dance

Physical inactivity is recognized as a risk factor for coronary artery diseases. Regular physical activity increases exercise capacity and plays a role in primary and secondary prevention of cardiovascular diseases (Krzwkowski, Peterson, Ostrowski, Link, Amster, Boza, Halkjaer, Pedersen, 2001; Smith, Blair, Criqul, Fletcher, Fuster, Gersh, Gotto, Gould, Greenland, Grundy Hill, Hisky, 2005; Wenger Froelicher, Smith, Ades, Berra, Certo, 2010). Aerobic dance exercise training increases myocardial oxygen demand at any level of physical activity in apparently healthy persons as well as in most subjects with cardiovascular disease. Regular physical activity is required to maintain these training effects (Karacabey, Peker, Saygun, Ciloglu and Ozmerdivenli, 2005).

b. Beverage industry workers and physical activity

Beverage industry workers are the workers engaged in transforming raw materials into finished products with the help of machine. In industries, according to the Health 2000 study, approximately 4% of the people in the labour force had during the past 12 months, participated in rehabilitation programmes designed to promote their ability to manage in their current work, or received retraining because of illness or injury. Almost one -fifth of the labour force aged 30 to 64 felt they needed rehabilitation to improve their work ability.And among those aged 45 to 54, the corresponding proportion was one in four (KTL, 2004). In health care evidence-based practices may rationalize allocation of resources as well as improve quality and effectiveness of treatments. Despite this, it seems difficult to implement randomized controlled studies in the workplace. (Shephard ,2012); Tveito et al. (2014). In physiotherapy, occupational health and rehabilitation, more practices and guidelines based on randomized controlled trials and systematic reviews are needed. Waddell and Burton (2001) assert that strong or moderate evidence of treatment can only be concluded for outcomes from randomized controlled trials (RCT) of high quality.

The reviews by Kesaniemi and et al. (2001) and ACSM (2008) showed that there is scientific evidence of physical activity dose-response effects on all-cause mortality, cardiovascular disease, blood pressure, hypertension, overweight, obesity, fat distribution, diabetes mellitus and cancer. But in the field of low back pain, osteoarthritis and osteoporosis, physical activity or exercise may have both beneficial and detrimental effects. However it appears that information about dose-response effects on musculoskeletal symptoms in the reviewed studies is largely lacking and, therefore, it is not possible to quantify the specific health benefits of physical activity. There is an even greater lack of valid information about the effects of physical activity on depression, anxiety (Dunn et al. 2001; Kesaniemi et al.2001) and other psychological functioning or work-related social environmental factors (Griffiths ,2006). Although musculoskeletal and psychosocial variables are important in physiotherapy, occupational health and rehabilitation in maintaining work ability and preventing impairment in employees' work ability, the dose-response effects on musculoskeletal symptoms and psychosocial functioning are not yet fully understood.

Although physical exercise interventions are commonly used in the workplace to promote employees' physical and psychosocial functioning and work ability, there is limited scientific evidence of the effectiveness of such programmes (Drisman and et al. 2000; Macher, 2000; Proper et al, 2002; Proper et al. 2003; Van Poppel etal. 2004;Twieto etal 2004 Griffiths,2006;Shephard,2012) and dose-response effects on health-related type of exposure-response relationships (Viikari-Juntura, 2007) and their interactions with workplace physical exercise interventions. Further randomised and controlled physical activity or exercise studies are needed to investigate the acute or chronic dose-response effects on musculoskeletal functioning, psychological functioning and social work-related environmental factors (Griffiths, 2006; Kesaniemi et al. 2001; Shepard,2012) among different types of working populations or among different levels of functioning populations. In addition to dose-response effects, study reports should provide information about clinically important differences or changes on functioning and work ability (Farrar et al;2000; Farrar et al. 2001; Hagg et al. 2003), the long-term effects of interventions (Dworkin et al. 2005) and how controlling confounding factors, such as other physical activity outside the intervention, have been controlled.

Randomised-controlled in which the dose-response effectiveness of a workplace physical exercise intervention has been evaluated while controlling other physical activities exists. The main purpose of this study was therefore, to examine, in a natural working environment, the effectiveness of a cluster randomized and controlled workplace physical exercise intervention on physical and psychosocial functioning, work ability, and subjective well-being. This was to create data for evidence-based physiotherapy, occupational health and rehabilitation, where physical exercise dose-response effects and confounding factors have been controlled . In addition, the purpose investigated the long-term effects of interventions and the complex interactions between functioning, work-related social environmental factors, individual factors, work ability and subjective well-being.

c. Health-related variables and exercise training

i. Cardiovascular endurance and exercise training

Cardiovascular endurance may be defined as the ability to perform heavy physical work involving large muscle groups continuously for an extended period of time. The performance of such tasks largely depends on the ability of the body to deliver oxygen to the working muscles and the ability of these muscles to extract and use this oxygen. The level at which one can participate in such activities as cycling, running, swimming, dancing and a variety of other aerobic activities depends on the efficiency of one's circulatory and respiratory systems. When insufficient oxygen is delivered to the muscles, their ability to perform work diminishes greatly.

Aerobic processes account for the majority of the energy produced in the body. The ability to take in and deliver oxygen to the working musculature is an important factor in determining how much work can be performed. The more oxygen the body is able to take in and use, the more work a person should be able to perform before fatigue and exhaustion set in. Cardiovascular endurance may, therefore, be defined more simply as the maximum amount of work an individual is capable of performing continuously where the work involves large muscle groups. It is often referred to as physical work capacity. The circulatory and respiratory systems must function efficiently if a high level of cardiovascular fitness is to be achieved. It is therefore often referred to as cardiovascular endurance or aerobic fitness. Because of the various health benefits associated with the development of a high level of cardiovascular endurance, it is by far the most important physical fitness component (Hockey 2003).

ii. Flexibility and exercise training

Flexibility is recognised as one of the important health-related components of physical fitness. It can be defined simply as the capacity of a joint to move freely through a full range of motion without undue strain. The amount of movement possible at a joint is usually determined by the length of the muscles, ligaments and tendons and by the structure of the joint. The most important of these appears to be length of the muscles. When muscles are not used, they tend to become shorter and tighter and the range of motion at the specific joint is reduced significantly.

Having a full range of motion at each of the major joints of the body is advantageous. Without flexibility, movement is impossible. With limited flexibility, there is decrease in the efficiency with which one can perform everyday activities. This can be seen in the performance of such simple activities as walking up a flight of stairs, bending to pick up a newspaper, tying one's shoes, or getting into or out of the back seat. People with poor flexibility tend to be accident-prone and to be tired very quickly when performing simple tasks. Certain activities tend to shorten muscles and this reduces flexibility. Often, this may result in muscle tear or strain. As the body grows older, this may become a very serious problem. It is, therefore, very important not to neglect the development of flexibility.

iii. Strength and aerobic exercise training

Strength can be defined as the ability of a muscle or muscle group to exert force against a resistance. It is measured by determining the maximum one-time force that can be exerted. This is referred to as one repetition maximal (IRM). Each person needs a certain level of strength without which it would be impossible to carry out many of the simple everyday tasks, such as lifting a heavy suitcase, picking up a bag of garbage or even maintaining an upright posture. In some cases, the development of strength of specific muscles reduces the incidence of joint injury. For instance, well-developed abdominal muscles and strong lower back muscles can contribute significantly to the reduction of many low back pain problems (Hockey 2003).

iv. Muscular endurance and aerobic exercise training

There are two components of muscle fitness: strength and muscular endurance. Strength is the amount of force one can produce with a single maximal effort of a muscle group. Muscular endurance is the capacity of the skeletal muscles or group of muscles to continue contracting over a long period of time. You need both strength and muscular endurance to increase work capacity; to decrease the chance of injury; to prevent low back pain; poor posture and other hypokinetic conditions; and to improve athletic performance. Aerobic dance training increases the fitness of the bones; tendons and ligaments, as well as the muscles. It has been found to be therapeutic for patients with chronic pain. Progressive resistance training is the type of physical activity done with the intent of improving muscle fitness. Progressive resistance exercise is designed to maintain muscle fitness.

v. Body composition and aerobic exercise training

Body composition is generally considered to be a health-related component of physical fitness. Most national fitness tests include either a skinfold test or the Body Mass Index as an indicator of this component. Body composition is related to good health. However, it is not a performance measure. Cardiovascular fitness, strength, muscular endurance and flexibility can be assessed using some types of movement or performance such as running, lifting, dancing or stretching. Body composition requires no movement or performance. This is one reason why some experts prefer to consider body composition as a component of metabolic fitness. Metabolic fitness includes other non-performance measures associated with increased risk of health problems, such as high blood fat, high blood pressure and high blood sugar levels (Hockey 2003).

d. Work productivity and aerobic Exercise training

Work productivity is the amount of goods and services that a worker produces in a given amount of time. Work ability is the result of the interaction between individual resources and work. According to Ilmarinen (2009), a person's individual resources included health, functional capacity, education and know-how. These are influenced by the person's values and attitudes, motivation and job satisfaction. A person realizes his or her resources at work and the result is influenced by the community and the work environment, as well as by the physical and mental demands of the work. Good resources do not transform into good work ability unless the content of the work, the community and the work environment provide the proper conditions. Similarly, a well-operating work community or work environment cannot fully compensate for weakened resources (Ilmarinen 2009).

Among the industrial working age population (30 to 64 years), over 90% said they were completely fit for work. Of those respondents (30 to 44years) who had been working within the past years, more than 90% said that their subjective work ability in relation to the physical and mental demands made upon them was quite good or very good (KTL 2004). However, subjective work ability in relation to physical demands tends to decline with age more than work ability in relation to mental demands (Ilmarinen et al. 2009; TTL 2012 and 2013; KTL 2014). Subjective estimations of present work ability compared with the lifetime best were 9 on the scale 0-10 in age group 30-44years, while in the age group 55 to 64 years the average was one point less (TTL 2012; 2013; KTL 2014). Most persons (97%) in the age group 30 to 44 years reported that they would still be able to continue in their current job in two years' time. In the age group 55 to 64, still 74% thought they would be able to manage their job two years (KTL 2014).

In the year 2000, among the industrial working population, about 25% of administration and office workers reported long-standing or repeated physical or psychological symptoms during the past six months that were caused by work or increased at work and 7% reported symptoms which caused problems at work (TTL 2013). Despite good averages of self-estimated work ability, the reported inability to work and increase in the number of disability pensions owing to musculoskeletal diseases and mental problems are worrying signs of problems in physical and physiological functioning and in the work ability and working life generally of certain groups in the population (STM 2002; Hytti et al. 2002; Erlich, 2003; KTL, 2004).

In industry non-experimental and epidemiological studies of municipal employees associations have been found between work ability and leisure-time physical activity (Tuomi et al. 2011b; Tuomi 2012), as well as work and life satisfaction and basic education (Tuomi et al., 2011a). Work ability has been associated with musculoskeletal and psychological symptoms, aging, being overweight, smoking (Tuomi 2011a, Tuomi

2011b, Pohjonen 2012a, Pohjonen 2012b) and physical performance (Nygard et al. 2011; 2001b). Factors in the physical, social or attitudinal working environment which caused inability to work were poor working posture, repetitive movements, high physical demands, physically disturbing working conditions, lack of freedom, decrease in recognition and esteem at work, role ambiguity at work and dissatisfaction with supervisor's attitude (Tuomi et al. 2011a, 2011b,Tuomi et al 2011; Pohjonen 2012a). Strong correlations have been found among health, lifestyle, work ability and life satisfaction (Seistamo and Ilmarinen, 2009).

Physical and psychological functioning, environmental and personal risk factors and their interaction with musculoskeletal symptoms

Comparing risk factors among different occupations is difficult because of the different outcomes and the fact that occupational physical activity (OPA) was not determined well enough in previous studies (Howley 2014). In the general population and especially among workers in physically demanding jobs, there are several physical and psychological functioning, environmental and personal risk factors and obstacles which are related to musculoskeletal symptoms (Kiblom et al., 2007; Tola et al., 2008; ViikariJuntura et al., 2008; Batie et al.; 2009; Linton, 2012; Blader et al.; 2001; Makela et al., 2009; Stock, 2007; Holmstrom et al., 2002; Johansson and Rubenowitz, 2004; Ekberg et al., 2005; Cole and Hudack ,2006; Pope et al., 2007; Bruilin et al., 2008; Estlander et al., 2008; Thorbjornsson et al.; 2008; Hoogendoor, 2006; Tuomi et al., 2011; Fredriksson et al., 2000; Hellsing and Bryngelsson, 2000; Hoogendoor et al., 2000a; Hoogendoor et al., 2000b; Linton 2000; Luoma et al., 2000; Thorbjornsson et al., 2000; Vingard et al., 2000; Hakkanen et al., 2001; Hoogendoor et al., 2001; Leclerc et al., 2001; Palmer 2001;Trop et al., 2001; Viikari-Juntura et al., 2007; Lee et al, 2005; Waddeland Burton, 2005). In contrast, in persons in physically light work and who use a visual display terminal (VDT) the risk factors were not so well known; possible risk factors have only been studied later and there are less available published studies (Linton and Kamwendo 2009, Takala et al. 2012, Levoska 2013, Hales 2014, Bergqvist et al. 2015, Nelson and Silverstein 2008, Smith et al. 2009, Fredriksson et al. 2000, Fogelman and Lewis 2002, Omokhodion and Sanya 2003, Strazdins and Bammer 2004, Hannan et al. 2005).

Among a Swedish population (n=22180), in different age groups, monotonous work was found to be a risk factor for back (Odds ratio (OR) 1.58-1.94) and neck pain (OR 2.25-2.95) (Linton, 1990) .In a United Kingdom population (n=500) for shoulder pain (relative risk (RR) it was 2.7) (Pope et al., 1997). In another Swedish population (n=484), VDT work (among women OR 1.5) and frequent hand and finger movements (in both men and women OR 1.5) were found to be risk factors for neck and shoulder symptoms (Fredrikson et al., 2000). The combination of exposure to monotonous work and a poor psychosocial work environment produced high risk factors for neck (OR 2.85) and shoulder (OR 3.32) symptoms (Linton, 2000). Monotonous work and few possibilities of development (OR 2.6) or low influence over conditions of work (OR 1.7) also increased neck and shoulder symptoms (Fredriksson et al., 2000). According to Ekberg et al. (1995) and Fredriksson et al. (2000) musculoskeletal symptoms may also be signs of ergonomic deficiencies in the workstation and organizational working conditions.

In the general working population, there is a link between psychological variables and the prevalence of neck and back symptoms (Pope et al. 1997, Linton 2000, Thorbjornsson et al., 2000). Previous studies have indicated that psychological variables were related to the onset of pain and to acute, sub-acute and chronic pain. Stress, distress or anxiety as well as mood and emotions, cognitive functioning and pain behaviour were found to be significant factors for musculoskeletal symptoms. Personality factors produced inconclusive results (Linton 2000). In a retrospective nested case-control study, factors at work were seen to be risk indicators for low back pain among both sexes. Low influence over working conditions among women and poor social relations at work among men, in combination with other factors, seem to be of high relevance for the occurrence of low back pain (Thorbjornsson et al., 2000). In a systematic review of psychological factors at work and outside work, it was found that a strong risk factor for back pain was low social support in the workplace and low job satisfaction. Insufficient evidence was found for an effect of a high pace of work, high qualitative demands, low job content, low job control and psychosocial factors outside work (Hoogendoorn et al., 2000a). In addition, the association between the meaning of work and musculoskeletal symptoms was found to be moderate (Baker et al., 2003).

Risk factors related to human interaction with computers

The critical review by Smith et al. (2009) indicated risk factors that are related to work activities where human interaction with computers occurs. Many of the stressors in human- computer interaction are similar to those that have historically been observed in other automated jobs. These include high workload, high work pressure, diminished job control, inadequate employee training in the use of new technology, monotonous tasks, poor supervisory relations and fear for job security. In addition, new stressors have emerged that can be linked primarily to human computer interaction have emerged. These include technology breakdowns, technology slowdowns and electronic performance monitoring. In the workplace, the effects of these stressors are increased arousal; somatic complaints, particularly those of the musculoskeletal system; mood disturbances, notably anxiety, fear and anger, and diminished quality of working life, such as reduced job satisfaction.

Bergqvist et al. (2015) found among VDT workers (n=260) several individual, ergonomic and work organizational factors associated with various upper-body muscular problems: age, gender, women with children at home, use of spectacles, smoking, stomach-related stress reactions, negative affectivity, static work posture, hand position, use of lower arm support, repeated work movements, keyboard or vertical position of VDT. Other occupational risk factors which have been associated with self-reported musculoskeletal symptoms were increased number of hours of keyboard use and improper monitor and keyboard position among college students (n=6) in an experimental laboratory study (Liao and Drury 2000) and among VDT operators (n=292) (Fogleman and Lewis, 2002).

Strazdins and Bammer (2004) investigated public service employees (73% women and 73% clerical workers) and found gender differences in risk factors. Women's working conditions were more likely to involve physically repetitive work demands. For example, 34% of the women compared to 21% of the men, sat in the same position for long periods of time; 81% of the women, compared to 73% of the men worked longer than 5 hours per day on a computer; and 30% of the women, compared to 16% of the men, reported that their job involved repetitive movements all of the time. Women were also more likely to work in poorly designed and uncomfortable environments. A total of 15% of the women, compared to 10% of the men described their work environments as either uncomfortable or very uncomfortable. In addition, the women spent considerably less time than men exercising or relaxing during leisure-time. A total of 20% of the women did not exercise at all and 14% did not spend time relaxing, over the previous month. This compared to 12% and 10%, respectively, for men. Female gender was determined to be a risk factor in other studies as well (Bergqvist et al., 2005; Ekberg et al., 2005; Hakkarainen et al., 2001; Viikari-Juntura et al., 2007).A cohort study among occupational computer users by Nelson and Silverstein (2008) found that a reduction in hand and arm symptoms was associated with improved satisfaction with the physical workstation. In contrast VDT workers who reported high job strain were more likely to develop neck-shoulder symptoms during follow-up (Hannan et al., 2005).

One explanation for the increased number of musculoskeletal symptoms reported in sedentary work or among computer users is concerned with the existence of low-threshold motor units, which are always recruited as soon as the muscle is activated and stay active until total muscular relaxation. In the long run and due to lack of recovery, metabolic overload at the membrane level may occur, resulting in degenerative processes leading to cell damage, necrosis and pain (Hagg 2000, Sjogaard et al. 2000, Forsman et al., 2002; Kadefors and Laubli, 2002). In Finland, the percentage of the workforce engaged in sedentary work rose from per cent unit between 1997 (31%) and 2003 (35%) (TTL 2012). For example, in a population of Finnish administration and office workers studies in 2000, 76% reported that their working positions were most often sedentary (TTL, 2012). A similar trend has been found also in other industrialized countries such as Sweden (Fredriksson et al., 2000). Linton and Van Tulder (2001) over that workplace programs should assess risk and be tailored to the risk profile of individual or the workplace. Also, Hales et al. (2004) and Fogelman and Lewis et al. (2002) note that, among VDT workers, the main foci in reducing musculoskeletal symptoms are workstation ergonomics, the need to limit the number of uninterrupted hours at the keyboard and the psychosocial work environment.

Physical activity

Much of the evidence in the field of workplace physical exercise interventions currently available seems to be related to the effects of regular physical activities rather than to the relationship between dose and response on health-related changes (Kesaniemi et al., 2001). In order to analyse the relationships between these factors, we must first define the concepts. Physical activity (PA) is defined as any bodily movement produced by a contraction of skeletal muscle that substantially increases energy expenditure. PA is an umbrella term encompassing leisure time activity (LTPA), occupational type of activity (OPA) and commuting (Malkia et al., 2004; Malkia, 2006; ACSM, 2006; ACSM, 2008; Howley, 2014; Kesaniemi et al., 2001). LTPA or OPA can be categorised into specific physical exercise and physical training. The gross cost of an activity is the total energy expenditure, which includes the resting metabolic rate and the cost of the activity itself. The net cost is associated with the activity alone. The dose of physical activity, or exercise, is described by the characteristics of frequency, duration, intensity and type of activity. Frequency is described as the number of activity sessions per time period (for example day or week). Duration refers to the number of minutes of activity in each session. Intensity describes, in relative or absolute terms, the measured or estimated efforts associated with the physical activity. With these measurements, it is possible to calculate the required dose of PA, LTPA, OPA or exercise (ACSM, 2006; ACSM, 2008; Howley, 2014; Kesaniemi et al., 2001).

Acute effects to responses of physical activity or exercise refer to health-related changes that occur during and in the hours after physical activities. Chronic effects associated with physical activities or exercises occurs over time owing to changes in the structures or functions of various body systems, independent of acute effects or responses. Acute responses to exercise and chronic adaptations to exercise cannot be viewed in isolation because the frequent repetition of isolated sessions with transient responses produces more permanent adaptations (that is chronic effect or responses). In some instances, exercise may have acute but rapidly disappearing effects. Acute exercise, if repeated, can also have a cumulative effect or one that diminishes gradually. The effect of repeated, acute, low-intensity, physical activities or exercise may also result in small changes that may not be detectable in clinical studies but nonetheless have a discernible effect if adopted by large populations (ACSM, 2006; ACSM ,2008; Kesaniemi et al., 2001; Linton and Van Tulder, 2001).

The effectiveness of physical activity programs at work places

Studies of effectiveness of physical activity programmes in the workplace were examined with respect to physical and psychological functioning, environmental factors and general subjective well-being outcomes. A computerized literature search, a reference search and a manual search of personal database from 1996 to November 2005 were utilized to find the latest published workplace physical exercise intervention review studies, RCTs and cluster randomized trials (CRT). The computerized literature search was conducted in Medline, PEDro and Psychlit. The key search words used were divided into four headings: work, exercise, pain and well-being. Keywords under work were words such as workplace, worksite and workability. Under exercise, the keywords were exercise, exercise therapy, physical fitness, physical activity, training and physical exercise. Under pain the keywords were back pain, low back pain, headache, neck pain and shoulder pain. Under well-being, such keywords as well-being, psychosocial functioning, self-confidence, somatic symptoms, anxiety, mood and stress (psychological) were searched. Studies that were included were published in English. Reviews and RCT studies on the effectiveness of workplace physical exercise interventions are presented in Table 1 (RCT studies are presented only if they were not included in the review

Table 1: Reviews and RCT studies on the effectiveness of workplace physical exercise interventions

a) Review studies on the effectiveness of workplace physical exercise interventions

Study	Materials	Study design	Methodological description	Outcomes (Benefits)
Griffiths (1996)	No reported	No reported	Methodological problems	1. for individuals 2. more for physical health than psychological well-being
Shephard (1996)	52 studies	5RCT 13CT	Methodological problems	1. small positive changes: Body mass, skin folds, aerobic power, muscle strength, flexibility, overall risk-taking behaviour, systematic blood pressure, serum cholesterol, cigarrete smoking. 2. improved mood state based only on uncontrolled studies
	26 studies	13RCT 13CT	Generally poor	1. Inconclusive effect: Physical activity, physical fitness
Maher (2000)	13 studies	5CT	Moderate quality -Mean value 4.8 (range1-8) in scale 0-11	Back pain: 1. Effective: workplace exercise 2. Ineffective: braces and education 3. Unknown: workplace modification plus education
Linton (2001)	27 studies	20RCT - exercise 6 -lumbar support 4 -back school and education 10	Not assessed	Back and neck problems: -Effective: exercise -Ineffective: lumbar supports back school -Unknown: ergonomic intervention
Proper et al. (2002)	8 studies	4RCT 4CT	Generally poor -Mean value 4.1 (range1-7) in scale 0-9	1) Limited: absenteeism 2) Inconclusive: job satisfaction, job stress, employee turnover 3) Nil: productivity
Proper et al. (2003)	26 studies	15RCT 11CT	Generally poor -Mean value 3.2(range 0-6) in scale 0-9	1) Strong: physical activity, musculoskeletal disorders 2) limited: fatigue 3) Inconclusive or no evidence: physical fitness, general health, blood serum lipids, blood pressure
Van Poppel et al. (2004)	16 studies	11RCT	In most studies low -Mean value 6.1 (range 1-12) in scale 0-15	Back pain: 1) Positive effect, indicating limited evidence for the effectiveness of exercise 2) No evidence for education and lumbar supports.
Tveito (2004)	26 studies	25CT -education 11 -exercise 6 -back belts 5 -multidisciplinary 2 -pamphlet 1	Overall low -Medium in exercise studies in scale: low, medium, high	Exercise studies (6 studies) 1) Limited evidence: episodes of LBP, sick leave, cost 2) No evidence: pain

b. RCT studies on the effectiveness of workplace physical exercise intervention not reported in the review studies

Study	Materials	Study designs and methodological description	Intervention	Outcomes
Nurminen et al. 2000; 2002	Cleaning company's workers, Finland n=260	RCT -PETro score 7/10 in scale 0-10	1) Group gymnastics: 60min, 1x week 8 month (26sessions) 2) Control group	1) Positive effects: Muscle strength and endurance, neck, upper extremity and knee pain 2) Slightly effects: Physical activity, perceived work ability 3) No effects: Cardiorespiratory fitness, sick leaves, job satisfaction, work ability index
Horneij et al. 2001	Female home care personnel Sweden n=282	RCT -PETo score 4/10 in scale 0-10	1) Individually designed physical training programme (IT) (4 sessions) 2) Work-place stress management (SM) (7sessions) 3) Control group (c)	- The IT group reported less interference with work and/or leisure activities due to discomfort in the low back compared with the control group at the 12month follow-up - The SM group reported increased perceived amount of training at 18 month follow up compared C - The SM group reported greater dissatisfaction with supervisor compared IT and C.
Eriksen et al. 2002	Working population, Norway n=860 employees	RCT -PETro score 6/10 in scale 0-10	12 weeks Groups: 1) Management training 2) Physical exercise 3) Integrated health programme 4) Control	Specific positive effects in groups: 1) Improved stress management 2) Improved general health, physical fitness and muscle pain 3) Showed the strongest effects affecting most goals set for treatment 4) -

In MAcher (2000), Linton and van Tulder (2001), Properet al. (2002), Proper et al. 2003, van Poppel et al. (2004), Tceito et al. (2004), there were 6 RCT physical exercise interventions studies among sedentary workers (Gronninsater et al., 2002; Kerr and Vos 2012; Takala et al., 2012; Gerdle et al.; 2005; Lee and White, 2007; Pritchard et al., 2007). The weakness of these studies was that OPA was not adequately determined in any of them. Usually, occupation was the only variable which describes the subject's

OPA or physical workload. Other PA effects on the study results were not even discussed.

In their review article, Proper et al. (2003) investigated the effectiveness of workplace physical activity programmes on physical activity. Physical fitness and health in which questions about somatic symptoms, psychological complaints and well-being were included. According to the results, they found strong evidence that workplace physical activity programmes increased the level of physical activity and reduced risk of musculoskeletal disorders. Limited positive evidence was found on fatigue and inconclusive or no evidence on general health. This limited or inconclusive scientific evidence on the effectiveness of such a programme is mainly because of the small number of high-quality trials. The results of Drisman et al. (2008) indicated that the typical workplace intervention has yet to demonstrate a statistically significant increase in physical activity or fitness. They also found that the effects were smaller in randomized studies compared with studies using quasi-experimental designs. The review by Shephard (2012) reported that participation in workplace fitness programmes can enhance health-related fitness and reduce risk-taking behaviour, but that the population effect is limited by low participation rates. Claims of improved mood state are largely based on uncontrolled studies.

In their review article, Proper et al. (2002) investigated the effectiveness of physical activity programmes in the workplace with respect to work-related outcomes. The evidence was limited for absenteeism, inconclusive for job satisfaction, job stress and employee turnover and nil for productivity. In the randomized controlled trials in two out of four studies, the study population's work was probably physical light (insurance company workers and bank workers). Because of the few high-quality randomized controlled trials, it is strongly suggested that such studies be carried out. In Tveito et al. (2004), exercise interventions (n=6) among physically demanding occupations showed limited evidence of effects on sick leave, costs and new episodes of low back pains, and no evidence of an effect on level of pains.

(c) RCT studies on the effectiveness of Workplace physical exercise intervention not reported in the review studies.

	Part 1: Functioning and Disability		Part 2: Contextual Factors	
Components	Body functions and structures	Activities and participation	Environmental factors	
Domains	Body functions Body structures	Life areas (tasks, actions)	External influences on functioning and disability	
Constructs	Changes in Body functions and structures (physiological and psychological)	Changes in capacity Executing tasks in a standard environment Performance Executing tasks in the current environment	Changes in Facilitating or hindering impact of features of the physical, social and attitudinal world	Changes in General subjective well-being
I. Statistically significantly positive effect				
1) Griffiths 1996	1) Risk for coronary heart disease, cancer, osteoporosis, osteoarthritis, inflammatory joint disease, low back pain			
2) Shephard 1996	2) Body mass, skin folds, aerobic power, muscle strength, flexibility			
3) Drisman et al. 1998	3) Physical fitness	3) Physical activity		
4) Maher 2000	4) Low back pain			
5) Linton and Van Tulder 2001	5) Neck and Low back pain			
6) Proper et al. 2002		6) Absenteeism		
7) Proper et al. 2003	7) Musculoskeletal disorders	7) Physical activity		
8) van Poppel et al. 2004	8) Low back pain			
9) Tveito et al. 2004	9) Low back episodes	9) Sick leave	9) Cost	
II. No statistically significantly effect				
1) Griffiths 1996	1)Psychological health	1) Absenteeism	1) Work related stress, financial benefits	
2) Proper et al. 2003	2) Physical fitness, General health			
3) van Poppel et al. 2004	3) Low back pain		3) Job satisfaction, job stress, employee turn-over, productivity	
4) Tveito et al. 2004	4) Low back pain			
III. Statistically significant negative effect	-	-	-	

In summary, although it is commonly held that physical exercise interventions in the workplace promote employee's physical and psychosocial well-being, the scientific evidence on the effectiveness of such programmes remains limited (Griffiths 2006; Shephard, 2012; Drisman et al., 2008; Macher, 2000; Proper et al., 2002; Proper et al.,2003; Van Poppel et al., 2004; Tveito et al., 2004). Exercise programmes confer more significant benefits on the physical functioning of subjects, especially musculoskeletal symptoms, than on psychological functioning (Griffiths, 2006; Shephard, 2012; Drisman et al., 2008; Maher, 2000; Proper et al., 2003; van Poppel et al., 2004) or work-related outcomes (Proper et al., 2002). In addition, in the ICF framework, the benefits of physical exercise interventions, were connected more to the physiological body functions and structures component than to the activities and participation or environmental components. Also several results from RCTs (Nurminen et al., 2000;Horneij et al., 2001, Eriksen, et al., 2002; Nurminen ,2002) supported the findings of these review studies . Table 2 presents the results of reviews according to the components of the modified version of ICF: body functions and structures, activities and participation, Environmental factors and general subjective well-being.

Study designs and the methodology of trials in the workplace

Many previous studies have recommended performing more randomized, controlled trials of high methodological quality. Internal validity scores, like randomization, treatment allocation, drop-out rate, blinding, intention-to-treat analysis, relevant outcome measures and definition of the intervention should be taken into account (Shephard, 2012; Drisman et al., 2008; Proper et al, 2002, Proper et al. 2003, Liddle et al. 2004, van Poppel et al. 2004, Tveito et al 2004, Dworking et al., 2005). In addition, co-interventions should be avoided and compliance with the treatment (van Tulder et al., 2007 a b, van Tulder, 2000) and the adverse effects should be reported (Liddle et al., 2004). It is difficult to implement randomized controlled studies in the workplace , Tveito et al. 2004; Shephard,2012) as both management and staff should accept a random assignment of employees between two alternative types of treatment. The study design is also often not satisfactory because the supposed control groups are contaminated by extensive daily contact with the treatment intervention participations in the workplace (Shephard, 2012). In addition, it is very difficult, and perhaps impossible to blind subjects and therapists in studies of exercise therapy (Shephard, 2012; Koes and Hoving, 2008; van Tulder, 2000; Liddle et al., 2004).

In the cluster randomized and cross-over study design each cluster and also each employee within each cluster receives both the treatment and control interventions but in a different order. In the intervention studies of workplace, few examples of CRT have been described. Simpson et al. (2000) used CRT in their workplace health project Menzies et al. (2003) used CRT and crossover designs in their sick-building syndrome study. Neither of these studies used physical exercise as a treatment in their interventions. Takala et al. (2012) used a RCT crossover study design among women employed in a printing company with light sedentary work. There is no evidence that CRTs and crossover studies have been used in the context of a physical exercise intervention in the workplace.

Workplace productivity can be directly traced to amount of exercise, overall health, and the total number of days present on the job (Mitchell and Bates, 2011). In contrast, not taking vacation days and long periods of work without a break can decrease long-term productivity (Schultz and Edington, 2007). In 2007, Schultz and Edington conducted a review that examined the literature to explore the link between employee health and on-the-job productivity, also known as presenteeism. Searches of Medline, CINAHL and PubMed were conducted in October 2006, with no starting date limitation with "presenteeism" or "work limitations" as keywords. A total of 113 studies were found using this method. Each study was evaluated based on the strength of the study design, statistical analyses, outcome measurement, and controlling of confounding variables. The Literature showed that presenteeism is linked with a large number of health risks and health conditions, including exercise, weight, allergies and irritable bowel syndrome (Schultz and Edington, 2007). Based on the research reviewed here, it can be deduced that health conditions such as allergies and arthritis are associated with presenteeism. Moreover, health risks traditionally measured by a health risk appraisal, especially physical activity and body weight, also showed an association with presenteeism.

Also in 2007, Mills and colleagues conducted research that evaluated the impact of a multi-component workplace health promotion programme on employee health risks and work productivity. A quasi-experimental, 12-month before-after intervention-control study was used as the design. Of the 618 employees offered the programme, 266 (43%) completed a questionnaire before and after the programme.. Out of the 2500 in the control participants, 1242 (49.7%) completed questionnaire 12 months apart. The Outcomes included a cumulative count of health risk factors the World Health Organization performance questionnaire, which measures workplace absenteeism, and work performance. After adjusting for baseline differences, improvements in all the three outcomes were significantly greater in the intervention group than with the control group (Mills et al., 2007). The results suggest that a well-implemented multi-component workplace health promotion programme can produce sizeable changes in health risks and productivity.

Mitchell and Bates studied health-related productivity loss in 2011. The objective of their study was to determine the relationship between health status and productivity loss and to provide estimates of the business implications of lost work performance. Health risk appraisal responses from over 1 million participants were analyzed to determine productivity loss associated with several common health conditions and health risks. Propensity scores and a matching technique were used to create analysis groups that differed only by presence of a particular health condition or risk. The results were monetized and multiplied by the average number of employees with conditions or risks to illustrate the potential 5 impact of productivity loss to employers. Costs of productivity loss were compared to medical costs for the same conditions and health risks. The final results support the premise that lifestyle risk factors and health conditions are directly associated with workplace productivity loss.

In 2006, Musich and colleagues conducted a the research on another Australian study linking medical conditions and workplace productivity. The overall purpose of this research was to investigate the impact of health on job performance using two measures of productivity loss: a self-reported measure of health-related presenteeism; and an objective measure of absenteeism. A cross-sectional survey using Health Risk Appraisal (HRA) to evaluate self-reported presenteeism and the prevalence of 12 health risks and eight medical conditions was used. The employees (n = 224) of a private insurance provider in Australia were used as subjects. A Health Risk Appraisal (HRA) questionnaire was employed to evaluate self-reported presenteeism on different aspects of job demands and to assess the prevalence of 12 health risks and eight medical conditions. Illness absent hours were obtained from company administrative records. Increased presenteeism was significantly associated with high stress, life dissatisfaction, and back pain, while increased illness absenteeism was significantly associated with overweight, poor perception of health, and diabetes. Excess presenteeism associated with excess health risks (productivity loss among those with medium or high-risk status compared to those with low-risk status) was independently calculated at 19.0% for presenteeism and 12.8% for illness absenteeism. This study demonstrated an association between health metrics and self-reported work impairment (presenteeism) and measured absenteeism (Musich et al., 2006). The study provided an indication of the potential benefits of health promotion programming for improving health of Australian employees. It also showed the benefits of the corporation in minimizing health-related productivity loss

Low, Gramlich, and Engram (2007) investigated the impact of a self-paced exercise programme on productivity and health outcomes of 32 adult workers in a large federal office complex during a 3-month period. Walking was the sole form of exercise. The first month, during which no walking occurred, was the control period. The second and third months were the experimental period. The participants were divided into three levels based on initial weight and self-determined walking distance goals. Productivity (using the Endicott Work Productivity Scale), walking distance (using a pedometer), and health outcomes (blood pressure, weight, pulse rate, and body fat percentage) were measured weekly. The results from this study, based on a paired t test analysis, suggested that, although the self-paced exercise programme had no impact on productivity. It lowered blood pressure and promoted weight loss. Further study using a larger sample and a controlled experimental design is recommended to provide conclusive evidence.
Aghop Der-Karabetian, University of La Verne, and Norma Gebharbp,

General Dynamics conducted a study to measure job satisfaction, body image, and sick days for those who exercised and those who did not. They selected two groups were from a large Southern California company. The first group participated in a physical fitness programme for six months. The three variables— job satisfaction, body image, and sick days— were measured at the start of this programme and again six months later. The second group was used as a control group to make sure no major external factors affected the variables. They found that after the six months' time, the employees who participated in the fitness programme had a higher job satisfaction and body image, and had less sick days than the control group. They then suggested that every company should focus on employee fitness since it reduces absenteeism (sick days), and increases morale of the employees, which will increase productivity.

Mills PR, Kessler RC, Cooper J, and Sullican reported that being part of a company's fitness program increased productivity levels. This survey consisted of a variable group (n=266) and a control group (n=1242). The variable group was placed in a multi-component health promotion programme which showed participants their health risks, a personalized health improvement plan, literature, and lectures focused on health improvement. Using the World Health Organization health and work performance questionnaire they concluded that those enrolled in the multi-component health promotion programme reduced their health risks by 0.45, lowered their monthly absenteeism days by 0.36, and had a mean increase on the work performance scale of 0.79. These results suggest that implementing a multicomponent health promotion program to increase the fitness levels of its participants would also make noticeable differences in health risks and productivity.

Wayne Burton , Katherine, McCalister, Chin-Yu Chen , and Dee W. Edington conducted a study in which they surveyed both people enrolled (n=854) and not enrolled in a company's fitness centre (n=4543). They asked questions based on their productivity in the workplace. Those employees who were not participating in their company's fitness programme reported higher loss of productivity due to time management, physical difficulty of the work, limitations of output, and overall loss of productivity than their counterparts of the same race, age, gender, and work location who were enrolled in their company's fitness centre. (The Association of Health Status, Worksite Fitness Centre Participation, and Two Measures of Productivity) Christopher. Neck and Cooper note that the higher one's fitness is, the higher one's productivity will be. They mention many studies which show that fitness and work productivity are related.

In a study by Frew, and Brunning that measured improved productivity and job satisfaction with enrolment in an employee exercise programmes, commercial real estate stock brokers who participated in an aerobics programmes for 12 weeks had higher sales than their comparable brokers during and after the 12- week aerobic programmes. Another study which looked at 56 college professors, noticed that the physically active professors were able to retain information better and experience slower decline in memory with age.

Lloyd, Lloyd etal., and Foster, argue that there is a relationship between fitness and productivity only when fitness is extremely low. For example, someone who is extremely obese, or someone who has severe diabetes, or even someone who has heart disease needs to worry about loss of productivity; but someone who is slightly overweight, or is not fit will experience no loss of productivity. Lack of fitness is a major health risk and it could affect workplace productivity.

DeNelsky and McKee tried to predict the job performance of individuals based on an assessment which included fitness. They had a sample of 32 government employees. They gave them a health assessment which predicted their individual job performance as above average, average, or below average. Their results showed that 71% of those who received an above average or average score on the assessment performed at an above average, or average level. Sixty per cent of those who received a below average score on their assessment performed at a below average level. This assessment was able to predict performance better than just plain chance. However, this study did not provide enough support to the claim that fitness affects productivity, as psychologists used the health assessment to determine whether each person was a motivated person, which did affect productivity.

SimilarlyAllen, Harris conducted a study on whether health affected productivity. He created Health Risk Appraisal which examined health in the contexts of work, mental health, and demands from personal life. He had 17,821 respondents to his Work Limitation Questionnaire. The study confirmed that there were two types of productivity loss due to health conditions: presenteeism and absenteeism .Health was found to be one of the eight factors that affect productivity. The others are: work-life balance, personal life impact, stress, financial concerns, job characteristics, employee characteristics, and company characteristics. Although health affected productivity the other seven factors together impacted productivity five times as much as health. This study found that health and fitness had some impact on productivity, yet it was not the primary determinant.

Claire; Karin and Hildebrandt, examined how physical activity, cardiorespiratory fitness, and body mass index affect work productivity, and absence due to sickness in employees who do office work. All the participants had neck, arm and hand pain within the six months before the study. The productivity was measured using the Health and Performance Questionnaire. The amount of physical activity and cardio-respiratory fitness did not have an effect on work performance or sick absences.

However, obese male workers had significantly lower productivity levels than lean workers.

Falkenberg, asserts that there is not enough evidence to show that fitness increases workplace productivity at all. Higher fitness levels benefit body and mind in many positive ways. It has been proven that those who are fit have less depression, less stress, and less anxiety than people who are not fit. Fitness significantly lowers absenteeism (Cox, Shephard and Corey, 1981 (Bertera, 1990). The only probable reason for this drop in absenteeism is that fitness makes one healthier. Although fitness is good for one, and might make one healthier, it has never been shown to affect presenteeism (productivity while working).

With all the current studies that have been conducted, there still does not seem to be enough support to show that there is a strong relationship between fitness and productivity. Although the relationship can be pinpointed through small surveys and studies, other external factors, such as personal differences, motivation, differences in jobs and stress could affect body productivity and fitness. This would make both fitness and productivity the effect of some external cause, opposed to the theory that changes in fitness cause changes in productivity.

Aerobic dance and stress management

Stress has been linked to between 50 and 70 per cent of all illness. Some mental and physical conditions that can be psychosomatic (or stress-caused) include high blood pressure and heart disease; psychiatric disorders; such as depression and schizophrenia; indigestion; colitis; poor posture; headache; insomnia, diarrhoea; constipation; increased blood clothing time; increased cholesterol concentration; diuresis; edema; and low back pain. Other serious diseases, such as cancer, can be influenced by a person's state of mind. In many cases, there is considerable time between a major stressor and the onset of a disease. So the two are not always associated. Because of this, it is likely that the effect of stress on human body's function is underestimated. Stress affects nearly everyone to some degree. In fact, approximately 67 per cent of adults indicated that they feel "great stress" at least one day a week. Stress management is viewed as a priority lifestyle similar to physical activity and a healthy diet. There are many kinds of stressors; environmental stressors include heat, noise, overcrowding, climate and terrain. Physiological stressors may be such things as drugs, caffeine, tobacco, injury, infection or disease and physical effort. Emotional stressors are the most frequent and important stressors affecting humans. Some people refer to these as “psychosocial” stressors. They include life- changing events, such as a change in work hours or line of work, family illnesses.

When stress gets the best of a person, it is important to find ways to cope with it. Active coping strategies (problem solving, social support) are recommended when the stressful situations are largely within one’s control. Passive coping strategies (such as music, dance, relaxation and exercise) are recommended when the stress is largely out of one’s control or when one just wants some immediate relief from the stress at hand. Regular activity and a healthy diet can help adapt to stressful situations. An individual’s capacity to adopt is not a static function but fluctuates with energy, drive and courage. The better one’s overall health, the better one can withstand the rigours of tension without becoming susceptible to illness or other disorders. Physical activity is especially important because it conditions one’s body to function effectively under challenging physiological conditions. Aerobic dance has been found to be effective at relieving stress, particularly white-collar jobs. Studies have shown that regular exercise decreases the likelihood of stress disorders and reduces the intensity of the stress responses. It also shortens the time of recovery from an emotional trauma. Its effect tends to be short term. So one must continue to exercise regularly for it to have a continuing effect. Exercise is not like a measles vaccine where one inoculation is good for life. Aerobic dance exercise is believed to be particularly effective in reducing anxiety and relieving stress, though a wide variety of other activities are also good (Hockey 2003).

Aerobic dance and absenteeism

Work-site fitness programmes are gaining popularity because of their potential to lower absenteeism and job turnover and increase job productivity and morale. The percentage of work-sites offering activities to promote exercise and physical fitness in the US increased from 22% in 1985 to 42% in 1992. Management hopes these programmes would have a positive effect on the physiological and psychological variables that might positively influence worker’s performance. Furthermore, companies hope to reduce direct expenditure as a result of the aforementioned potential benefits of work-site fitness services. Positive relationships between regular exercise and worker’s productivity have been indicated in past studies, but the results were subjective and only identified exercise adherence levels by self-evaluation rather than fitness levels via objective assessment. Another aspect related to employees' productivity is to increase job satisfaction. If employees feel better about their jobs, it may be assumed that they will want to be more productive in their positions. A number of investigations of employees' fitness programmes attested to possible changes of mood and workers' satisfaction that have resulted from the introduction of fitness programmes. For example, Shephard et al. (2012). State possible explanations to include reduction in physical fatigue due to an increase of work capacity, reduction of minor illness and relief from boredom, anxiety or pent-up aggression.

The desire to reduce employees' absenteeism is another reason that initiates employees' fitness activities at work-sites. Absenteeism is a major problem for employers, particularly in production line tasks. In Canada, the average time loss from absenteeism is about five days/worker/year in non-union companies and 10days/worker/year in union operations. However in some European nations, the loss is 20-25 days/worker/year.

Initial research linking involvement in corporate health and fitness programmes to measure of absenteeism generally found an inverse relationship existed between membership in a company health and fitness programmes and absenteeism. Cost savings within an employee's fitness programmes can be derived from the reduction of costly behaviours, such as absenteeism, turnover and job-related injuries. Evidence is accumulating to support the relationship between regular participation in employee fitness programmes and lower absenteeism. In his review of 39 studies linking physical fitness and absenteeism, Shephard (2012) concluded that the average reported impact of fitness programmes on absenteeism was between 0.5 and 2.0 days improvement in attendance/year and estimated that the improvement would translate to a dollar savings of 0.35% to1.4% of payroll costs.

Cole et al. (1996). Selected two similar white-collar insurance companies and demonstrated a 22% reduction in absenteeism with the institution of a fitness programme. Using the 22% decrease in absenteeism or 1.3 days/employee, they estimated that a savings of $83,265/year would be evident in the company under study. Baker et a l. (2007). Investigated absenteeism in the Tenneco Corporation. Absenteeism (recorded as the number of sick hours/year) and exercise activity (the number of recorded exercise sessions in the fitness centre) were determined from a group of exercisers and non-exercisers. The female exercisers had 32% fewer sick hours than the non-exercisers, but the male exercisers and non-exercisers showed no significant differences.

The relationships between exercise and employee's absenteeism has mainly focused on exercise participation rates and not exercise intensity. While previous research noted that fitness levels were associated with improved productivity, satisfaction and attendance relationships are vulnerable, as only employee participation at fitness centres and not fitness levels were assessed. With deteriorating economic conditions, budget cuts are common in American corporations. Corporations may be tempted to eliminate employee's fitness programmes if the evidence is not forthcoming to show that employee fitness has a positive effect on the cost-savings variable of productivity, job satisfaction and absenteeism.

One study that applied data from a prospective cohort with a follow-up period of 3 years is from the Netherlands (Van den Heuvel et al., 2005). The study investigated the effect of sporting activities on absenteeism of employees. Registered data on illness-related absenteeism covering a period of 4 years were collected from 1,228 workers from 21 Dutch companies. Sporting activities had favourable effect on absenteeism with those participating in sports having less sick leave. A significant higher mean duration of absenteeism of about 20 days over a period of 4 years was observed among those not practising sports compared to their sporting colleagues.

The relation between aerobic physical activity and absenteeism was confirmed by a study of Jacobson and Aldana (2001). The aim of their study was to compare the frequency of self-reported exercise with illness-related absenteeism. The results revealed a significant relation between weekly exercise days and annual absenteeism, with lower exercise rates being associated with higher rates of annual absenteeism duration. The association was specifically significant between no exercise at all (0 day per w eek) and 1 day per week of exercise compared to a higher exercise frequency rate (Jacobson and Aldana, 2001). Moreover, it appeared that non-exercisers were more likely to be absent for more than 7 days when compared to those exercising at least once per week.

The purpose of this study was to examine the relationship between various components of health-related fitness (that is body composition, cardiorespiratory endurance, flexibility, muscular strength) and employees perceived productivity, job satisfaction and absenteeism. Employees' overall rating of fitness was assessed independently against productivity and job satisfaction. Correlations among fitness levels and absenteeism were measured over a one-year period. The main reason for this study

was that very few studies on exercise and employees' job performance had measured employees' fitness levels and compared them to productivity, job satisfaction and absenteeism. This study is unique in the fact that it determines the subjects' level of fitness and relates it to their perceived productivity, job satisfaction and absenteeism.
Aerobic dance and general well-being

Fundamental movements of man, which they have achieved from their pre-human ancestors, are walking, running, jumping, climbing, throwing, pulling, and pushing and so on. By permutation and combination of these basic fundamental movements, man has developed various secondary movements essential for day-to-day living and for use in games and sports. Physical fitness is important for all human beings, irrespective of their age. A given work may not be carried out if the required physical strength is not available. Fitness is the first and foremost thing to enjoy the life fully (Reddy, 2012). Regular physical activity, fitness and exercise are critically important for the health and well-being of all people whether they participate in vigorous exercise or some types of moderate health-enhancing physical activity. Even among frail and very old adults, mobility and functioning can be improved through physical activity (Butler et al. ,2013).

Regular aerobic exercise will produce beneficial effects for any age group provided the exercise is specific and appropriate to the level of fitness of the individual. Progressive exercise correctly performed will increase the level of fitness and improved health. It will also create a sense of well-being, produce greater energy and reduce the risk of developing many diseases. Exercise makes demands on the body systems over and above normal everyday activities and, as a result, the systems adapt anatomically and physiologically (Rosser, 2001). Appropriate regular daily physical activity is a major component in preventing chronic disease, along with a healthy diet and not smoking. It is a powerful means of preventing chronic diseases; for individual for nations, it can provide a cost-effective way of improving public health across the population. Experience and scientific evidence showed that regular physical activity provides people, of any conditions physical, social and mental health benefits (WHO, 2003).

Fitness for living in the house, on the farm, at office, factory, in workplaces or in any service implies freedom from disease, enough strength, endurance and other abilities to meet the demands of daily living. Doing physical activity everyday contributes to optimum health and quality of life. Life tyles can be changed to improve health and fitness through daily exercises. Many physiological changes are determined by daily aerobic exercises (Shahana et al, 2010).

Health care costs

According to the U.S. Centers for Disease Control and Prevention (CDC), regular exercise can reduce one's risk of diabetes, osteoarthritis and obesity. The CDC claims that obesity alone costs $147 billion a year. Diabetes, a common result of obesity, often necessitates medication, regular check-ups, massive diet changes and even surgery. Obesity puts you at risk of a wide variety of costly conditions. By exercising regularly and eating a healthful diet, one can significantly decrease your health care costs and avoid being a part of the group that drives up the overall cost of health care.

According to the CDC, regular exercise can reduce the risk of depression and improve sleep quality. The National Alliance on Mental Illness noted that mental illness costs $34 billion each year in health care costs, in workplace inefficiency and other costs. By reducing one's susceptibility to mental health problems, one will save money on the costs associated with those problems, like therapy and medication. One will also likely be more productive and more content with one's life. As observed by the Physicians Committee for Responsible Medicine, a high-fat diet increases the risk of cancer. A diet rich in vegetables and whole grains lowers the risk of cancer. Regular exercise can decrease the risk of some cancers, such as lung and endometrial cancers. A healthful diet and regular exercise can help reduce one's risk of cancer and save one the exorbitant costs and hardships associated with a cancer diagnosis, such as chemotherapy, regular hospital visits, surgery, drugs and palliative care.

Researcher examined data from an earlier nationally representative survey of some 26,000 Americans over the age of 18. After accounting for people who were unable to exercise regularly, pregnant, or underweight, they found a consistent pattern: People who said they met the recommended criteria for moderate to vigorous exercise on a weekly basis on average paid less in medical expenses annually than those who did not. The largest savings could be seen with people who had a history of cardiovascular disease — they paid around $2,500 less in medical costs compared to their counterparts who worked out less. "Even among an established high-risk group such as those diagnosed with heart disease or stroke, those who engaged in regular exercise activities reported a much lower risk of being hospitalized, (having) an emergency room visit and use of prescription medications," said study senior author Dr. Khurram Nasir, Director of the Center for Healthcare Advancement & Outcomes and the High Risk Cardiovascular Disease Clinic at Baptist Health South Florida.

Exercisers who were already in relatively good health with no preexisting chronic conditions also received a discount. They spent around $500 less annually compared to similar non-exercisers. Although they had lower savings, these healthier individuals spent less on medical costs to begin with compared to heart and stroke patients. Approximately one-half of the former group reported regular exercise compared to one-third of cardiovascular disease patients. Collectively, the researchers estimated that if just 20 percent of currently loafing cardiovascular disease patients began exercising regularly, the country would save billions of dollars annually in medical costs. Regular exercise is defined as 30 minutes of moderate-intensity aerobic activity 5 days a week, or at least 25 minutes of vigorous aerobic activity 3 days a week.

The study of used data collected in 2012 from over 26,000 Americans, and included both healthy people and those who had been diagnosed with some kind of heart-related condition or disease. The researchers specifically looked at their exercise routines and whether or not they fit into the AHA's recommended guidelines. The AHA suggests 30 minutes of moderate-intensity aerobic activity (like walking, dancing or mowing the lawn) five days a week, or at least 25 minutes of vigorous aerobic activity (like running or swimming) three days a week. Doing a combination of the two is also an option. The study found that people who met these goals saved on average $2,500 in health costs each year.

"Even among an established high-risk group such as those diagnosed with heart disease or stroke, those who engaged in regular exercise activities reported a much lower risk of being hospitalized, (having) an emergency room visit and use of prescription medications," They added that "even if just 20 per cent of patients with cardiovascular disease who are not getting enough physical activity would meet exercise goals, the nation could save several billion dollars in healthcare costs annually.

The health benefits of regular physical activity are well established. The magnitude of such an effect remains unclear, and few direct estimates are available. The best known estimates to date rely on assessments of health effects attributing shares of average expenditure for specific diseases. Other studies compared active and inactive persons at one point in time (cross-sectionally), suggesting that physically inactive people have health care expenditures that are on average about one-third above medical costs of active individuals, or a difference of $330 in 1987 (which would correspond to $787 in 2004). A cross-sectional approach is problematic because it cannot correct selection bias.

Poor underlying health can simultaneously cause both high health care costs and physical inactivity. Prospective longitudinal data on health care costs can reduce selection bias. Longitudinal estimates are available only for members in a single health plan or for selected employers rather than for a national sample. Effectively promoting healthy diets and physical activity can help reduce the economic burden associated with chronic diseases.

For cardiovascular health, the American Heart Association recommends at least 30 minutes of moderate-intensity aerobic activity five days a week, or at least 25 minutes of vigorous aerobic activity three days a week, or a combination of the two. Moderate activity—which causes a light sweat, or only modest increases in breathing or heart rate includes fast walking, lawn mowing, or heavy cleaning. Vigorous activity includes running or race walking, lap swimming or aerobics. Heart patients should work with their health care team to achieve exercise goals.

e. Cardiorespiratory Indices

Cardiorespiratory system picks up and transports oxygen, nutrients and other substances to the organs and tissues that need them. It also picks up waste product of body metabolism and carries them to where they are expelled from the body. The system consists of the heart, blood vessels and the respiratory system where the lungs belong. Cardiorespiratory fitness is the ability to perform prolonged, large muscle, dynamic exercise at moderate-to-high level of intensity. It is the ability of the heart, lungs and blood vessels to supply oxygen to the cells to meet the demands of prolonged physical activity, particularly aerobic exercise (Corbin et al., 2003; Fahey et al., 2003; Hoeger and Hoeger, 2005). This ability depends on such factors as the ability of the lungs to deliver oxygen from the environment to the bloodstream; the hearts capacity to pump blood; the ability of the nervous system and blood vessels to regulate blood flow; and the capability of the body's chemical system to use oxygen and process fuel for exercise. Aerobic capacity is considered the best indicator or measure of aerobic or cardiorespiratory fitness. Another term used for it is maximum oxygen uptake.

Cardiorespiratory fitness has various variables. Pollock and Wilmore (2004) identifies some of them as the heart rate, blood pressure, maximum volume of expired air, maximum oxygen uptake and cardiac output. These variables are associated with the ability of the lungs and heart to take in and transport adequate amount of oxygen to the muscle for activities performed over long periods of time (McGlynn, 2009). They are affected by exercise in one way or the other. This section will review the indices of heart rate, blood pressure and maximum oxygen uptake.

Resting heart rate and aerobic dance.

Heart rate is the number of heart beats per minute. Findings of several studies have shown that aerobic or endurance exercise training lowered resting heart rate (Bizley, 2009; Brooks et al., 2000; Hockey, 2003; Fox and Mathew, 2008; McGlynn, 2009; Nwankwo, 2010). Each time the heart beats, it pumps blood into the arteries. The surge of blood causes a pulse that can be felt by holding a finger against an artery. The major arteries that are easy to locate and are frequently used for pulse count include the carotid artery and the radial artery. The carotid artery is located just under the jawbone and beside the Adam's apple while the radial artery is located just below the base of the thumb or the wrist. Other possible locations for feeling the heart rate include the inside of the upper arm and directly over the heart (Corbin et al., 2003; Payne and Hahn, 2006; Williams, 2007). The number of times the pulse is felt in one minute is the heart rate. Heart rate is an important physiological index of cardio-respiratory fitness which can be monitored at rest or during exercise. It is the major determinant of cardiac output, particularly during moderate to maximal exercise. It is also the most important factor affecting oxygen consumption in the heart (Brooks et al. 2000; Fox 2002; Heyward 2002).

To obtain heart rate per minute, simply place the index finger and the middle finger over the artery at one of the locations – carotid or radial arteries. Move the finger around the location until a strong pulse can be felt. Press the point gently, so as not to cut off the blood flow through the artery. The thumb is not recommended for counting the pulse, because the thumb has a relatively strong pulse of its own and it could be confusing when counting another person's pulse (Corbin et al., 2003). The carotid is very easy to locate. Nevertheless, caution should be used when taking carotid pulse counts because pressing on it can cause a reflex that slows the heart rate. This could lead to incorrect heart rate count.

Once the pulse is located, count the pulse for 30 seconds and multiply by 2 to get the resting heart rate (RHR) and record in beats/minute. Or count for 60 seconds and record for exercise heart rate, simply count for 6, 10 or 15 and multiply by 10, 6 or 4, respectively, and record in beats/minute. Williams (2007) advises that for the measurement to follow, take the resting heart rate in the position in which the exercise will take. For example, for swimming programme, it should be taken while lying down; for aerobic dance, it should be taken while standing; and for cycling, it should be taken while sitting.

Garder et al. (2012) found that aerobic exercises were excellent in reducing heart rate. They affirmed this after comparing the physiological effect of an 8-week aerobic dance programme to those of a walk job exercise training programme and found that heart rate significantly decreased in the aerobics (-4b/min-1) and walk –jog groups (-36/min-1). Conversely, Otinwa (2009) found no difference in resting heart rate between the trained and control group of rehabilitated male drug addicts following a 12-week structured exercise programme. Similarly, Brownley, West, Hinderliter and Light (2016) found no difference in the heart rate of participants placed on 20 minutes of moderate aerobic exercise on bicycle ergometer for 21 days. The duration (21days) of this training was short and may have contributed to their findings. For aerobic training to have significant effect, it should have the duration of about 6 weeks and above (Hoeger and Hoeger, 2005).

Normal resting heart rate may range from a low of thirty-five (35) to 100 beats per minute. The average resting heart rate for adolescents is around 70 and 72 beats per minute (Bizley 2009; Mc Glynn 2009). Heart rate is used to monitor the intensity of exercise training. This is because there is a linear relationship between it and workload (Bizley, 2009). A percentage of the heart rate maximum indicates exercise intensity. However, a reasonable estimate of the maximum heart rate (Max HR) is done using the Karvonen formula where age is subtracted from 220, which is constant (Chado 2011; Getchell 2013). The formula is simply stated as: **Max HR = 220-Age.** Evidence suggested that this formula may overestimate maximum heart rate in young people and underestimate it among older adults. Researchers have proposed a new formula: **[Max HR = 208-(7 x ages)]** (Schnirg, 2001). For a thirty year old, the new formula would predict a Max HR of 187, while the old formula would predict 190. For a sixty-year-old, the new formula would predict 166 as compared to 160 for the old formula. The old formula is considered acceptable because target zones were developed using this technique (Corbin et al. 2003).

To strengthen the heart, one should do aerobic exercise intensely enough to reach the target heart rate zone of 60 to 80% Max HR (AAOS, 2002). Training increases parasymphathetic tone to the sinotrial node (SA node), which is located in the right atrium, from the vagus nerve. Training may also decrease the intrinsic rhythmicity of the heart, thereby reducing resting heart rate. Resting heart rate of 40 beats/min may be observed in elite endurance athletes. There is probably a strong genetic influence in some low RHRs seen in endurance athletes but aerobic training is responsible for most of it (Brooks et al., 2000). This shows that a low RHR is not always a sign of physical fitness. On the contrary, bradycardia (low heart rate) may be inherited or is sometimes a sign of disease. For instance, bradycardia is a characteristic of sick sinus syndrome. The important sign of fitness is the reduction of RHR with training rather than the low RHR itself.

Blood pressure: systolic blood pressure and diastolic blood pressure and aerobic dance training.

Blood pressure is the force the blood exerts against the walls of the vessels (artery) in which it is contained (Amusa et al., 2001; Hockey, 2003). It is the pressure that moves the blood through the circulatory system. Blood pressure is highest in the arteries following the contraction of the ventricles. This is called systolic blood pressure. Systolic blood pressure tends to fall, reaching a minimum, just before the next ventricular contraction. This minimum pressure, which corresponds to ventricular relaxation, is called diastolic blood pressure (Amusa et al., 2001;McGlynn, 2009). Blood pressure is measured in millimetres of mercury (mmHg), (Amusa et al., 2001; Williams, 2007). It is conventionally written as a systolic over diastolic blood pressure (Nwankwo, 2010).

Studies have shown that exercise training lowers blood pressure (Arakawa, 2008; McGlyn, 2009; Orbach and Lowenthal, 2008; Underlay et al., 2002; WHO, 2003). USSM, (2004) found that after 8 weeks of Balis dancing exercise, systolic and diastolic blood pressures were significantly reduced. Brooks et al. (2000) reported that aerobic exercise training reduced resting and submaximal exercise systolic, diastolic mean arterial blood pressure. Kelley and Kelley (2000) found that, after 4 weeks of resistance training, both systolic and diastolic blood pressure decreased by an average of 3 mmHg. The participants in the study were normotensive people. William (2007) notes that regular aerobic dance training is recommended for reduction on blood pressure. Brownley et al. (2010) found that moderate aerobic exercise reduced blood pressure of individuals with elevated blood pressure. The American College of Sports Medicine

(ACSM) (2004) states that exercise training is the cornerstone therapy for the primary prevention, treatment and control of hypertension. A higher level of physical activity and fitness resulting from long-term exercise training has a protective effect against hypertension. Active lifestyle is developed during exercise training and it would have a more significant effect in preventing high blood pressure in old age.

A sphygmomanometer and a stethoscope are used to measure blood pressure. McGlynn (2009) provides the following description for measuring blood pressure: Help the individual to sit comfortably on a chair with the lift arm at heart level and supported on a firm table. Place the air-tight blood pressure cuff on the arm just above the elbow and securely wrap it around the arm. Place the stethoscope over the artery in the centre of the elbow crease and hold it firmly. Hold the bulb in your hand so that you can open and close the screw valve with one hand. Close the valve and pump air into the cuff by pressing the bulb repeatedly. As the cuff becomes tighter, it compresses a large artery, the brachial artery, in the arm. This temporarily cuts blood flow to the foreman (Hockey, 2003). Inflate the pressure to approximately 160 to 180 mmHg, as read on the pressure gauge. Then slowly open the screw valve, letting air escape and watch the fall on the pressure gauge. With the earpiece of the stethoscope in your ear, listen for the pressure of a beat or thumping sound (korotkoff sound) and mark the pressure at which the sound was first heard. This will be the systolic blood pressure value. Continue to decrease the cuff pressure while listening for the beat sound. When the beat sound disappears, mark the pressure level and record the number as the diastolic blood pressure value. Record the measures as shown below:

$$\text{Blood pressure (BP)} = \frac{\text{Systolic BP (mmHg)}}{\text{Diastolic BP (mmHg)}}$$

Maximum oxygen uptake and aerobic dance training

Physical fitness is the capacity to perform sustained physical activity without excessive fatigue. To a physiologist, it implies the ability to make adequate physiological adjustment to the stresses imposed by a specific task. This requires good cardiovascular function reflected by the ability to deliver oxygen to the tissues to maintain continuous activity (Amusa, Igbanugo and Toriola, 1998).The volume of oxygen used in any given condition is called uptake. This may be at rest, during submaximal exercise or during maximal exercise (Baumgartner and Jackson, 1999). Maximum oxygen uptake (VO_2

Max) is the maximum volume of oxygen an individual uses during exhaustive exercise. It is considered the best indicator of cardiovascular fitness, aerobic fitness, or exercise capacity. (Baumgartner and Jackson, 2006; Braden and strong, 2000; Heyward, 2002; hockey, 2003;McGlynn, 2009; Slievert and Rowlands, 2006 and Verducci ,1980). Maximum oxygen uptake or aerobic capacity correlates with maximum cardiac output and generally summarizes what is going on in the lungs, heart, blood vessels and the associated tissues of the oxygen transport system (Pollock and Wilmore 2004; Gethell,2013). The ability of the body to utilize oxygen depends on the physiological efficiency of the cardiorespiratory system. The maximum effort one can exert over a prolonged period of time is limited by the ability to deliver oxygen to the active tissues. Theoretically, a higher oxygen uptake indicates an increased ability of the heart to pump blood, of the lungs to ventilate larger volumes of air and of the muscles cells to take oxygen and remove carbondioxide (Getchell, 2013).

A study by Blair (2010) showed that low aerobic was associated with higher mortality rates. For good health, it is not critical to be an elite athlete.Rather, it is essential to be moderately fit. Studies have revealed that moderate fitness levels can be attained by engaging in aerobic exercise (Chad 2001; Pollock and Wilmore, 2004;Baumgartner and Jackson,2006). At the earlier part of the training, increase in Max VO_2 may not be significant, (Wildschutt, et al., 2002; McGlynn, 2009). Various factors influence max VO_2. According to Mc-Glynn (2009), training may be a 20 per cent determining factors, whereas the remaining 80 per cent is thought to be genetically determined. This is in agreement with Fox and Matthew (2008). Aerobic fitness or max VO_2 is age-dependant, steadily increasing during childhood and reaching a peak at about age 25, after which it slowly declines (Buskirt and Hodsgen, 2007). The max VO_2 of women is about 80% of that of men. This can be traced to gender differences in per cent body fat and blood haemoglobin. The average max VO_2 standard by age and sex recommended by the American College of Sports Medicine for Youths is 42 to 48 ml/kg/min for males and 33 to 39 ml/kg/min for females. These levels will increase if one maintains regular exercise habit and reduce per cent body fat (Baumgartner and Jackson, 2006). This is because studies showed that changing habits and per cent body fat dramatically affect the rate at which aerobic fit with age (Baumgartner and jacksnon, 2006).

Maximum oxygen uptake can be measured using laboratory or field tests. Direct measurement of max VO_2 is not feasible (Otinwa, 2008). Hence, indirect calorimeter, which is a laboratory test is the most accurate method of measuring max VO_2. This method involves the measurement of expired gases during exercise test (Baumgertner and Jackson, 2006). The second laboratory test is the method used to estimate max VO_2 from maximum power output. This test involves monitoring the heart rate blood pressure during maximum effort (Baumgartner and Jackson, 2006).

The estimation of maxVO_2 from heart rate is justified because the relationship between the heart rate and oxygen uptake is linear over a wide range (Amus, et al., 2009). The laboratory methods use treadmills, bicycles ergometer and step devices. They are not practical for testing a very large group; hence, the need for field tests. The field tests include the distance run – walk tests. They are usually scored in two ways: it is either the time it takes covers a specified distance of run in walk tests, as in 1 and 1.5- mile run/walk tests, or the distance covered in a fixed time, as in 9 and 12 minutes run in walk tests (Baumgartner and Jackson, 2006; Nam, 2003; Safrit and Wood, 2005; Verducci, 1980). The 1 mile (1600m) run/walk for time or the 9- minutes run/walk for distance is recommended for school boys and girls (Kirkendall, et al., 2007). The obtained scores may be employed in a regression equation for estimating MaxVo_2. For example, Cureton (2015) formulated a generalized equation for estimating MaxVo_2 from 1- mile – run/test. The equation for estimating max VO2from 1 – mile – run/walk tests. The equation is max VO_2 (ml/kg/min) = 108.94 – (8.41* T)+ (0.21 * T^2) + (0.21 * Age * G) – (0.84 * BMI).

Where,

T = *time in minutes for 1 – mile – run - /walk test;*

BMI = *Body Mass Index (w/h^2)* and

G = *Gender – coded: Female = 0; male = 1*. This equation has multiple correlation of 0.72, (Baumgartner and Jackson, 1999).

Body composition and aerobic dance training

Body composition is the make-up of the body in terms of muscle, bone and other elements (Prentice, 2014). According to Amusa et al. (2001), there is need to know the composition of the body in terms of its components. The fat component of the human body is usually called the fat mass or per cent body fat. The non-fat components of the body are termed lean body mass. Of particular interest to fitness experts and exercise physiologists are percentage of body fat, fat free weight and total body weight (Payne and Hahn. 2006). This interest is important because more people are becoming overweight and obese. Being overfat or overweight can result in a serious health concern. The third National Health and Nutrition Examination Survey (NHANES III) conducted from 2008 through 2011 revealed an alarming increase in prevalence of obesity in children and adolescents. Also, during the last 30 years the prevalence of overweight in children and adolescents has increased from 15.2-22.3% in the USA, (Troiano, et al., 1995). The prevalence of obesity in Africa is also increasing (Monyeki et al., 2013).

Body composition may be influenced by a number of factors, such as age, sex, diet and level of physical activity (Williams, 2007). Age effects are significant during the developmental years as muscle and other body tissues are being formed. Also, muscle mass may decrease probably due to reduced level of physical activity. There are some minor differences in body composition between boys and girls up to the age of puberty, but at adolescence, the difference becomes fairly great. In general, girls deposit more fat beginning with puberty, while boys develop more muscle tissues (Williams, 2007). A sound exercise programme helps to build muscle and lose fat. The ratio of fat to fat-free weight is particularly important during growth because overweight children tend to become overweight adults. Physical activities are vitally important in the maintenance of healthy body composition. Children and adolescents are increasingly inactive; these patterns tend to persist throughout life. However, programmes of vigorous physical activity and proper diet can reverse the process of chronic obesity (Brooks et al., 2000).

Effect of aerobic exercise training on:

Total body weight

The total body weight is the product of lean weight plus fat weight. The lean body weight or fat-free weight is the total weight of all the body component minus body fat,(Verducci, 1980). So, body composition is concerned in part with total body weight. The lean body weight is a quantitative measure of the lean body mass, which refers to all the body tissues with the exception of stored fat, (Amusa et al., 2005). The effect of exercise on lean body mass, specifically muscles, differ with different types of exercises. Resistance training results in an increase in muscle size by increasing muscle fibre size. Aerobic exercise, in contrast, does not usually result in an increase in muscle size, but concentration (Du Toit et al., 2002). Hoeger and Hoeger, (2005) mentioned a study that found that at the end of a 6 -week aerobic dance training, student participants had a significant increase in lean body mass and an aerobic decrease in total body weight. The determination of the body weight is made on a reliable set of scales. The bathroom or portable variety can be used for estimation but should be placed on a level surface and adjusted before use (Watson, 2013). The participatant, wearing light dress, should stand upright and perfectly still on the centre of the platform with his hands by his side.

Overweight is the excessive body weight for an individual's height, age and sex (Baumagartner and Jackson, 2006). The individual weighs more than his ideal weight. The ideal body weight is the weight at which the body fat percentage is equal to or lower than the recommended fat level for the sex and age of the individual (Hockey, 2003). When an individual's weight is 20% more than that defined on the basis of sex, height and frame size, it is overweight. When the overweight is because of excess body fat, it is called obesity. Body Mass Index, (BMI) is a better indicator of condition when compared to body weight. Bray (2004) avers that obesity is an epidemic disease itself and related health problems have been widely reviewed. It is one of the risk factors for coronary heart disease. It is also a risk factor for other diseases of the cardiovascular system including hypertension, congested heart failure, asthma, diabetes (type II) sleep apnoea, osteoarthritis and intermittent claudication (Bray, 2004, Hoeger and, 2005)

Health cost of obesity parallels the cost associated with smoke-related diseases. ACSM (2001) notes that an estimated $100 billion is spent on obesity-related conditions annually. The majority of this health care appears to be associated with the two main chronic diseases associated with obesity, namely, cardiovascular disease and cancer. Underweight people too, have health problems and a higher mortality rate. Although the social pressure to be thin has waned slightly in recent years, the pressure to attain model like thinness is still with and contributes to the gradual increase in incidence of eat disorders (anorexia nervosa and bulimia nervosa), especially among women . Hoeger and Hoeger, (2005) noted that extreme weight loss can spawn medical conditions such as heart damage, gastrointestinal problem, shrinkage of internal organs, immune system abnormalities, disorder of the reproductive system and even death.

Regular participation in physical activity plays a vital role in the regulation and maintenance of body weight (Getchell, 2013; Hockey 2003, Watson, 2013; Willians, 2007). It is an important lifestyle factor in weight management. Physical activity and exercise burn calories and keep the metabolism geared to using food for energy instead of storing it as fat (Fahey et al. 2003). According to Williams et al. (2007), continuous aerobic exercise lasting over ten weeks will reduce body weight. Orbach and Lowenthal, (2008) argue that exercise lowers body weight. Contrary to these, Otinwa, (2008) found no significant change in body weight after 12 weeks of structured exercise training. In a time when interest in exercise is generally decreasing and interest in music is increasing, integrating music and exercise may enhance interest and participation in exercise and reduce the many health problems associated with overweight.

Total body fat

Total body fat in the human body is classified into two types: essential fat and nonessential or storage fat. Essential fat is the body fat needed for normal physiological functions. It is necessary for proper functioning of certain body structures, such as the brain, nerve tissues, bone narrow, heart tissue and cell membrane. Essential fat constitutes about 300 of total weight in males and 12% in female (Hoeger and Hoeger, 2005; Williams, 2007. The additional 9-125 essential fat gives them a total of about 12-155 essential fat, although the amount may vary considerably among individuals (Williams 2007). Storage or nonessential fat is simply a depot for excess energy. It is the body fat stored in the adipose tissue and is found mostly beneath the skin, where it is called subcutaneous fat, and around major organs for protection in the body. Visceral fat is a type of storage fat. It is associated with increased health risks. So, there is need to put it in check. Excess storage fat is usually the result of consuming more energy as food than is expended in metabolism and physical activity (Williams, 2007).

The measurement of body composition and fat in particular, has become very popular in recent years, (Corbin et al., 2003). Many schools and fitness centres include a body fat analysis as one of their services. Many techniques are employed in this measurement and they have their own limitations (Williams 2007). The only direct, accurate method of analysing body composition is by chemical extraction of all fat from body tissues but this is not appropriate with living humans. Thus, a variety of indirect methods have been developed to assess body composition. Some are relatively simple, such as a visual observation by an experienced judge, while others are rather complex, such as the nuclear magnetic resonance imaging (MRI) using very expensive machines. Indirect methods are only estimates.

Willams (2007) mentions the following as methods used to determine body composition: anthropometry, bioelectrical impedance analysis, (BIA), body plethysmgraphy,

Computed tomography (CT), dual-energy x-ray absorptiometry (DEXA-DXA), dual-abaton absorptiometry (DPA), infrared interactance, MRI, neutron activation analysis, skinfold thickness, total body electrical conductivity (TOBEC), total body potassium, total body water, ultrasound, and underwater weighing (hydrodensiometry). Most of these techniques are sophisticated, costly and are not readily accessible to the general population. Fahey, Insel and Roth (2003) identify two simple, inexpensive methods of estimating body composition as body mass index (BMI) and skinfold measurement.

Body mass index

One of the techniques scientists use to estimate thinness and excessive fatness is the body mass index, (BMI). The body mass index is a crude anthropometric index of obesity, (Heyward, 2002). It is used to identify individuals at risk of disease such as diabetes mellitus, hypertension, heart disease, and even cancer. Compared to skinfold measures, it is relatively simple, expensive and does not require a high degree of technical skill and training (Heyward, 2002). It is a height-to-weight ratio which gives an approximate guidelines as to whether one is simple overweight or has passed into the obese stage. The height and weight table commonly used to control weight does not reveal whether a fluctuation in weight is due to a change in muscle, body water, or fat and cannot differentiate between overweight and overfat. It does not take into account a person's degree of fatness (Corbin et al., 2003 and Fahey et al., 2003).

The BMI is probably the best way to use height and weight to assess fatness. It is calculated using a special formula and has a higher correlation with true body fatness than weight determined from height-weight tables. Nevertheless, the BMI may misclassify active people who have large muscles mass (Corbin et al., 2003). The index incorporates height and weight to estimate critical fat values at which the risk for disease increases. Body mass index is calculated by dividing the weight in kilogram by the square of the height in metres or multiplying weight in pounds by 705 and dividing this figure by the square in inches (Hoeger and Hoeger, 2005). For example, a person who weighs 130 pounds (59kg) and is 5 feet, 3inches (1.6m) tall would have a BMI of $59kg/(1.6m)^2$ or $23kg/m^2$. Simply put, BMI is calculated by dividing the body weight in kilogramme by height by metres, then divide the result by the height in metres again. A BMI rating of 18.5 to 24.9 is considered the healthiest, 25-29.9 is overweight and over 30 is obese (Corbin et al., 2003). Also ACSM (2000) recommended it for the evaluation of obesity (BMI>30kg/m^2) and as an indicator of a risk factor for coronary heart disease. With BMI standards the overall average prevalence of obesity in adults for the year 2000 was 8.2% of the global population. The prevalence of obesity increased progressively with the degree of development of countries (WHO, 2001). Body mass index as a field test has been used many scientists. It is good for large population studies but it is less useful for measuring changes in body composition in individual.

There is paucity of literature in the area of exercise, adolescence and BMI. Frisancho (2000) argues that BMI increases steadily even during adolescence, which Eriga (2000) calls athlete stage of human life cycle. According to Pollock et al. (2002), many aerobic fitness programmes have recorded a significant decrease in body mass index, indicating that aerobic exercise training decreases BMI. Body fat and fat-free mass are mentioned more frequently than BMI in most studies. This may have contributed to the paucity of the literature in this area. However, Emeghara (2001) reported a significant reduction in the BMI of the cardiac patients after months of aerobic training programme. He postulates that the reduction in BMI could be attributed to the improvement in the body weight and per cent body fat.

Percent body fat

Per cent body fat is simply the proportion of total body weight that is fat weight (Baumgantner and Jackson, 1999). A person's performance is affected by higher percentage of body fat. This is true of all activities in which the body weight must be moved through space (Willmore and Costil, 2014). Too much body fat makes all types of physical activities very difficult because just moving through everyday activity means working harder and using more energy. Overfat people generally are not fit than others and do not have the muscular strength, endurance and flexibility that make normal activity easy. They do less of exercise because it is more difficult, depriving themselves of an effective way of improving body composition (Fahey, et al., 2003). An unfit, less active, overweight or obese adolescent would probably grow into adulthood with the health consequences of all or one of these conditions. Hence, the need to make special effort to increase the activity level of this population who, by nature, are athletic. (Eriga, 2012)

Body fat is regarded as being too high when it exceeds 25% for adolescent boys and 35% for adolescent girls (Westigate and Deuernberg, 2008). College-age men have an average of about 15% of their total weight as fat while college age women have about 23% (Amusa et al., 2001). Per cent body fat is considered to be low when it ranges between 6% and 10% in boys and 12% and 15% in girls. Low percentage of body fat can adversely affect metabolism and health and it may indicate the incidence of disease, under nutrition or eat disorder (Lohman, 2013).

Excessive body fat or obesity is a major health problem. It is associated with diseases such as diabetes mellitus, hypertension, coronary heart disease (CHD), cancer and many other health problems (Monyeki et al., 2002; Pi-Sunyer,2003; Bray, 2004). In recent years, national surveys have shown that children of all ages are fatter now than 20 years ago (Goran, 2000; Heward, 2002; Troiano et al., 2005). Akinrogunde (2008) mentions a study that indicated that children have a life-long struggle with their weight and are at high risk of developing high blood pressure, diseased arteries, damaged hearts and liver damage in adulthood. Obesity, according to WHO (2003), is a disease in which excess body fat has accumulated because more energy has been stored that has been used, to such an extent that health may be adversely affected.

Furthermore, Macek et al., (2008) found that aerobic exercise done 30-40 minutes, 3 times per week, between seven and twelve weeks significantly affected per cent body fat of adolescents. Other studies (Du Toit et al., 2001; Emiola et al., 2002; UUSM, 2004; Otinwa, 2008; Saris, 2015;), have shown that aerobic exercise lowers percent body fat. Contrary to the above findings, Pollock et al., (2002) and Boileau et al (2011) observed no significant reduction in percentage body fat following exercise training. Although physical activity or exercise will not result in immediate and large decrease in body fat levels, there is evidence that fat loss resulting from exercise may be more than fat loss from dieting. Vigorous exercise can increase the resting energy expenditure up to13 times, 13 METs, which means metabolic equivalent (Corbin et al.,2003). One metabolic equivalent is the amount of energy expenditure at rest.

Once an individual is obese, treatment is not very effective. Levin (2000) notes that neural circuits predisposing to obesity are not easily abolished. The prevention of obesity is, therefore, of prime importance, particularly in childhood and adolescence.

Gibbs (2006) asserts that there must be a window of opportunity in childhood where environment influences the set point. The two major elements in environment that can contribute to the development of obesity during childhood and adolescence when the most severe cases of obesity begin to develop are diet and physical activity (Williams, 2007). Fisher and Birch (2005) claim that the child may be raised in a family where high-fat meal and overeating are very common. Also, the supermarket diets of today make it easy for children to consume large calories. Sugar and fat are found in a variety of food that are eaten and constitute about 50% of daily caloric intake of most families. Some studies found that consumption of sugar-sweetened items is associated with obesity in women (Williams, 2007).

Modern technology has helped to make life more comfortable and enjoyable in numerous ways. Paradoxically, technology has exerted a negative effect on human health, as the development of television, computer, and other labour-saving devices may decrease levels of physical activity. Technology has decreased the amount of energy normally expended through no exercise activity thermogenesis (NEAT) each day, such as walking, standing and even fidgeting (Williams, 2007). Levine (2004) notes that NEAT is the energy expended for everything we do that is not sleeping, eating, or sports-like exercise. When the level of NEAT decreases, total daily energy expenditure decreases, leaving the body with excess calories to store as fat.

Measurement of per cent body fat

Per cent body fat is measured from body density, the ratio of body weight and body volume. The hydrostatic (or underwater) weighing method is the most common laboratory method used to measure body composition. Its measurement objective is to measure body volume, which then is used with body weight to calculate body density. Per cent body fat is then calculated from body density (Baumgantner and Jackson ,(2009). The hydrostatically determined body composition is rarely used in field settings due to the need for highly expensive equipment. The most common alternative is to use some form of anthropometric methods. These methods include weight-height ratios or BMI, body circumference, waist-hips ratio and skinfold measurements (Verducci, 1980;Baumgartner and Jackson, 2006). The skinfold measurements offer a second way to distinguish muscle from accumulation after hydrostatic method (Shepherd, 2012). Skin fold measurements are highly correlated (r=o.8-o.9) to hydrostatically determined body density.

It involves measuring a double thickness of subcutaneous fat with a specially designed calliper (Petter etal., 2004;Baumgantner and Jackon, 2009). Body fat is distributed throughout the body. About one-half of the body's fat is located around the various body organs and in the muscles. The other half of the body's fat is located under the skin or skinfolds. A skinfold is two thickness of skin and amount of fat that lies just under the skin. Skinfold thickness remains relatively constant until age seven, after which it gradually increases (Graham et al., 2001). By measuring skinfold thickness of various sites around the body, it is possible to estimate total body fatness. Skinfold measurement is often used because it is relatively easy to do. It is not like as underwater weighing and other methods that require expensive equipment. A set of calliper is used to make the measurement.

Amusa, Igbanugo and Toriola (1998) provids the following guidelines for taking skin measurement

(1) The participant's skinfold must be picked between the index finger and thumb.

(2) Apply the calliper jaw gently about one centimetre from the fingers.

(3) Measure all skinfold to the nearest 0.5mm.

(4) Be meticulous in locating the appropriate anatomical landmarks. Mark the anatomical landmarks with ink (Watson 1993).

(5) Allow a considerable practice to establish test –retest reliability.

(6) Take the reading 2-5 seconds after application of the calliper jaw (Watson, 1993).

Corbin et al (2003) simplity these guideline with the following procedures to be used for each skinfold site.

1 Lay the caliper down on a nearby table. Use the thumbs and index finger of both hands to draw up a skinfold or layer of skin and fat. The fingers and thumbs of the two hands should be about 1 inch apart, or half an inch on either side of the location where the measurement is to be made.

2 The skinfolds are normally drawn up in a vertical line or a horizontal line. However, if the natural tendency of the skin aligns itself less than vertical, the measurement should be done on the natural line of the skinfold, rather than vertical.

3 Do not pinch the skinfold too hard. Draw up so that the thumb and fingers are not compressing the skinfold.

4 Once the skinfold is drawn up, release the right hand and pick up the caliper. Open the jaws of the caliper and place it over the location of the skinfold to be measured and one half inch from the left index finger and thumb. Allow the tips, or jaw, of the caliper to close on the skinfold at the level about where the skin would be completely.

5 Let the reading on the caliper settle for 2 or 3 seconds, then note the thickness of the skinfold in millimetre (mm).

6 Three measurements should be taken at each site, or location. Use the middle of the three values to determine the measurement. For example, if the value of 10, 11 and 9 were observed, the measurement for that location would be 10. If the three measures vary by more than 3mm from the lowest to the highest, it may be repeated.

In general, the more the skinfolds measured, the more accurate the body fatness estimate, will be. However, measurement with two or three skinfolds have shown to be reasonably accurate and can be done in a relatively short period (Corbin et al 2013). Lohman (1992) developed several skinfold equations for estimating the per cent body fat of youths. These equations use the sum of two skinfolds combinations:

(1) Sum of triceps and calf and

(2) Sum of triceps and subscapular skin folds.

The sex – specific triceps and calf skin fold equations were developed with the multicomponent model and are recommended for use with children and youth of any ethnic group (Baumgatner and Jackson, 1999). These equations are-

Male % fat = [(0.735 * Triceps + calf) + 1.0]

Female % fat = [(0.735* Triceps + calf) + 5.0]

Factors guiding exercise training

In designing a development exercise programme, certain factors must be considered. Chad (2001) mentions that every cardiovascular exercise should start with a good warm-up and end with a cool down. A good warm-up should be done for at least 5 to 20 minutes at low intensity. It is usually done by doing the same activity as the aerobic workout but at an intensity of 50-60 % of maximum heart rate (max HR). After 5-10 minutes' warm-up at a relatively low intensity, the primary muscles used in the warm – up should be stretched before proceeding to the aerobic exercise bout (AAOS, 2002; Balbach, 2000; Getchell, 2013; McGlynn, 2009).

The cool down follows the exercise bout. It is not good to stop suddenly at the end of exercise training.This is because the body is still sending extra blood to the muscles. Stopping suddenly can lead to muscles cramping and dizziness. This is why there should be a cool down at the end of the aerobic or bout section (Balbach, 2002). The cool down is similar to the warm-up in that it should last 5 to 10 minutes and be done at a low intensity (50-60% of max HR). This tapering-off period can be made up of activities like slow jogging, walking and stretching the major groups used in the exercise (Getchell, 2013). For maximum effectiveness and safety in the use of exercise in developing physiological profiles, specific instruction on the some factors should be considered. These factors are intensity, duration, frequency and mode of exercise (ACSM, 2008; 2009; 2010).

Frequency of exercise

This is the first computer of aerobic exercise (Chad, 2001), which refers to the number of sessions per week (Watson, 2013). To develop both cardiovascular fitness and to decrease body fat (physiological profiles) or to maintain body fat at optional levels, aerobic exercise should be performed at least three days per week (Chad, 2001). Several studies (Davies and Knibbs, 2001; Jackson et al., 2008; Shepherd, 2008), cited by Watson (2013), have found out that training for only a day per week produced no improvement in aerobic fitness. American College of Sport and Medicine (2008; 2009; 2010) recommended that training should be done three to five days a week. It is important to allow twenty- four to forty-eight hours for rest and recovery between exercise bouts, especially for beginners in exercise and people of low fitness levels (McGlynn, 2009).

Pollock and Wilmore (2004) reported the result of the study on aerobic capacity involving two groups of men trained for either 3 or 5 days per week for eight weeks. The findings showed that the " 5 days per week" group showed more improvement than "3 days" group. In an attempt to equalize training effects, the 3 – days group continued to train for another 5 weeks. The distribution of training session in the week (placement) can be Monday, Tuesday and Wednesday or Monday, Wednesday and Friday. (Watson, 2013).

Intensity of exercise

This is the level of physiological stress on the body during exercise (McGlynn, 2009). It refers to how vigorous or hard an exercise must be in order to contribute toward the development of aerobic fitness (Hockey, 2003). It is an important consideration in exercise training. It is usually quantified in terms of the percentage of max VO_2 or HR max (Chado, 2011; Watson, 2013). The max VO_2 is the most recommended because it is related to the amount of energy utilization, but is very difficult to measure and the equipment needed is expensive (Chado, 2011). The % HR max is such easier to measure in a practical training situation (Watson, 1993). Davies and Convertius (2005) found that the percentage of heart rate reserve (HRR), used during exercise was highly related to the percentage of VO_2 max (HRR = max HR - RHR).

The recommended intensity for aerobic fitness is 60 to 80% max HR, (Chad, 2001; AAOS, 2002, ACSM, 2002; and Balbach, 2002). An increase in heart to 75 per cent of the heart rate reserve is safe and reasonable intensity for participants (Getchell, 2013). Hoeger and Heoger (2005) provide the following steps for the determination exercise intensity or cardiorespiratory training zone:

1. Estimate the maximal heart rate (Max HR) using the formula: Max HR = 220 – age.

2. Check the resting heart rate (RHR) sometime after sitting quietly for 15 to 20 minutes. This can be done taking the pulse rate for 30 seconds and multiplying by 2, or taking it for a full minute. The pulse can be checked at the wrist by placing two or three fingers over the radial artery, or over the carotid artery in the neck.

3. Determine the heart rate reserve (HRR) by subtracting the resting heart rate from the maximal heart rate (HRR = MHR - RHR).

4. Calculate the training intensity (TI) at 40%. 50%, 60%, 80% and 85%. Multiply the heart rate reserve by the respective 40, 50, 60, 80 and 85 percentages, and then the resting hear rate to each of these five values.

The formula below is followed to calculate this training heart rate (THR) for both 60% of maximal heart rate.

THR (60% Max HR) = [(Max HR – RHR) * 0.60] +RHR

For most young adults, this intensity means a training heart rate in the range of 150 to 170b/min; (Getchell, 2013).

Duration of exercise

This is a factor that can make or mar an exercise training programme. An appropriate duration enhances exercise benefits, while inappropriate duration can increase the risk of injury that could stop the exercise; or too short to enhance exercise benefits. The duration is based on the intensity of exercise. It refers to the length of each training sessions (Chad, 2001 and Watson, 1993). According to Pollock and Wilmore (1994), improvement in aerobic capacity is directly related to duration of exercise. They reported improvement in aerobic fitness after 6 to 10 sessions, each lasting only 5 to 10 minutes. Earlier studies (Watson, 1993) found that greater gains occurred during 20 to 30 minutes' periods of work than from 10 minutes' period. The American College of Sports Medicine (ACSM) recommended a minimum of 10 minutes per session (ACSM, 1990; 1991). Other authorities have recommended a minimum period of 20 to 60 minutes per session (Chad,2001; AAOS, 2002; Balbach, 2002; McGlynn, 2009). Hockey (1993) recommended that under 20-years-olds should have a warm-up (5-10 mins); aerobic session (20-30 min) and cool down (5-10 min).

Mode of exercise

This refers to the type of activity that is used to achieve the desired outcome. The types of exercise that belong to the aerobic exercise include – vigorous, continuous and rhythmic activities that use the large muscle group (Balbach, 2002;Getchell, 2013). These activities include aerobic dance, walking, biking, jogging, running, swimming, roping, canoeing, stair, climbing, rowing and other activities of long duration, yet low in intensity (AAOS, 2002; Balbach, 2002; Heyward, 2002; Hockey, 2003;Getchell,2013). Football, soccer, volleyball, golf, lifting, bowling, gymnastics and tennis are anaerobic activities (Balbach, 2002) or poor aerobic activities, (Hockey, 2003).

Dance and aerobic dance

Dance is probably one of the most difficult areas in physical education programme. Few teachers in physical education have experience in dance. This limited background on the part of the teachers has negatively affected the programme of dance in physical education (Graham et al., 2001). Dance experience in physical education gives the learners the ability to use their bodies to express feelings and attitudes about themselves and others; a sense of self-satisfaction that can be derived from effectively using one's body as an instrument of expression; enjoyment and appreciation of dance as a worthwhile expression for all, not just for few; an appreciation of dance as an art medium that can have value for both the participant and the spectators; and the ability to interpret and move to different rhythms.

Dance experience can be classified into three types: rhythmic experience; folk (ethnic or square dance) and creative dance (Graham, et al., 2001). In recent years, more popular dance types have changed. Examples include ballet, country, disco, folk, hip-hop, square and swing. These forms of dance, when done continually, can contribute significantly to cardiovascular fitness. For dance to be considered active, it should be performed in the target zone for cardiovascular fitness. Less active dance, like slow social dance is equivalent to a lifestyle activity (Pryor,2000;Corbin et al, 2003 and Pryor). In the 1970s, Jackie Sorensen popularized a type of dance called aerobic dance. Aerobic has become a popular form of exercise in fitness and wellness practice.

Aerobic dance-mode of exercise

Aerobic dance was thought to be the most common fitness activity for women and older people. Its routines consist of a combination of stepping, walking, jogging, skipping, kicking and arm swinging movements performed to music (Heyward, 2002; Hockey, 2003; Hoeger and Hoeger,2005). It is a choreographed series dance steps and exercise done to music. Other forms of these activities have been promoted as rhythmical aerobics, jazzercise, and dancercise, (Corbin et al.; 2003). Exercise focused on rhythmic aerobics dance can be done with no special equipment and can be adapted to almost any kind of music (Daniel, 2009). It is a fun way to exercise and promote cardiorespiratory development. The up – beat music tempo creates an atmosphere of excitement (Robbins et al.; 2009).

Aerobic dance was developed initially in the early 1970s by Jackie Sorenson as a fitness programme for Air Force wives in Puerto Rico. Then it was well accepted. It is a legitimate fitness activity with more than 20 million participants of all ages. In USA and Latin America, it is part of school curriculum, health clubs, and national facilities. It has become a very popular fitness activity (AAOS, 2002; Balbach, 2002; Heywood, 2002;Peltzer et al.;2002; Hoeger and Hoeger, 2005; Oduyale, 2012; Lorna, 2013).

In aerobics, moves of low intensity or high intensity can be done. The level of intensity depends upon how high one can bring the arms. They can drop around the hip-line, raised to the shoulder level or over the head. When tiredness sets in, the dancer marches in a place for a while until exercise is resumed. A warm-up should end with a cool-down (Balbach, 2002).

Aerobic dance combines the cardiovascular benefits of jogging and traditional walk – jog, with the joy of dancing (Robbins et al.; 2009; Garber et al.; 2012). It has excellent potential for the development of all components of physical fitness and has been found to be a total body work-out that is effective in younger population, like the adolescents (Williford et al.; 1990). Aerobics involves varieties of movements which involve large muscle group. These movements not only strengthen the cardiorespiratory system but also increase flexibility and tone muscles and enhance body composition (Lorna, 1993; Robbins et al.; 1999; Hockey 2003). Studies have shown that the effects of aerobics on health related variables are comparable to that of any other mode of aerobic exercise (Williford et al.; 2011 ;Garber et al.;2012).Hoeger and Hoeger (2005) reported a study that found, that at the end of a 6- week aerobic dance training programme, student-participants had a significant fat loss. During training on aerobic dance, heart rate should be monitored at least six times to ensure that the heart rate stays within the target zone (Russell, 2003).

Aerobic dance has three popular modalities, namely high impact-aerobics, low-impact aerobics and step aerobics. High - impact aerobics (HIA) is the traditional form of aerobic dance. The movement exerts a great amount of vertical force on the feet as they contact the floor. This modality requires proper leg conditioning through other forms of weight-bearing aerobic exercise as well as strength training. Therefore, it is not recommended for beginners and people of low fitness level (Hoeger and Hoeger, 2005). High - impact aerobics is an intense activity, and it produces the highest rate of aerobic injury. Common injuries associated with HIA are shin splints, stress fractures, low- back pain and tendonitis. These injuries are caused by the constant impact of the feet on firm surfaces.

Low-impact aerobics (LIA) is a mode of aerobics where the impact is less. Each foot contacts the surface separately. It has a low rate of aerobic injuries. To help elevate the exercise heart rate, all arm movements and other movements that lower the centre of gravity of the body should be accentuated. Movement should be sustained throughout the programme to maintain or keep the heart rate in the target cardiorespiratory zone. In step aerobics, (SA) the participants here step up and down from a bench 2-10 inches high. The step is a variety that adds enjoyment to the aerobic workout. It is high-intensity but a low-impact activity. The intensity is raised easily by increasing the height of the bench. The benches can be stacked together safely to adjust the height of the bench. Beginners and people of low fitness levels start with benches with the lowest stepping height and gradually progress to higher benches. This systematic and gradual advancement to higher level decreases the risk of injury. This modality aerobics is not recommended for people with ankle, knee or hip injuries (Hoeger and Hoeger, 2005).

Appraisal of the literature reviewed

The review of related literature in this study examined the health-related variables and work productivity. It also looked into the definition and overview of aerobic dance exercise. The effect and prevention of health implication of health-related variables were also examined.

The literature on the global prevalence of health-related variables and work productivity in relation to the uses of aerobic dance exercise programme were also reviewed. The intensity of exercise, the duration and frequency of exercise and sample of the participants involved in the study, possible effect of aerobic dance exercise were also discussed.

CHAPTER THREE

METHODOLOGY

The method and procedure used in this study are discussed under the following sub-headings:

1. Research design
2. Population of the study
3. Sample and sampling techniques
4. Research instruments
5. Validity of the instruments
6. Reliability of the instruments
7. Procedure for training programme
8. Procedure for data collection
9. Pilot study
10. Procedure for data analysis

Research design

The pretest posttest control group quasi experimental design was used for this study. The two groups were assigned into experimental and control groups. The participants in the experimental group were involved in the intervention programme of aerobic dance exercise. The control group was placed on placebo (Lifestyle education) only without aerobic dance exercise. This design provided the venue through which differences were checked.

Population

The population for this study were male and female beverage industry workers in Oyo and Osun States.

Sample and sampling technique

The samples for this study were seventy-two (72) beverage industry workers. The purposive sampling technique was used to select those departments where there are high cases of health-related fitness complications (low back pain, pain in the arms, shoulder pain, neck pain, upper back pain regular, early fatigue and depressive mood). Beverage industry clinic case files were used to select the participants. The two groups were assigned into experimental and control groups Thirty-six participants in International

Brewery Ilesa served as the experimental group, while thirty-six participants from Cocacola Factory Asejire were in the control group.

Exclusion Criteria

1 Participants must not have medical reports such as chest pain, heart attack, asthma etc contra-indicating exercise participation.

2 Participants must not engage in any exercise programme few weeks before, during and after the recruitment for the study.

Inclusion criteria

1 Participants were beverage industry workers from Oyo and Osun States.

2 The participants who filled the informed consent and physical readiness questionnaire form were allowed to participate in the exercise.

Research instruments

The following instruments were used for this study.

1. **Skin fold Calliper**: The Large skinfold caliper (non-metallic model 3003) made by Cambridge Scientific Industries Incorporated, U.S.A. was used to measure thickness of fat of the participants. The calipers are graduated from 0 mm to 67mm with a constant pressure of log1mm.
2. **Flex Box**: With a measuring scale marked in centimetres, the wall sit and reach test was used to assess the flexibility of the participants.
3. **Hand Grip Dynamometer:** Camry model EH101 was used to measure the strength of the hand.
4. **Stethoscope**: Made in the United State of America (USA) it was used to measure heart rate profiles of the participants.
5. **Sphygmomanometer**: The freestyle ACCUSSON Aneroid Sphygmomanometer made in England was used to measure blood pressure profiles.
6. **Stadiometer:** This was used to measure participants' height to the nearest 0.5 centimetre
7. **Weighing Scale**: Hanna portable weight measuring scale (RA9012) made in England was used to measure the total body weight of the participants in kilogram (kg).

8. **Stop Watch**: The track star jewels digital stopwatch made in Switzerland was used in timing the participants' heart rate.

9 **Register:** This was used to obtain records of absenteeism of the industrial staff.

10 **Clinic case file records:** These were used to access workplace accident rate record on health related fitness complications and medical history prior to the treatment.

11 **Productivity Scales:** These were used to access the industrial staff work output.

12 **Palomino cardio-fitness audio cassette jam beat and rhythm:** This was used for dance exercise and movement counts

Validity of instrument

The instruments for this study were standardized instruments. They had the important characteristics of a standardized instrument as requested by Gay (1980) which are specification, direction for scoring and interpretation. However, the researcher and her assistants cross-checked the instruments and ascertained that they were in good working condition before usage.

Reliability of the instrument

All the instruments used have been proven scientifically reliable. The stadiometer had a reliability coefficient of 0.99 (Mathiowetz, Weber, Volland and Kashman 1984). The weighing scale had 0.96 (Watson, 1993;Matheouretz, Weber, Volland and Kashman 1984) reported that stethoscope, sphygmomanometer, and skinfold calliper have a reliability coefficient of 0.95.each

Pilot study

A pilot study was carried out before the main study. Twenty (20) male and female workers from Nigeria Brewery Ibadan were used for the pilot study. The pilot study helped the researcher to be well acquainted with the instrument and other requirements for the study. The pilot study also informed the researcher on the need to sustain the interest and commitment of the participants. It also enabled the researcher to know if there was need for more research assistants for the study. This helped to save time and material resources.

Ethical consideration

The study was subjected to ethical consideration and subsequent approval from the Social Science and Humanities Research Ethics Committee (SSHREC) of the University of Ibadan. Both electronic and hard copies of the research proposal indicating the participants' dossiers and letter of introduction from Head, Department of Human Kinetics and Health Education, University of Ibadan was submitted to the Chairman of SSHREC for approval. Only participants who filled the informed consent form were used in this study. Confidentiality of the participants was assured; reference was not made to their names and other personal data. They were not exposed to any form of risks, there were regular water breaks, they visited the rest room, they picked towels to clean up the sweat on the their bodies.

Research schedule

The following research schedule was followed in this study:

Test Location: The open field in front of the International Brewery Clinic Ilesa served as the research centre and test location for the experimental group, while the clinic and the canteen of Cocacola Factory, Asejire were used for the control group.

Informed Consent: All participants were well informed about the nature and purpose of the test before commencement. They were also given informed consent form which they filled, signed and returned to the researcher.

Procedures for Training Programme: The following procedures were followed for the training programme.

1. The training programme was a continuous low to moderate impact of aerobic dance performed by experimental group, while the control group was placed on lifestyle education.
2. The training programme lasted for twelve weeks. There were three sessions per week.
3. The placements (days for training) were Tuesdays, Thursdays and Saturdays for the experimental group with music, while Mondays, Wednesdays and Fridays were for the control group without music.
4. Each training session for the experimental group was made up of three segments. This included general calisthenics, conditioning bout or aerobic segment and cool down.

5. The training was conducted on the industry's field while the measurements were taken inside the industry's clinic.
6. The researcher, with the help of 6 trained research assistants undertook the administration, measurement and recording of the data.

Muscular strength test

Objective: To assess muscular strength

Equipment: Hand grip dynamometer

Procedure: The hand strength of the participants was measured using the hand grip dynamometer. The participant placed his/ her forearm between angles of 90-180 to the upper arm; the participant was then squeezed as hard as possible. The procedure was repeated twice or thrice for each hand and alternating between the hands. The middle recording/ the mean of the recording was used as the score.

Scoring and interpretation: After each test, the maximum force generated was recorded in Kilogram (Hockey, 2003)

Muscular endurance test (Sit-up in 1min)

Objective: To perform the maximum number of sit-up in 1minute.

Equipment: Mat and stopwatch

Procedure: The participant performed the test with knees bent, feet flat on the floor about 18 inches (45.7cm) from the buttocks and the hands touching the side of the head. A partner held the participants feet as the test was being performed. The elbow to the alternate knee with each sits-up and the participant performed as many sit-ups in 1 minute as possible.

Scoring and interpretation: The number of correct repetitions were compared with first record and recorded (Hockey, 2003)

Flexibility test (sit and reach)

Objective: To monitor the development of the trunk flexibility.

Equipments: Metre rule, tape measure.

Procedures: The participant warmed up for one minute and then removed his/her shoes. The assistant secured the ruler to the box top with the tape so that the front edge of the box was in line with the 15cm (16 inches) mark on the ruler and the zero end of the ruler point towards the participant. The participant sat on the floor with his/her legs fully extended with the heel against the box. The participant placed one hand on the top of the other; slowly bent forward to reach along the top of the ruler as far as possible, holding the stretch for two seconds.

Scoring and interpretation: The distance reached by the participant's finger tip was recorded. Three performances were allowed: the average of the three distances were recorded as the participant's performance (Hockey, 2003)

Cardiovascular endurance test (YMCA 3 minute step test)

Purpose: To assess aerobic fitness.

Objective: To step up and down to a set cadence for 3 minute and take the resulting heart rate.

Equipment: 12in. (30.5cm) high bench.

- Metronome sets at 96beat/ min.
- Stop watch.
- Stethoscope

Procedures: The participant listened to the metronome to become familiar with the cadence and begin when ready with the time started. The participant stepped up and down to the 96beat/min cadence, which allows 24 steps/min. This continued for three minutes. After the final step-down, the participant sat down and the heart rate was counted for one minute.

Scoring and interpretation: The one-minute recovery heart rate was the score for the test (Hockey, 2003).

Body composition test (YMCA skin fold test)

Purpose: To estimate the participants per cent body fat.

Objective: To provide a method of accurately estimating body composition.

Equipment: Skinfold calliper.

Procedures: Measurements was taken on the left side of the body in the following order:

- Mark participant site.
- Pull fat away from muscles
- Place the calliper halfway between top and bottom of the mark
- Allow calliper to settle (1-2 seconds) and record

Scoring and interpretation: The process was repeated at least three times; the measure did not vary by more than 1mm. The median value was used as the measurement (Hockey 2003)

Procedure for data analysis

The data were analysed using descriptive statistics of frequency count, percentage mean and standard deviation for demographic characteristic of the participants as well as to answer some research questions. Cochran Q test and Analysis of Covariance (ANCOVA) was used to test the hypothesis at 0.05 level of significance.

CHAPTER FOUR

RESULTS AND DISCUSSION OF FINDINGS

The study was carried out to determine the effect of a 12-week aerobic dance exercise programme on selected health-related variables and work productivity of beverage industry workers in Oyo and Osun States. Data were collected through pre-test and post-test performance of the participants following their exposure to the treatment.

Presentation of results

Descriptive statistics of demographic variables

Table 4.1: Frequency distribution of participants based on group

	Frequency	Per cent	Valid Per cent	Cumulative Per cent
Experimental group	36	50.0	50.0	50.0
Control group	36	50.0	50.0	100.0
Total	**72**	**100.0**	**100.0**	

Fig. 4.1 shows the frequency distribution of participants. Thirty-six (50%) were in the experimental group, while thirty-six (50%) were in the control group.

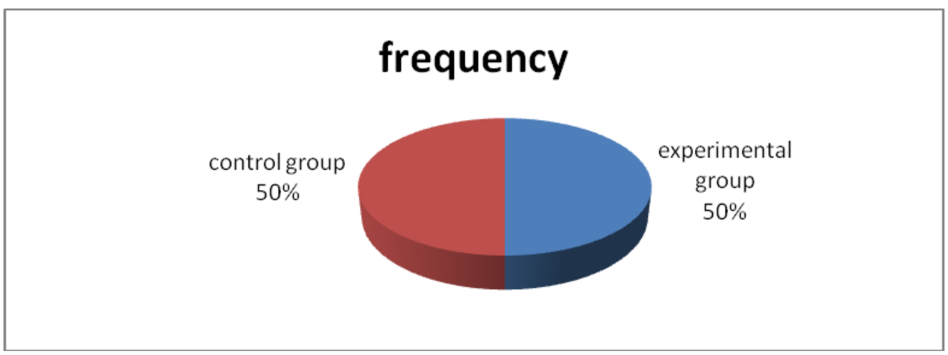


Table 4.2: Frequency distribution of participants based on gender

Categories	Frequency	Per cent	Valid Per cent	Cumulative Per cent
Male	46	63.9	63.9	63.9
Female	26	36.1	36.1	100.0
Total	**72**	**100.0**	**100.0**	

Table 4.2 captures the frequency distribution of the participants. Forty-six (63.9%) were male, while twenty-six (36.1%) were female participants

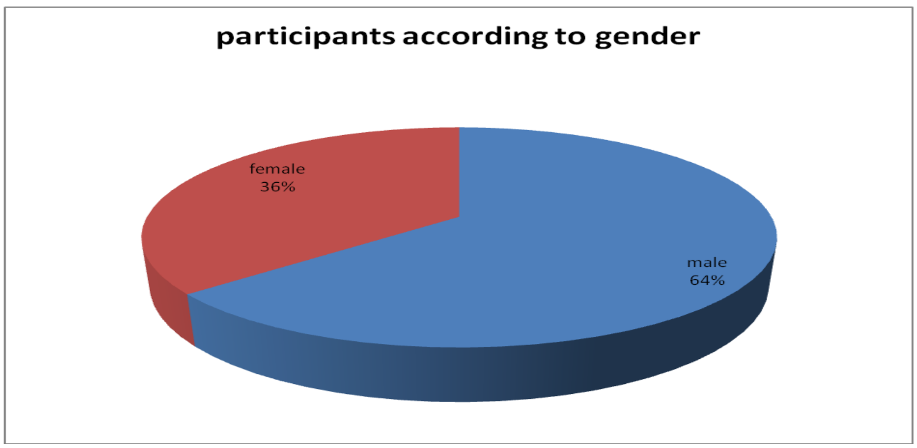


Table 4,3: Frequency distribution of participants based on age

Categories	Frequency	Per cent	Valid Per cent	Cumulative Per cent
30 to 49 years old	51	70.8	70.8	70.8
50 to 69 years old	21	29.2	29.2	100.0
Total	**72**	**100.0**	**100.0**	

Table 4.3 shows the frequency distribution of the participants. Fifty one (70.8%) were between the ages 30 and 49 years, while twenty (29.2%) were 50 to 69 years old

4.4.1: Research Questions

Research question 1a: What are the types of work health promotion programme existing in the industry?

Table 4.4.1a: Types of worksite health promotion programme in the industries

S/no	Item	Frequency YES	%	Frequency NO	%
1	Does your establishment have state of the art sporting facilities, fitness programme or recreation park?	10	27.8	26	72.2
2	Do you regularly participate in the programme?	6	16.7	30	83.3
3	Are your dependants incorporated in to the programme?	-	-	36	100
4	Is the industry have coordinator for the programme?	36	100	-	-
5	Do you have any other hobbies like cycling,	19	52.8	17	41.2
6	Do you have programme for back management?	19	52.8	17	41.2
7	Do you smoke?	05	13.9	31	86.1
8	Does you industry have programme for stress management?	10	27.8	26	72.2
9	Does your organization have programme for weight control?	-	-	36	100

Source: Computed from primary data

Table 4.4.1a: above shows the responses on worksite fitness programme among industry workers in Oyo and Osun States: 10 (27.8 %) of the workers in the industries have fitness programme, while 26(72.2 5) said no. Also 6 (16.7%) regularly participated in the worksite health promotion programme, while 30(83.3%) did not. All the 36(100%) participants said that their dependant was not incorporated into the programme. All of them 36 (100%) said that their industry had coordinator for the programme. Only19 (52.8%) said they had other hobbies, like cycling, while 17 (41.2%) said that they did not have other hobbies. Similarly 10 (27.8%) said that the breweries have programmes for stress management, while 26(72.2) said no Also 19 (52.8%) said the industries have programme for back management while17(41.2%) said no. Only 5 (13.9%) said they were smoking, while 31 (86.1%) said they were not smoking. Lastly 36 (100%) said the organisation did not have programmes for weight control.

This result revealed that worksite health promotion programme existing in the industry. These included cycling and fitness programmes .However weight control was not in existence. This is an indication that intervention is necessary to improve worksite health promotion programmes of the companies.

Control Research question 1b: What are the types of work health promotion programme existing in the industry?

Table 4.4.1b: Types of worksite health promotion programme in the industries

S/no	Item	Frequency YES	%	Frequency NO	%
1	Does your establishment have state of the art sporting facilities, fitness programme or recreation park?	19	52.8	17	41.2
2	Do you regularly participate in the programme?	10	27.8	26	72.2
3	Are your dependants incorporated in to the programme?	05	13.9	31	86.1
4	Is the industry have coordinator for the programme?	36	100	-	-
5	Do you have any other hobbies like cycling?	-	-	36	100
6	Do you have programme for back management?	05	13.9	31	86.1
7	Do you smoke?	02	5.5	34	94.5
8	Does you industry have programme for stress management?	07	19.4	29	80.6
9	Does your organization have programme for weight control?	02	5.5	34	94.5

Source: Computed from primary data.

Table 4.4:1b above shows the responses on worksite fitness programme among industry workers in Oyo and Osun States: 19 (52.8 %) of the workers said the industry have fitness programmes while 17(41.2) said no; 10 (27.8%) regularly participated in the worksite health promotion programme, while 26(72.2%) did not,; 05(13.9%) said that their dependants were incorporated into the programme, while 31(86.1%) said no; and 36 (100%) said that their industry had coordinator for the programme. Similarly 36 (100%) said they had other hobbies like cycling; 05 (13.9%) said that they had programme for stress management, while 31(86.1%) said no; 02 (5.5%) said they had programme for back management, while 34(94.5%) said no; 07 (19.4%) said they were smoking while 29 (80.6%) said they were not smoking;36 (100%) said the organisation did not have programmes for weight control.

This result revealed that worksite health promotion programme existed in the industry but weight control did not exist. This indicates that intervention is necessary to improve worksite health promotion programme of the industry.

Research question 2a: What are the common health complications of workers in the industry?

Table 4.5.2a: Common health complications of workers in the industries?

S/N	ITEM	Frequency YES	%	Frequency NO	%
1	In the last 12 weeks do you have a heart attack?	-	-	36	100
2	In the last 12 weeks do you have heart problems?	-	-	36	100
3	In the last 12 weeks do you have chest pain?	-	-	36	100
4	In the last 12 weeks do you have high blood pressure?	06	16.6	30	83.4
5	In the last 12 weeks do you have any surgical operation?	-	-	36	100
6	In the last 12 weeks do you have diabetes?	-	-	36	100
7	In the last 12 weeks do you have muscle pain?	8	22.2	28	77.8
8	In the last 12 weeks do you have bone pain?	-	-	36	100
9	In the last 12 weeks do you have asthma?	2	5.5	34	94.5
10	In the last 12 weeks do you have arthritis?	-	-	36	100

Source: Computed from primary data

Table 4.5.2a: captures the response on available health complications among industry workers in Oyo and Osun States: 36 (100%) of the workers said no to having no heart attack; also 36 (100%) said no to having heart problem; 36(100%) said no to having chest pain; 06(16.6%) said yes to having high blood pressure, while 30(83.4%) said no; 36 (100%) said they did not undergo any surgical operation ; and 36(100%) also said no to having diabetes .Besides 08 (22.2%) said that they had muscle pain, while 28 (77.8%) said no; 36 (100%) said no to having bone pain ; 02 (5.5%) said they had asthma, while 34 (94.5%) said no; and 36 (100%) said no to having arthritis .

Control Research question 2b: What are the common health complications of workers in the industry?

Table 4.5.2b: Common health complications of worksite in the industries

S/N	ITEM	Frequency YES	%	Frequency NO	%
1	In the last 12 weeks do you have a heart attack?	-	-	36	100
2	In the last 12 weeks do you have heart problems?	-	-	36	100
3	In the last 12 weeks do you have chest pain?	-	-	36	100
4	In the last 12 weeks do you have high blood pressure?	05	13.9	31	86.1
5	In the last 12 weeks do you have any surgical operation?	-	-	36	100
6	In the last 12 weeks do you have diabetes?	-	-	36	100
7	In the last 12 weeks do you have muscle pain?	19	52.8	17	41.2
8	In the last 12 weeks do you have bone pain?	-	-	36	100
9	In the last 12 weeks do you have asthma?	-	-	36	100
10	In the last 12 weeks do you have arthritis?	-	-	36	100

Source: Computed from primary data

Table 4.5.2b: shows the response on available health complications among industry workers in Oyo and Osun States: 36 (100%) of the workers said no to having no heart attack; also 36 (100%) said no to having heart problem; 36(100%) said no to having chest pain; 05(13.9%) said yes to having high blood pressure while 31(86.1%) said no; and 36 (100%) said they did not undergo any surgical operation. In the same vein 36(100%) said no to having diabetes; 19 (52.8%) said they had muscle pain while 17 (41.2%) said no; 36 (100%) said no to having bone pain; 36(100%) said they did not have asthma; 36 (100%) said no to having arthritis.

Research question 3a: What are the common causes of low productivity among industry workers?

Table 4.6.3a: Common Causes of low productivity among the beverage industry workers

(Treatment group)

No	ITEM	SA	A	N	D	SD
1	Ailments lead to absenteeism	25 69.4%	8 22.2%	2 5.6%	1 2.8%	-
2	The company offers educational and motivational programme	18 50%	14 38.8%	1 2.8%	2 5.6%	1 2.8%
3	Aging has effects on work performance	22 61.1%	12 33.3%	1 2.8%	1 2.8%	
4	The company offers health promotion events	15 41.6%	18 50%	2 5.6%	1 2.8%	
5	The company offers health subsidy to retain workers	10 27.7%	24 66.7%	1 2.8%	1 2.8%	
6	The company operates health insurance Scheme for workers	14 38.8%	8 22.2%	6 16.7%	5 13.9%	3 8.4
7	Provision of health insurance Scheme promotes the company's Image	14 38.8%	8 22.2%	6 16.7%	6 16.7%	2 5.6%
8	Increased media coverage is necessary for Innovation	21 58.3%	9 25%	6 16.7%		
9	Health promotion programme will improve the company's productivity.	22 61.1%	10 27.7%	2 5.6%	2 5.6%	

Source: *Computed from* primary *data*

Table 4.6.3a: shows *the* responses on the causes of low productivity among the industry workers in Oyo and Osun States 33 (69.4%) agreed that ailments lead to absenteeism, while 1 (2.8%) disagreed and 2(5.6%) were neural; 32 (88.8%) agreed that the company offers educational and motivational programme, while 3 (8.4 %) disagreed , and 1 (2.8%) neutral; 34 (94.4%) agreed that ageing has effects on work performance, while 1

(2.8%) disagreed, and 1 (2.8%) was neutral; and 33 (91.6%) agreed that the company offers health promotion events, while 1 (2.8%) disagreed and 2 (5.6%) were neutral. Besides 34 (94.4%) agreed that the company offers health subsidy to retain workers, while 1(2.8%) disagreed, and 1 (2.8%) was neutral; 22 (61%) agreed that the company operates Health Insurance Scheme for workers, while 8(22.3%) disagreed, and 6 (16.7%) were neutral; 22 (61%) agreed that the provision of health insurance scheme promotes the company's image, while 8 (22.3%) disagreed, and 6 (16.7%) were neutral; 30 (83.3%) agreed that the increase in media coverage is necessary for innovation, while 6 (16.7%) were neutral; 32 (88.8%) agreed that the health promotion programme will improve the company productivity, while 2 (5.6%) disagreed, while 2 (5.6%) were neutral.

Research question 3b: What are the common causes of low productivity among industry workers?

Table 4.6.3b: Common Causes of low productivity among the beverage industry workers

(Control group)

No	ITEM	SA	A	N	D	SD
1	Ailments lead to absenteeism.	22 61.1%	10 27.7%	2 5.6%	2 5.6%	-
2	The company offers educational and motivational programme.	15 41.6%	18 50%	2 5.6%	1 2.8%	-
3	Aging has effects on work performance.	25 69.4%	08 22.2%	2 5.6%	1 2.8%	-
4	The company offers heath promotion events.	18 50%	14 38.8%	1 2.8%	2 5.6%	1 2.8%
5	The company offers health subsidy to retain workers.	14 38.8%	8 22.2%	6 16.7%	6 16.7%	2 5.6%
6	The company operates health insurance scheme for workers.	10 27.7%	24 66.7%	1 2.8%	1 2.8%	-
7	Provision of health insurance scheme promotes the company's Image.	14 38.8%	8 22.2%	6 16.7%	6 16.7%	2 5.6%
8	Increased media coverage is necessary for Innovation	22 61.1%	10 27.7%	2 5.6%	2 5.6%	
9	Health promotion programme will improve the company productivity	21 58.3%	9 25%	6 16.7%	-	-

Source: Computed from primary data

Table 4.6.3b: indicates the responses on the causes of low productivity among the beverage industry workers in Oyo and Osun States 32 (88.8%) agreed that ailments lead to absenteeism while 2 (5.6%) disagreed, while 2(5.6%) were neural; 33 (91.6%) agreed that the company offers educational and motivational programme, 1 (2.8 %) disagreed , and while 2 (5.6%) neutral; 33 (91.6%) agreed that the ageing has effects on work performance, 1 (2.8%) disagreed, while 2 (25.6%) were neutral; and 32 (88.8%) agreed that the company offers health promotion events, 3 (5.6%) disagreed and 1 (2.8%) was neutral; Similarly, 22 (61%) agreed that the company offers health subsidy to retain workers, 8(22.8%) disagreed, while 6 (16.7%) were neutral; 34 (94.4%) agreed that the company operate, health insurance scheme for workers, 1(2.8%) disagreed, and 1 (2.8%) was neutral; 22 (61%) agreed that the provision of health insurance scheme promote the company's image 8 (22.3%) disagreed , while 6 (16.7%) were neutral; 32 (88.8%) agreed that the increase in media coverage is necessary for innovation, while 2 (5.6%) and 2 (5.6%) were neutral; and 30 (83.3%) agreed that the health promotion programme will improve the company productivity, while 6 (16.7%) were neutral.

Hypotheses testing

Table 4.7: ANCOVA summary table for the twelve-week post test score on health-related variables according to treatment gender and age using the baseline score as a co-variate

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Eta^2
Corrected Model	Weight	4956.651	14	354.046	297.065	.000	.986
	% BF	2695.820	14	192.559	51.026	.000	.926
	Resting H/R	1322.923	14	94.495	34.157	.000	.893
	Systolic BP	2508.659	14	179.190	25.129	.000	.861
	Diastolic BP	1618.185	14	115.585	13.031	.000	.762
	Hand Strength	8779.078	14	627.077	375.254	.000	.989
	Flexibility	3753.806	14	268.129	45.208	.000	.917
Treatment	Weight	494.685	1	494.685	415.068	.000	.879
	% BF	329.175	1	329.175	87.227	.000	.605
	Resting H/R	847.473	1	847.473	306.339	.000	.843
	Systolic BP	946.229	1	946.229	132.697	.000	.700
	Diastolic BP	378.190	1	378.190	42.637	.000	.428
	Hand Strength	215.910	1	215.910	129.204	.000	.694
	Flexibility	854.578	1	854.578	144.086	.000	.717
Gender	Weight	.482	1	.482	.405	.527	.007
	% BF	2.194E-03	1	2.194E-03	.001	.981	.000
	Resting H/R	2.431	1	2.431	.879	.353	.015
	Systolic BP	12.335	1	12.335	1.730	.194	.029
	Diastolic BP	5.154E-04	1	5.154E-04	.001	.994	.000
	Hand Strength	9.550E-02	1	9.550E-02	.057	.812	.001
	Flexibility	6.687	1	6.687	1.158	.286	.020
Age :	Weight	9.157E-02	1	9.157E-02	.077	.783	.001
	% BF	.522	1	.522	.138	.711	.002
	Resting H/R	.157	1	.157	.057	.813	.001
	Systolic BP	3.411	1	3.411	.478	.492	.008
	Diastolic BP	.133	1	.133	.015	.903	.000
	Hand Strength	3.723E-02	1	3.723E-02	.022	.882	.000
	Flexibility	1.104E-02	1	1.104E-02	.002	.966	.000
Treatment x Gender	Weight	12.722	1	12.722	10.674	.002	.158
	% BF	6.765	1	6.765	1.793	.186	.030
	Resting H/R	20.240	1	20.240	7.316	.009	.114
	Systolic BP	6.364	1	6.364	.892	.349	.015
	Diastolic BP	24.366	1	24.366	2.747	.103	.046
	Hand Strength	2.255	1	2.255	1.350	.250	.023
	Flexibility	4.712	1	4.712	.795	.376	.014
Treatment x Age	Weight	.452	1	.452	.379	.540	.007
	% BF	13.575	1	13.575	3.597	.063	.059
	Resting H/R	1.985	1	1.985	.718	.401	.012
	Systolic BP	12.642	1	12.642	1.773	.188	.030
	Diastolic BP	4.799	1	4.799	.541	.465	.009
	Hand Strength	6.120E-02	1	6.120E-02	.037	.849	.001
	Flexibility	28.163	1	28.163	4.748	.033	.077
Gender x Age:	Weight	4.211	1	4.211	3.533	.065	.058
	% BF	2.096	1	2.096	.555	.459	.010
	Resting H/R	3.035	1	3.035	1.097	.299	.019
	Systolic BP	5.542	1	5.542	.777	.382	.013
	Diastolic BP	1.948E-02	1	1.948E-02	.002	.963	.001
	Hand Strength	3.447-02	1	3.447-02	.021	.886	.001
	Flexibility	.246	1	.246	.041	.839	.001
Treatment x Gender x Age	Weight	6.031	1	6.031	5.061	.028	.082
	% BF	8.337	1	8.337	2.209	.143	.037
	Resting H/R	2.507	1	2.507	.906	.345	.016
	Systolic BP	2.179	1	2.179	.306	.583	.005
	Diastolic BP	14.380	1	14.380	1.621	.208	.028
	Hand Strength	1.149E-02	1	1.149E-02	.007	.934	.001
	Flexibility	3.112	1	3.112	.525	.472	.009
Error :	Weight	67.933	57	1.192			
	% BF	215.105	57	3.774			
	Resting H/R	157.688	57	2.766			
	Systolic BP	406.452	57	7.131			
	Diastolic BP	505.593	57	8.870			
	Hand Strength	95.251	57	1.671			
	Flexibility	338.069	57	5.931			
Total:	Weight	5.024.584	71				
	% BF	2910.925	71				
	Resting H/R	1480.611	71				
	Systolic BP	2915.111	71				
	Diastolic BP	2123.778	71				
	Hand Strength	8874.329	71				
	Flexibility	4091.875	71				

Source: Computed from primary data

<u>Interpretation on workplace accident rate, factory fault-products, absenteeism and healthcare cost of beverage industry workers in Oyo and Osun States</u>

Table 4.8 Results on treatment, gender and age on workplace accident Rate, factory fault-products, absenteeism and healthcare cost of beverage industry workers in Oyo and Osun States

Source	Dependent Variable	Type III Sum of Squares	DF	Mean Square	F	Sig.	Eta^2
Corrected Model	Workplace Accident Rate	517.149	14	36.939	13.131	.000	.763
	Factory Fault-Products	119.078	14	8.506	8.620	.000	.679
	Absenteeism	4831.345	14	345.096	10.931	.000	.729
	Healthcare Cost	392.488	14	28.035	6.893	.000	.629
Treatment	Workplace Accident Rate	125.901	1	125.901	44.754	.000	.440
	Factory Fault-Products	18.507	1	18.507	18.757	.000	.248
	Absenteeism	1275.339	1	1275.339	40.396	.000	.415
	Healthcare Cost	83.173	1	83.173	20.450	.000	.264
Gender	Workplace Accident Rate	1.023	1	1.023	.364	.549	.006
	Factory Fault-Products	.151	1	.151	.153	.697	.003
	Absenteeism	2.177	1	2.177	.069	.794	.001
	Healthcare Cost	.329	1	.329	.081	.777	.001
Age :	Workplace Accident Rate	3.035	1	3.035	1.079	.303	.019
	Factory Fault-Products	1.836	1	1.836	1.861	.178	.032
	Absenteeism	22.837	1	22.837	.723	.399	.013
	Healthcare Cost	3.404	1	3.404	.837	.364	.014
Treatment x Gender	Workplace Accident Rate	1.850	1	1.850	.658	.421	.011
	Factory Fault-Products	9.895E-02	1	9.895E-02	.100	.753	.002
	Absenteeism	15.962	1	15.962	.506	.480	.009
	Healthcare Cost	8.336E-02	1	8.336E-02	.020	.887	.001
Treatment x Age	Workplace Accident Rate	.311	1	.311	.111	.741	.002
	Factory Fault-Products	.918	1	.918	.930	.339	.016
	Absenteeism	5.300E-04	1	5.300E-04	.000	.997	.000
	Healthcare Cost	.697	1	.697	.171	.681	.003
Gender x Age:	Workplace Accident Rate	3.927	1	3.927	1.396	.242	.024
	Factory Fault-Products	1.274	1	1.274	1.292	.261	.022
	Absenteeism	17.143	1	17.143	.543	.464	.009
	Healthcare Cost	5.669E-02	1	5.669E-02	.014	.906	.000
Treatment x Gender x Age	Workplace Accident Rate	.969	1	.969	.344	.560	.006
	Factory Fault-Products	.233	1	.233	.236	.629	.004
	Absenteeism	5.637	1	5.637	.179	.674	.003
	Healthcare Cost	.449	1	.449	.110	.741	.002
Error :	Workplace Accident Rate	160.351	57	2.813			
	Factory Fault-Products	56.242	57	.987			
	Absenteeism	1799.530	57	31.571			
	Healthcare Cost	231.831	57	4.067			
Total:	Workplace Accident Rate	677.500	71				
	Factory Fault-Products	175.319	71				
	Absenteeism	6630.875	71				
	Healthcare Cost	624.319	71				

Hypothesis 1a: There will be no significant main effect of treatment on weight of beverage industry workers in Oyo and Osun States.

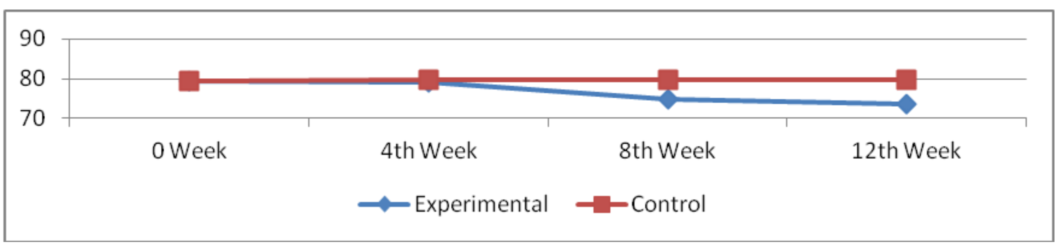
The result presented in Table 4.7 above showed that the treatment (aerobic dance) had a significant main effect on weight of the participants ($F_{(1,70)}$ =415.068, $p<.05, \eta^2=.879$) . The treatment (aerobic dance) contributed 87.9% to weight of the participants.

Table 4.7.1 The estimated marginal means of main effect of treatment on weight of the beverage industry workers in Oyo and Osun States

	TREATMENT	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
WEIGHT	Experimental group	73.500	.232	73.036	73.965
	Control group	79.791	.232	79.326	80.256

The mean score of the experimental group was smaller than that the Control group mean score. This means that the treatment (aerobic dance) reduced the weight of the participants in the Experimental group. Therefore, the hypothesis that there will be no significant main effect of treatment on weight of beverage industry workers in Oyo and Osun States was rejected.

Fig 4.4: Line graph showing the mean scores of weight of the respondents of the experimental and control groups in the baseline, 4th week, 8th week and 12th week



The graph shows the trend of weight of the repondents of the experimental and control groups in the baseline, 4th weeks, 8th weeks and 12th weeks

Hypothesis 1b: There will be no significant main effect of treatment on percent body fat of beverage industry workers in Oyo and Osun States.

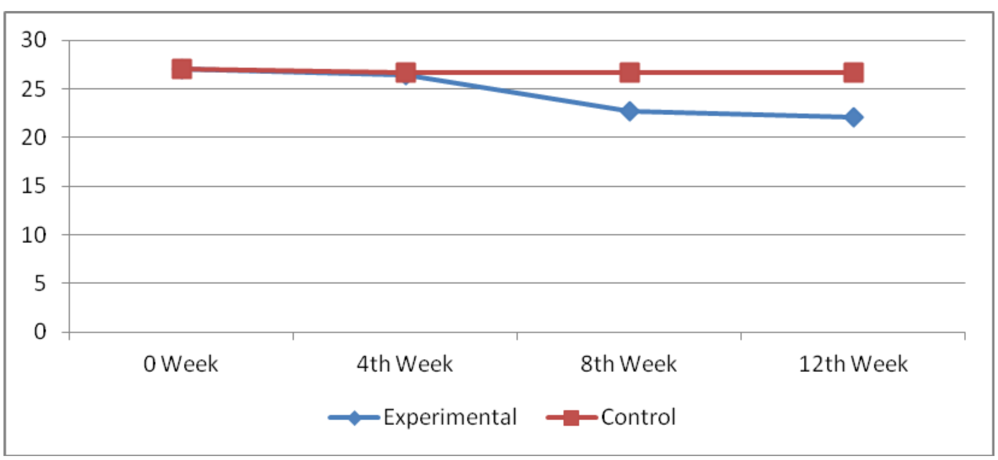
The result presented in the Table 4.7 above revealed that the treatment (aerobic dance) had a significant main effect on body fat of the participants ($F_{(1, 70)}$ =87.227, $p<.05$, $\eta2=.605$). The treatment (aerobic dance) contributed 60.5% to per cent body fat of the participants.

Table 4.7.2 The estimated marginal means of main effect of treatment on percent body fat of the Beverage industry workers in Oyo and Osun States

PER CENT BODY FAT	Treatment	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
	Experimental group	21.765	.413	20.939	22.592
	Control group	26.896	.413	26.069	27.724

The mean score of the experimental was smaller than that of the Control group. This means that the treatment (aerobic dance) reduced the per cent body fat of the participants in the Experimental group. Therefore, the hypothesis that there will be no significant main effect of treatment on per cent body fat of the beverage industry workers in Oyo and Osun States was rejected.

Fig 4.5: Line graph showing the mean scores of %BF of the respondents of the Experimental and Control groups in the baseline, 4th week, 8th week and 12th week



Hypothesis 1c: There will be no significant main effect of treatment on resting heart rate of beverage industry workers in Oyo and Osun States

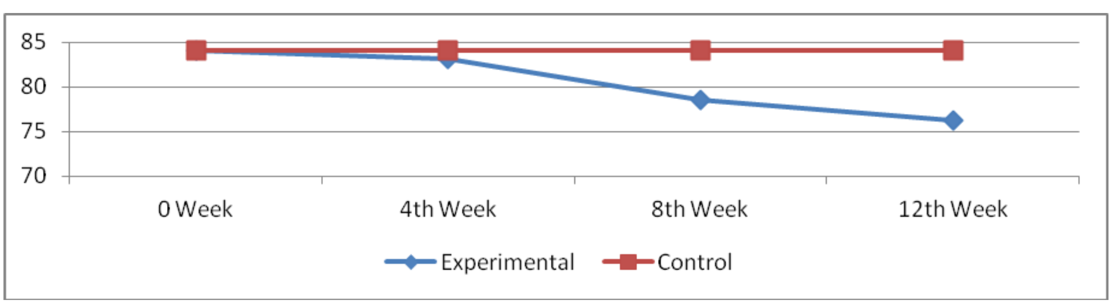
The result presented in the table 4.7 above indicated that the treatment (aerobic dance) had a significant main effect on resting heart rate of the participants ($F_{(1,70)}$ =306.339, $p<.05, \eta^2=.843$). The treatment (aerobic dance) contributed 84.3% on resting heart rate of the participants.

Table 4.7.3 The estimated marginal means of main effect of treatment on resting heart rate of the beverage industry workers in Oyo and Osun States

	Treatment	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
RESTING HEART RATE	Experimental group	75.939	.353	75.231	76.647
	Control group	84.172	.354	83.464	84.881

The experimental group's mean score was smaller than that of the Control group. This implies that the treatment (aerobic dance) reduced the resting heart rate of the participants in the experimental group. Therefore, the hypothesis that there will be no significant main effect of treatment on resting heart rate of the beverage industry workers in Oyo and Osun States was rejected.

Fig 4.6: Line graph showing the mean scores of RHR of the respondents in the experimental and Control groups in the baseline, 4th week, 8th week and 12th week



Hypothesis 1d: There will be no significant main effect of treatment on systolic of beverage industry workers in Oyo and Osun States

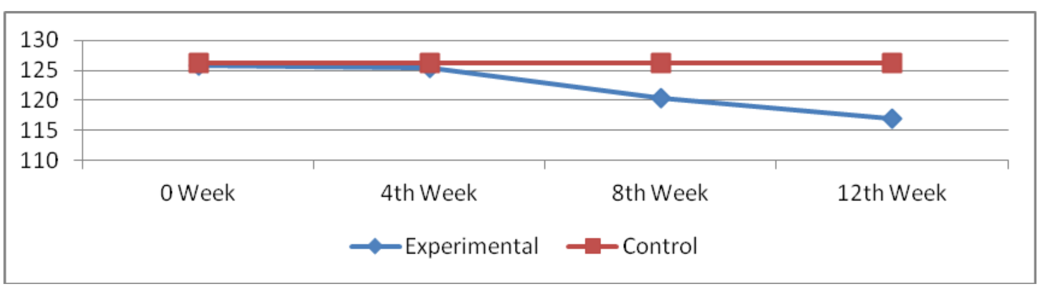
The result presented in Table 4.7 above showed that the treatment (aerobic dance) had a significant main effect on systolic of the participants ($F_{(1,70)}$ =132.697, $p<.05, \eta^2=.700$). The treatment (aerobic dance) contributed 70.0% to systolic of the participants.

Table 4.7.4 The estimated marginal means of main effect of treatment on systolic of the beverage industry workers in Oyo and Osun States

	Treatment	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
SYSTOLIC BLOOD PRESURE	Experimental group	116.849	.567	115.712	117.985
	Control group	125.548	.568	124.411	126.686

The experimental group's mean score was smaller than that of the Control group. This means that the treatment (aerobic dance) reduced the systolic of the participants in the Experimental group. Therefore, the hypothesis that there will be no significant main effect of treatment on systolic of the beverage industry workers in Oyo and Osun States was rejected.

Fig 4.7: Line graph showing the mean scores of systolic blood pressure of the respondents in the experimental and control groups in the baseline, 4th week, 8th week and 12th week



Hypothesis 1e: There will be no significant main effect of treatment on diastolic blood pressure of beverage industry workers in Oyo and Osun States.

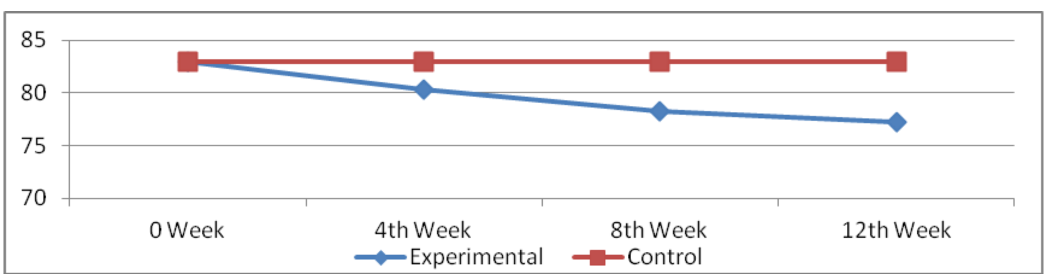
Table 4.7 above indicates that the treatment (aerobic dance) had a significant main effect on diastolic of the participants ($F_{(1,70)}$ =.42.637, p<.05,η^2=.428). The treatment (aerobic dance) contributed 42.8% to diastolic of the participants.

Table 4.7.5 The estimated marginal means of main effect of treatment on diastolic blood pressure of the beverage industry workers in Oyo and Osun States.

	Treatment	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
DIASTOLIC BLOOD PRESSURE	Experimental group	77.334	.633	76.067	78.601
	Control group	82.834	.634	81.565	84.103

The experimental group's mean score was smaller than the means score of the Control group. This meant that the treatment (aerobic dance) reduced the diastolic of the participants in the experimental group. Therefore, the hypothesis that there will be no significant main effect of treatment on diastolic of the beverage industry workers in Oyo and Osun States was rejected.

Fig 4.8: Line graph showing the mean scores of diastolic blood pressure of the respondents in the experimental and control groups in the baseline, 4th week, 8th week and 12th week



Hypothesis 1f: There will be no significant main effect of treatment on hand strength of beverage industry workers in Oyo and Osun States.

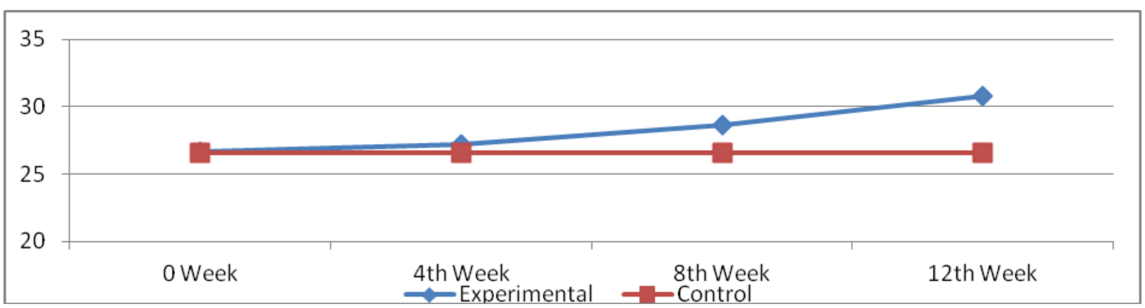
The result presented in Table 4.7 above revealed that the treatment (aerobic dance) had a significant main effect on hand strength of the participants ($F_{(1,70)}$ =129.204, $p<.05, \eta^2=.694$). The treatment (aerobic dance) contributed 69.4% to hand strength of the participants.

Table 4.7.6 The estimated marginal means of main effect of treatment on strength of the beverage industry workers in Oyo and Osun States

	Treatment	Mean	Std. Error	95% Confidence Interval	
HAND STRENGTH				**Lower Bound**	**Upper Bound**
	Experimental group	30.781	.275	20.231	31.331
	Control group	26.625	.275	26.074	27.176

The experimental group's mean score was higher than the control group's mean score. This means that the treatment (aerobic dance) increased the hand strength of the participants in the Experimental group. Therefore, the hypothesis that there will be no significant main effect of treatment on hand strength of the beverage industry workers in Oyo and Osun States was rejected.

Fig 4.9: Line graph showing the mean scores of hand strength of the respondents in Experimental and Control groups in the baseline, 4th week, 8th week and 12th week



Hypothesis 1g: There will be no significant main effect of treatment on flexibility of beverage industry workers in Oyo and Osun States.

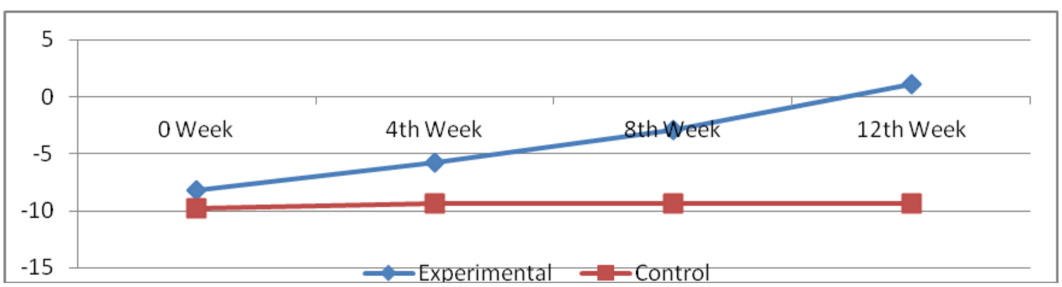
The result in Table 4.7 above indicated that the treatment (aerobic dance) had a significant main effect on flexibility of the participants ($F_{(1,70)}$ =144.086, $p<.05, \eta^2=.717$). The treatment (aerobic dance) contributed 71.7% to flexibility of the participants.

Table 4.7.7 The estimated marginal means of main effect of treatment on flexibility of the beverage industry workers in Oyo and Osun States

	Treatment	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
FLEXIBILITY	Experimental group	-.177	.517	-1.213	.859
	Control group	-8.445	.518	-9.482	-7.407

The experimental group's mean score was higher than the control group's mean score. In other words the treatment (aerobic dance) increased the flexibility of the participants in the experimental group. Therefore, the hypothesis that there will be no significant main effect of treatment on flexibility of the beverage industry workers in Oyo and Osun States was rejected.

Fig 4.10: Line graph showing the mean scores of flexibility of the respondents in experimental and control groups in the baseline, 4th week, 8th week and 12th week



Hypothesis 2a: There will be no significant main effect of treatment on workplace accident rate of beverage industry workers in Oyo and Osun States.

Table 4.8 indicates that the mean effect of treatment was significant on the participants workplace accident rate ($F_{(1,70)}$ =.44.754, $p<.05, \eta^2=.440$). Hence, the hypothesis was rejected. Partial eta squared of 0.440 implies that treatment accounted for 44.0% of the observed variance in workplace accident rate of the beverage industry workers.

Table 4.8.1: Estimated marginal mean scores of the treatment on workplace accident rate of the beverage industry workers in Oyo and Osun States

Dependent variable	Treatment Groups	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Workplace Accident Rate	Experimental	16.765	.494	15.776	17.754
	Control	12.737	.338	12.061	13.413

Table 4.8:1 reveals that the participants in the experimental group had the highest means score of 16.765, while the participants in the control group had the lowest mean score of 12.737. It could, therefore, be inferred that the participants exposed to aerobic dance (experimental group) had reduced workplace accident rate that their counterparts in the control group.

Hypothesis 2b: There will be no significant main effect of treatment on factory fault products of beverage industry workers in Oyo and Osun States.

Table 4.8 shows that the mean effect of treatment was significant on the participants factory fault products ($F_{(1,70)}$ =18.757, $p<.05, \eta^2=.248$).Hence, the null hypothesis was rejected. Partial eta squared of 0.248 implies that treatment accounted for 24.8% of the observed variance in Factory fault products of beverage industry workers.

Table 4.8.2: Estimated marginal mean scores of the treatment on factory fault products of the beverage industry workers in Oyo and Osun States

Dependent variable	Treatment Groups	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Factory Fault-Products	Experimental	11.369	.200	10.969	11.770
	Control	9.825	.293	9.239	10.411

Table 4.8.2: reveals that the participants in the experimental group had the highest means score of 11.369, while the participants in the control group had the lowest mean score of 9.825. It could, therefore, be inferred that the participants exposed to aerobic dance (experimental group) had reduced factory fault products rate than their counterparts in the control group.

Hypothesis 2c: There will be no significant main effect of treatment on absenteeism of beverage industry workers in Oyo and Osun States.

As evident in Table 4.8, the mean effect of treatment was significant on the participants' absenteeism ($F_{(1,70)}$ =40.396, $p<.05, \eta^2=.415$). Hence, the null hypothesis was rejected. Partial eta squared of 0.415 implies that treatment accounted for 41.5% of the observed variance in Absenteeism of beverage industry workers.

Table 4.8:3 Estimated marginal mean scores of the treatment on absenteeism of the beverage industry workers in Oyo and Osun States

Dependent variable	Treatment Groups	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Absenteeism	Experimental	43.657	1.655	40.343	46.970
	Control	30.837	1.131	28.572	33.102

Table 4.8.3: indicates that the participants in the experimental group had the highest means score of 43.657, while the participants in the control group had the lowest

mean score of 30.837. It could, therefore, be inferred that participants which were exposed to aerobic dance (experimental group) had reduced absenteeism compared to their counterparts in the control group.

Hypothesis 2d: There will be no significant main effect of treatment on health care cost of beverage industry workers in Oyo and Osun States.

Table 4.8 shows that the mean effect of treatment was significant on the participants health care cost ($F_{(1,70)}$ =20.450, $p<.05, \eta^2=.2640$). Hence, the null hypothesis was rejected. Partial eta squared of 0.264 implies that treatment accounted for 26.4% of the observed variance in health care cost of beverage industry workers.

Table 4.8:4 Estimated marginal mean scores of the treatment on health care cost of the beverage industry workers in Oyo and Osun States

Dependent variable	Treatment Groups	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Healthcare Cost	Experimental	11.182	.406	10.369	11.995
	Control	7.908	.594	6.719	9.098

Table 4.8.4: reveals that the participants in the experimental group had the highest means score of 11.182, while the participants in the control group had the lowest mean score of 7.908.

Hypothesis 3a: There will be no significant main effect of age on weight of beverage industry workers in Oyo and Osun States.

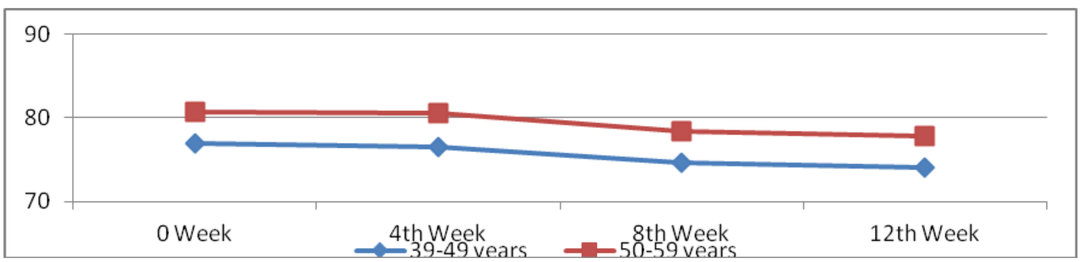
The result presented in the Table 4.7 above showed that age had no significant main effect on weight of the participants ($F_{(1,70)}$ =.077, $p>.05, \eta^2=.001$). The age contributed 0.1% to weight of the participants.

Table 4.7.8 The estimated marginal means of main effect of age on weight of the beverage industry workers in Oyo and Osun States

	Treatment	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
WEIGHT	30 to 49 years old	76.582	.212	76.158	77.005
	50 to 69 years old	76.709	.349	76.011	77.408

Age accounted for the reduction in weight. In other words, the 30 to 49 years old participants had reduced weight than their 50 to 69 years old counterparts. Age, as an intervening variable, therefore, had effect on the weight of the beverage industry workers in Oyo and Osun States. The hypothesis that there will be no significant main effect of age on weight of beverage industry workers in Oyo and Osun States was rejected.

Fig 4.11: Line graph showing the mean scores of weight between the age groups of the respondents in the baseline, 4th week, 8th week and 12th week



Hypothesis 3b: There will be no significant main effect of age on percent body fat of beverage industry workers in Oyo and Osun States.

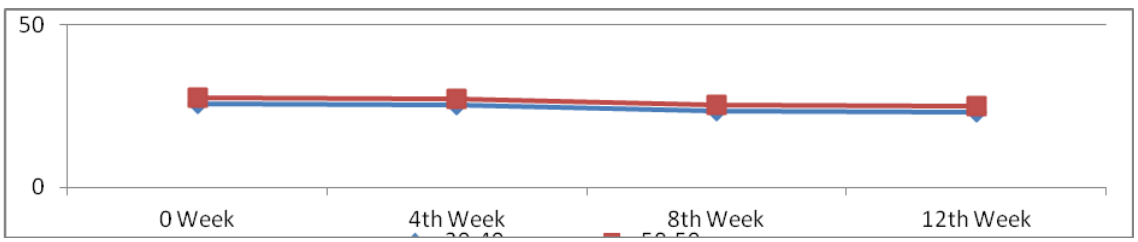
The result presented in the table 4.7 above showed that age had no significant main effect on per cent body fat of the participants ($F_{(1,70)}$ =.138, p>.05,η^2=.002). Age contributed 0.2% of per cent body fat on the participants.

Table 4.7.9 The estimated marginal means of main effect of age on body fat of beverage industry workers in Oyo and Osun States.

	Treatment	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
BODY FAT	30 to 49 years old	24.178	.612	22.935	25.422
	50 to 69 years old	24.483	.377	23.729	25.238

Age accounted for the reduction in per cent body fat. In other words, the 30 to 49 years old participants had reduced per cent body fat compared to their 50 to 69 years old counterparts. Age, as an intervening variable, therefore had no effect on the per cent body fat of the beverage industry workers in Oyo and Osun States. The hypothesis that there will be no significant main effect of age on percent body fat of beverage industry workers in Oyo and Osun States was accepted.

Fig 4.12: Line graph showing the mean scores of per cent body fat between the age groups of the respondents in the baseline, 4th week, 8th week and 12th week



Hypothesis 3c: There will be no significant main effect of age on resting heart rate of beverage industry workers in Oyo and Osun States

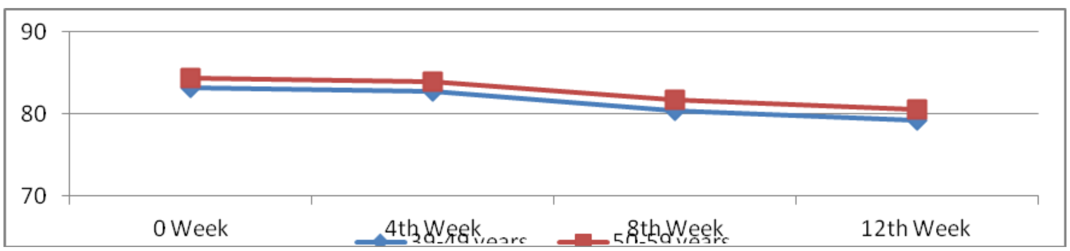
The result presented in Table 4.7 above showed that age had no significant main effect on resting heart rate of the participants ($F_{(1,70)}$ =.057, p>.05,η^2=.001). Age contributed 0.1% on resting heart rate of the participants.

Table 4.7.10: The estimated marginal means of main effect of age on resting heart rate of the beverage industry workers in Oyo and Osun States.

RESTING HEART RATE	Treatment	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
	30 to 49 years old	79.972	..323	79.326	80.618
	50 to 69 years old	80.139	.532	79.075	81.204

Age accounted for the reduction in resting heart rate. In other words, the 30 to 49 years old participants had reduced resting heart rate compared to their 50 to 69 years old counterparts. Age, as an intervening variable, therefore had no effect on the resting heart rate of beverage industry workers in Oyo and Osun States. The hypothesis that there will be no significant main effect of age on resting heart rate of beverage industry workers in Oyo and Osun States was accepted.

Fig 4.13: Line graph showing the mean scores of resting heart rate between the age groups of the respondents in the baseline, 4th week, 8th week and 12th week



Hypothesis 3d: There will be no significant main effect of age on systolic of beverage industry workers in Oyo and Osun States

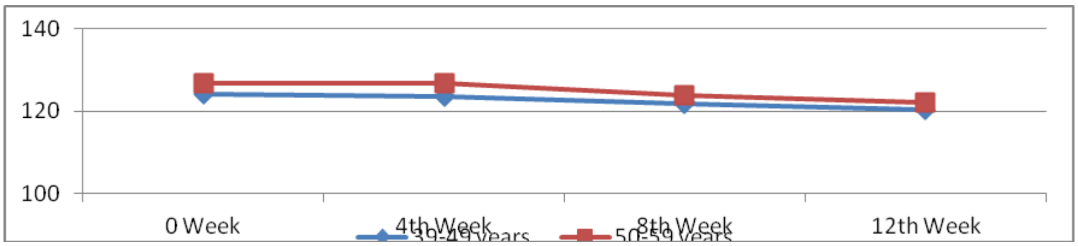
Table 4.7 above reveals that age had no significant main effect on systolic blood pressure of the participants ($F_{(1,70)}$ =.478, p>.05,η^2=.008). Age contributed 0.8% on systolic blood pressure of the participants.

Table 4.7.11: below presents the estimated marginal means of main effect of age on systolic of beverage industry workers in Oyo and Osun States

SYSTOLIC	TREATMENT	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
	30 to 49 years old	120.808	.518	119.099	122.517
	50 to 69 years old	121.589	.854	120.552	122.626

Age accounts for the reduction in systolic blood pressure. In other words, the 30 to 49 years old participants had reduced systolic compared to their 50 to 69 years old counterparts. Age, as an intervening variable, therefore, had no effect on the systolic of beverage industry workers in Oyo and Osun States. The hypothesis that there will be no significant main effect of age on systolic blood pressure of beverage industry workers in Oyo and Osun States was accepted.

Fig 4.14: Line graph showing the mean scores of systolic blood pressure between the age groups of the respondents in the baseline, 4th week, 8th week and 12th week



Hypothesis 3e: There will be no significant main effect of age on diastolic blood pressure of beverage industry workers in Oyo and Osun States

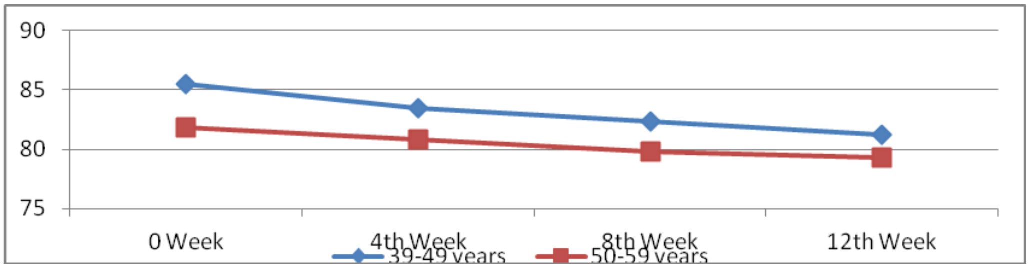
The result presented in the Table 4.7 above showed that age had no significant main effect on diastolic blood pressure of the participants ($F_{(1,70)}$ =.015, $p>.05, \eta^2=.000$). age contributed 0.00% to the diastolic blood pressure of the participants.

Table 4.7.12 The estimated marginal means of main effect of age on diastolic blood pressure of beverage industry workers in Oyo and Osun States.

DIASTOLIC	Treatment	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
	30 to 49 years old	80.161	.952	78.254	82.067
	50 to 69 years old	80.007	.578	78.850	81.163

Age accounted for the reduction in the diastolic blood pressure of the participants. In other words, the 30 to 49 years old participants had increased diastolic than their 50 to 69 years old counterparts. Age, as an intervening variable, therefore had no effect on the diastolic of beverage industry workers in Oyo and Osun States. The hypothesis that there will be no significant main effect of AGE on diastolic of beverage industry workers in Oyo and Osun States was accepted.

Fig 4.15: Line graph showing the mean scores of diastolic blood pressure between the age groups of the respondents in the baseline, 4th week, 8th week and 12th week



Hypothesis 3f: There will be no significant main effect of age on hand strength of beverage industry workers in Oyo and Osun States

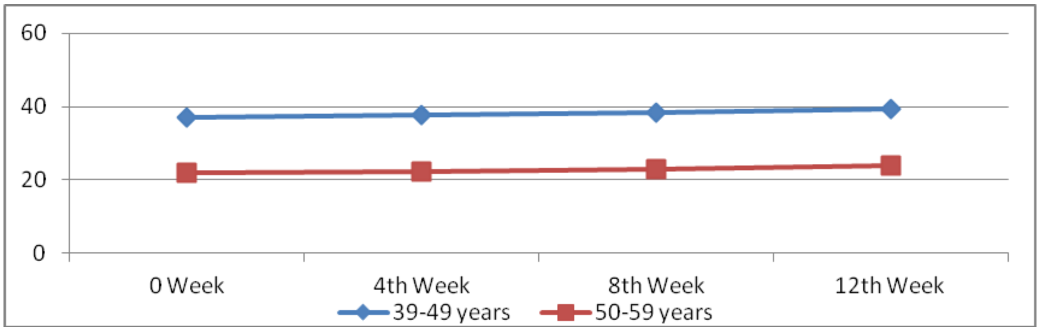
As the result in Table 4.7 age had no significant main effect on hand strength of the participants ($F_{(1,70)}$ =.022, p>.05,η^2=.000). Age contributed 0.0% to hand strength of the participants.

Table 4.7.13: The estimated marginal means of main effect of age on hand strength of the beverage industry workers in Oyo and Osun States

HAND STRENGTH	Treatment	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	**Upper Bound**
	30 to 49 years old	28.662	.413	27.835	29.490
	50 to 69 years old	28.744	.251	28.242	29.246

Age accounted for the reduction in hand strength but it is not significant. In other words, the 30 to 49 years old participants had reduced hand strength compared to their 50 to 69 years old counterparts. Age, as an intervening variable, therefore had no effect on the hand strength of beverage industry workers in Oyo and Osun States. The hypothesis that there will be no significant main effect of age on hand strength of beverage industry workers in Oyo and Osun States was accepted.

Fig 4:16: Line graph showing the mean scores of hand strength between the age groups of the respondents in the baseline, 4th week, 8th week and 12th week



Hypothesis 3g: There will be no significant main effect of age on flexibility of beverage industry workers in Oyo and Osun States.

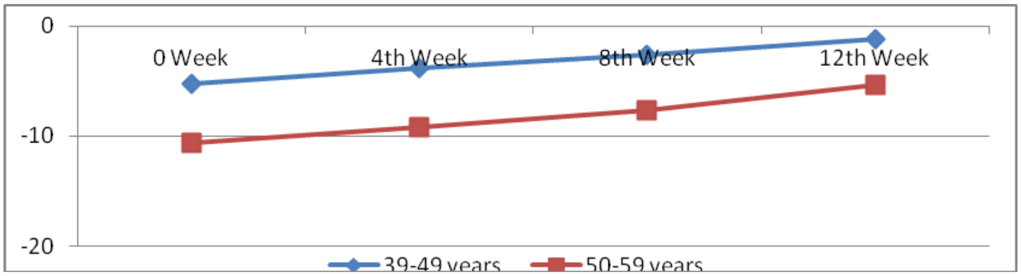
Table 4.7 above showed that age had no significant main effect on flexibility of the participants ($F_{(1,70)}$ =.002, p>.05,η^2=.000). Age contributed 0.0% on flexibility of the participants.

Table 4.7.13 The estimated marginal means of main effect of age on flexibility of the beverage industry workers in Oyo and Osun States.

	Treatment	Mean	Std. Error	95% Confidence Interval	
FLEXIBILITY				**Lower Bound**	**Upper Bound**
	30 to 49 years old	-4.289	.779	-5.848	-2.730
	50 to 69 years old	-4.333	.472	-5.279	-3.388

Age accounted for the reduction in flexibility but it is not significant. In other words, the 30 to 49 years old participants had slightly reduced flexibility compared to their 50 to 69 years old counterparts. Age, as an intervening variable, therefore had no effect on the flexibility of beverage industry workers in Oyo and Osun States. The hypothesis that there will be no significant main effect of AGE on flexibility of beverage industry workers in Oyo and Osun States was accepted.

Fig 4.17: Line graph showing the mean scores of flexibility between the age groups of the respondents in the baseline, 4th week, 8th week and 12th week



Hypothesis 4a: There will be no significant main effect of age on workplace accident rate of beverage industry workers in Oyo and Osun States.

The table 4.8 above showed that the mean effect of age on workplace accident rate was not significant on the participants ($F_{(1,70)}$ =1.079, p>.05,η^2=.019). Therefore, the null hypothesis was accepted. Partial eta squared of 0.019 implies that age accounted for 1.9% of the observed variance on workplace accident rate of beverage industry workers.

Table 4.8.5: Estimated marginal mean scores of age on workplace accident rate of beverage industry workers in Oyo and Osun States

Dependent variable	Age	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Work Place Accident Rate	30-49	15.080	.257	14.566	15.595
	50-69	14.422	.558	13.304	15.540

Table 4.8:5 reveals that participants in the 30-49 age range had the highest means score of 15.080, while participants in the 50-69 age range had the lowest mean score of 14.422. It could therefore be inferred that participants in the 30-49 age range had reduced workplace accident rate than their 50-69 age range counterpart.

Hypothesis 4b: There will be no significant main effect of age on factory fault products of beverage industry workers in Oyo and Osun States.

Table 4.8 above shows that the mean effect of age on factory fault products was not significant on the participants ($F_{(1,70)}$ =1.861, p>.05,η^2=.032). Therefore, the null hypothesis was accepted. Partial eta squared of 0.032 implies that age accounted for 3.2% of the observed variance on factory fault products of beverage industry workers.

Table 4.8:6 Estimated marginal mean scores of age on factory fault products of the beverage industry workers in Oyo and Osun States.

Dependent variable	Age	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Factory Fault Products	30-49	10.853	.152	10.549	11.158
	50-69	10.341	.331	9.679	11.003

Table 4.8.6: reveals that the participants in the 30-49 age range had the highest means score of 10.853, while the participants in the 50-69 age range had the lowest mean score of 10.341. It could, therefore, be inferred that the participants in the 30-49 age range had reduced factory fault products than their 50-69 years old counterparts.

Hypothesis 4c: There will be no significant main effect of age on absenteeism of beverage industry workers in Oyo and Osun States.

Table 4.8 above shows that the mean effect of age on absenteeism was not significant on the participants ($F_{(1,70)}$ =.723, p>.05,η^2=.031). Therefore the null hypothesis was accepted. Partial eta squared of 0.031 implies that age accounted for 3.1% of the observed variance on absenteeism of beverage industry workers.

Table 4.8:7 Estimated marginal mean scores of age on absenteeism of the beverage industry workers in Oyo and Osun States

Dependent variable	Age	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Absenteeism	30-49	38.150	.861	36.426	39.873
	50-69	36.344	1.870	32.600	40.088

Table 4.8.7: indicates that the participants in the 30-49 age range had the highest means score of 38.150, while those in the 50-69 age range had the lowest mean score of 36.344. It could therefore be inferred that the participants in the 30-49 age range had reduced absenteeism compared to their 50-69 years old counterparts.

Hypothesis 4d: There will be no significant main effect of age on health care cost of beverage industry workers in Oyo and Osun States.

As shown in Table 4.8 above, the mean effect of age on health care cost was not significant on the participants ($F_{(1,70)}$ =.837, p>.05,η^2=.014). Therefore the null hypothesis was accepted. Partial eta squared of 0.014 presupposes that age accounted for 1.4% of the observed variance on health care cost of beverage industry workers.

Table4.8:8 Estimated marginal mean scores of age on health care cost of the beverage industry workers in Oyo and Osun States.

Dependent variable	Age	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Health Care Cost	30-49	9.894	.309	9.275	10.512
	50-69	9.197	.671	7.853	10.541

Table 4.8.8: reveals that the participants in the 30-49 age range had the highest means score of 9.894, while those in the 50-69 age range had the lowest mean score of 9.197. Therefore, the participants in the 30-49 age range had better health care cost than their 50-69 age range counterpart.

Hypothesis 5a: There will be no significant main effect of gender on weight of beverage industry workers in Oyo and Osun States.

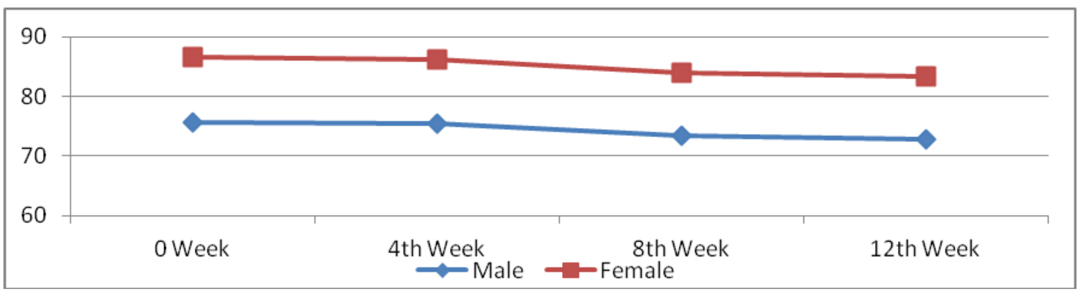
The result presented in Table 4.7 above showed that gender had no significant main effect on weight of the participants ($F_{(1,70)}$ =.405, p>.05,η^2=.007). Therefore, gender contributed 0.7% of weight to the participants.

Table 4.7. The estimated marginal means of main effect of gender on weight of the beverage industry workers in Oyo and Osun states.

	Treatment	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
WEIGHT	MALE	76.831	.268	76.294	77.369
	FEMALE	76.460	.398	75.663	77.257

Femaleness of the gender alone accounted for the reduction in weight. In other words, the participants had reduced weight because they were female; the opposite was the case for their male counterparts. Gender, as an intervening variable, therefore had effect on the weight of beverage industry workers in Oyo and Osun States. The hypothesis that there will be no significant main effect of gender on weight of beverage industry workers in Oyo and Osun States was accepted.

Fig 4.18: Line graph showing the mean scores of weight between the male and female respondents in the baseline, 4th week, 8th week and 12th week



Hypothesis 5b There will be no significant main effect of gender on body fat of beverage industry workers in Oyo and Osun States.

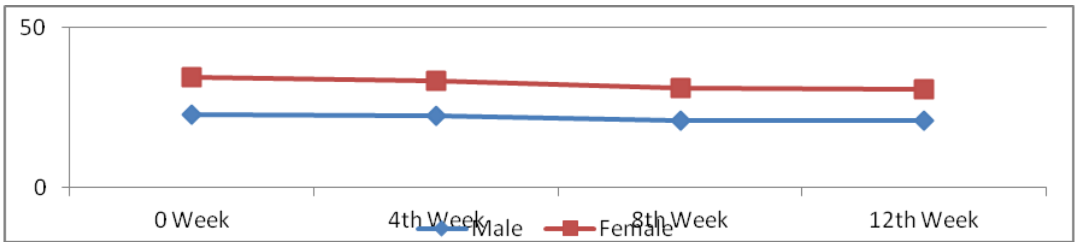
The result presented in Table 4.7 above showed that gender had no significant main effect on body fat of the participants ($F_{(1,70)}$ =.001, p>.05,η^2=.000). Therefore, gender contributed 0.0% of per cent body fat to the participants.

Table 4.7.15 The estimated marginal means of main effect of gender on body fat of the beverage industry workers in Oyo and Osun States

	Treatment	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
BODY FAT	MALE	24.318	.478	23.362	25.275
	FEMALE	24.343	.708	22.925	25.762

Femaleness of the gender alone accounted for the reduction in body fat. Gender, as an intervening variable, therefore, had no effect on the body fat of beverage industry workers in Oyo and Osun States. The hypothesis that there will be no significant main effect of gender on percent body fat of beverage industry workers in Oyo and Osun States was accepted.

Fig 4.19: Line graph showing the mean scores of percent body fat between the male and female respondents in the baseline, 4th week, 8th week and 12th week



Hypothesis 5c: There will be no significant main effect of gender on resting heart rate of beverage industry workers in Oyo and Osun states.

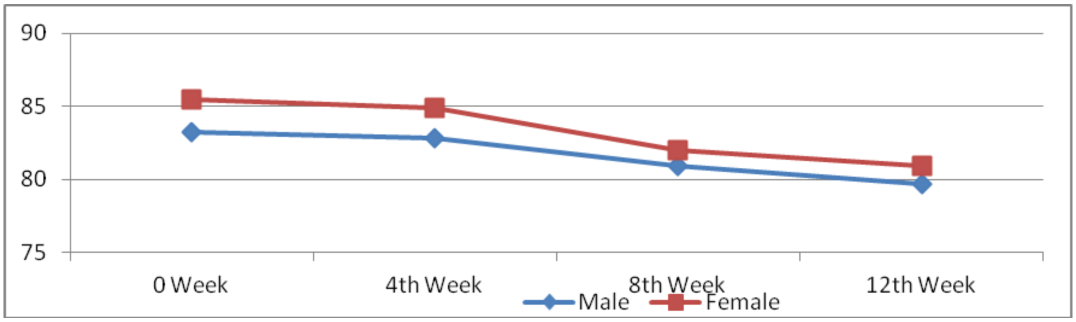
The result presented in Table 4.7 above showed that gender had no significant main effect on resting heart rate of the participants ($F_{(1,70)}$ =.879, p>.05,η^2=.015). Therefore, gender contributed 1.5% of resting heart rate to the participants.

Table 4.7.16 The estimated marginal means of main effect of gender on resting heart rate of beverage industry workers in Oyo and Osun states

	Treatment	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
RESTING HEART RATE	MALE	80.473	.409	79.654	81.291
	FEMALE	79.639	.607	78.424	80.853

Femaleness of the gender alone accounts for the reduction in resting heart rate. In other words, the participants had reduced resting heart rate because they are female; the opposite was the case for their male counterparts. Gender, as an intervening variable, therefore had no effect on the resting heart rate of beverage industry workers in Oyo and Osun States. The hypothesis that there will be no significant main effect of gender on resting heart rate of beverage industry workers in Oyo and Osun States was accepted.

Fig 4.20: Line graph showing the mean scores of resting heart rate between the male and female respondents in the baseline, 4th week, 8th week and 12th week



Hypothesis 5d: There will be no significant main effect of gender on systolic of beverage industry workers in Oyo and Osun States.

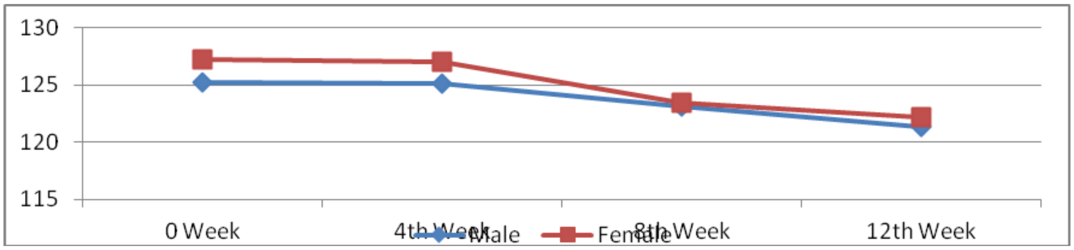
Table 4.7 indicates that gender had no significant main effect on systolic blood pressure of the participants ($F_{(1,70)}$ =1.730, p>.05,η^2=.029). Therefore, gender contributed 2.9% of systolic blood pressure on the participants.

Table 4.7.17: The estimated marginal means of main effect of gender on systolic blood pressure of the beverage industry workers in Oyo and Osun States.

	Treatment	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
SYSTOLIC BLOOD PRESURE	MALE	122.138	.656	120.823	123.452
	FEMALE	120.259	.974	118.309	122.209

Femaleness of the gender alone accounted for the reduction in systolic blood pressure. In other words, the participants had reduced systolic because they were female; the opposite was the case for their male counterparts. Therefore. Gender, as an intervening variable, had no effect on the systolic blood pressure of the beverage industry workers in Oyo and Osun States. In view of this the hypothesis that there will be no significant main effect of gender on systolic blood pressure of beverage industry workers in Oyo and Osun States was accepted.

Fig 4.21: Line graph showing the mean scores of Systolic Blood Pressure between the male and female respondents in the baseline, 4th week, 8th week and 12th week



Hypothesis 5e There will be no significant main effect of gender on diastolic blood pressure of beverage industry workers in Oyo and Osun States.

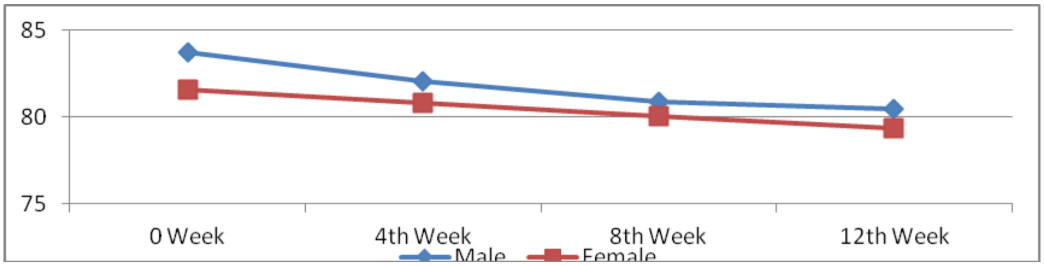
The result presented in Table 4.7 above in that gender had no significant main effect on diastolic blood pressure of the participants ($F_{(1,70)}$ =.001, p>.05,η^2=.000). Therefore, gender contributed 0.0% of diastolic on the participants.

Table 4.7.18: The estimated marginal means of main effect of gender on diastolic blood pressure of beverage industry workers in Oyo and Osun States.

	Treatment	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
DIASTOLIC BLOOD PRESSURE	MALE	80.090	.732	78.624	81.556
	FEMALE	80.078	1.086	77.903	82.253

Femaleness of the gender alone accounted for the reduction in diastolic. In other words, the participants had reduced diastolic blood pressure because they are female; the opposite was the case for their male counterparts. Gender, as an intervening variable were therefore, had no effect on the diastolic of the beverage industry workers in Oyo and Osun States. The hypothesis that there will be no significant main effect of gender on diastolic of beverage industry workers in Oyo and Osun States was accepted.

Fig 4.22: Line graph showing the mean scores of diastolic blood pressure between the male and female respondents in the baseline, 4th week, 8th week and 12th week



Hypothesis 5f: There will be no significant main effect of gender on hand strength of beverage industry workers in Oyo and Osun States.

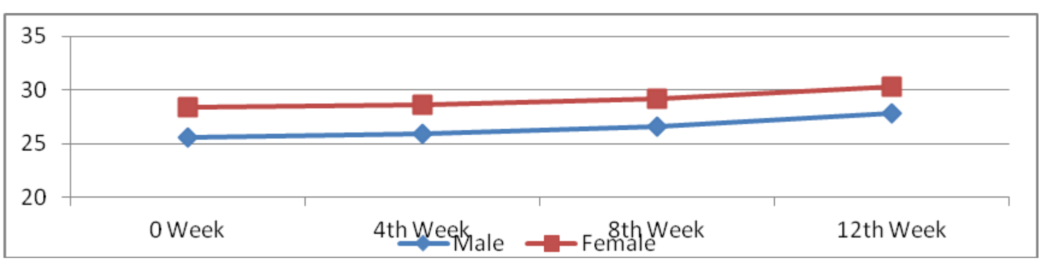
The result presented in Table 4.7 above showed that gender had no significant main effect on hand strength of the participants ($F_{(1,70)}$ =.057, p>.05,η^2=.001). Therefore, gender contributed 0.1% of hand strength to the participants.

Table 4.7.19 The estimated marginal means of main effect of gender on hand strength of the beverage industry workers in Oyo and Osun States.

	Treatment	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
HAND STRENGTH	MALE	28.620	.318	27.984	29.257
	FEMALE	28.786	.471	27.842	29.729

Gender alone accounted for the increase in hand strength. In other words, the female participants had increased hand strength; the opposite was the case for their male counterparts. Gender, as an intervening variable, therefore had no effect on the hand strength of the beverage industry workers in Oyo and Osun States. The hypothesis that there will be no significant main effect of gender on hand strength of beverage industry workers in Oyo and Osun States was accepted.

Fig 4.23: Line graph showing the mean scores of hand strength between the male and female respondents in the baseline, 4th week, 8th week and 12th week



Hypothesis 5g: There will be no significant main effect of gender on flexibility of beverage industry workers in Oyo and Osun States.

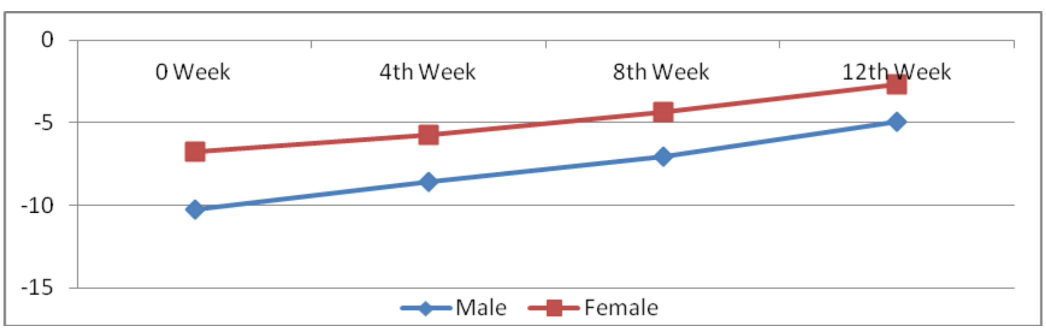
The result Table 4.7 above indicated that gender had no significant main effect on flexibility of the participants ($F(_{1,70})$ =1.158, p>.05,η^2=.020). Therefore, gender contributed 2% of flexibility on the participants.

Table 4.7.20 The estimated marginal means of main effect of gender on flexibility of the beverage industry workers in Oyo and Osun States.

	Treatment	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
FLEXIBILITY	MALE	-5.012	.888	-6.790	-3.233
	FEMALE	-3.610	.599	-4.809	-2.411

Femaleness of the gender alone accounted for the increase in flexibility. That is, the participants had increased flexibility because they are female; the opposite is the case for their male counterparts. Therefore, gender, as an intervening variable, therefore had no effect on the flexibility of beverage industry workers in Oyo and Osun States. Consequently, the hypothesis that there will be no significant main effect of gender on flexibility of beverage industry workers in Oyo and Osun States was accepted.

Fig 4.24: Line graph showing the mean scores of flexibility between the male and female respondents in the baseline, 4th week, 8th week and 12th week



Hypothesis 6a: There will be no significant main effect of gender on workplace accident rate of beverage industry workers in Oyo and Osun States.

Table 4.8 table indicates that the mean effect of gender on workplace accident rate was not significant on the participants ($F_{(1,70)}$ =.364, p>.05,η^2=.006). Therefore the null hypothesis was accepted. Partial eta squared of 0.006 implies that gender accounted for 0.6% of the observed variance on workplace accident rate of beverage industry workers.

Table 4.8:9 Estimated marginal mean scores of the gender on workplace accident rate of beverage industry workers in Oyo and Osun States

Dependent variable	Gender	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Work Place Accident Rate	Male	14.931	.257	14.416	15.446
	Female	14.571	.537	13.496	15.647

Table 4.8.9: reveals that the male participants had the highest means score of 14.931, while the female participants had the lowest mean score of 14.571. It could therefore be inferred that the male participants had better reduced workplace accident rate than their female counterparts.

Hypothesis 6b: There will be no significant main effect of gender on factory fault products of beverage industry workers in Oyo and Osun States.

As seen in table 4.8, above showed that the mean effect of gender on factory fault products was not significant on the participants ($F_{(1,70)}$ =.153, p>.05,η^2=.003). Therefore, the null hypothesis was accepted. Partial eta squared of 0.003 implies that gender accounted for 0.3% of the observed variance on factory fault products of beverage industry workers.

Table 4.8.10: Estimated marginal mean scores of the gender on factory fault product of the beverage industry workers in Oyo and Osun States

Dependent variable	Gender	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Factory Fault Products	Male	10.666	.152	10.361	10.971
	Female	10.528	.318	9.8981	11.165

Table 4.8.10: reveals that the male participants had the highest means score of 10.666, while the female participants had the lowest mean score of 10.528. It could,

therefore, be inferred that male participants had better reduced factory fault product rate than their female counterparts.

Hypothesis 6c: There will be no significant main effect of gender on absenteeism of beverage industry workers in Oyo and Osun States.

Table 4.8 above shows that the mean effect of gender on absenteeism was not significant on the participants ($F_{(1,70)}$ =.069, p>.05,η^2=.001).Therefore null hypothesis was accepted. Partial eta squared of 0.001 implies that gender accounted for 0.1% of the observed variance on absenteeism of beverage industry workers.

Table 4.8:11 Estimated marginal mean scores of the gender on absenteeism of the beverage industry workers in Oyo and Osun States

Dependent variable	Gender	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Absenteeism	Male	37.509	.861	35.785	39.234
	Female	36.985	1.799	33.383	40.587

Table 4.8.11: reveals that the male participants had the highest means score of 37.509, while female participants had the lowest mean score of 36.985. It could, therefore, be inferred that the male participants had better reduced absenteeism than their female counterparts.

Hypothesis 6d: There will be no significant main effect of gender on health care cost of beverage industry workers in Oyo and Osun States.

As captured in Table 4.8 above the mean effect of gender on health care cost was not significant on the participants ($F_{(1,70)}$ =.081, p>.05,η^2=.001). Therefore, the null hypothesis was accepted. Partial eta squared of 0.001 implies that gender accounted for 0.1% of the observed variance on health care cost of beverage industry workers.

Table 4.8:12 Estimated marginal mean scores of the gender on health care cost of the beverage industry workers in Oyo and Osun States.

Dependent variable	Gender	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Health Care Cost	Male	9.647	.309	9.028	10.266
	Female	9.443	.646	8.151	10.736

Table 4.8.12: reveals that the male participants had the highest means score of 9.647, while the female participants had the lowest mean score of 9.443. It could, therefore, be inferred that the male participants had reduced health care cost compared to their female counterparts.

Hypothesis 7a: There will be no significant interaction effect of treatment and age on weight on beverage industry workers in Oyo and Osun States.

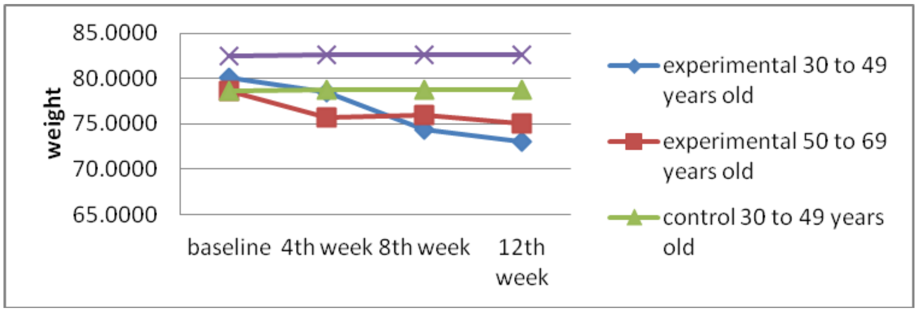
The result presented in Table 4.7 above showed that the treatment (aerobic dance) and age had no significant main effect on weight of the participants ($F_{(1,70)}$ =.379, p>.05,η^2=.007). The treatment (aerobic dance) and age contributed 0.7% to the weight of the participants.

Table 4.7.21 The estimated marginal means of main effect of treatment (aerobic dance) and age on weight of beverage industry workers in Oyo and Osun States

TREATMENT	Age	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
EXPERIMENTAL	30 to 49 years old	73.740	.438	72.594	74.347
	50 to 69 years old	73.530	.262	73.006	74.055
CONTROL	30 to 49 years old	79.949	.435	79.078	80.819
	50 to 69 years old	79.633	.269	79.093	80.172

Aerobic dance combined with age account for the reduction in weight. In other words, the participants had reduced weight because they are both exposed to aerobic dance in experimental group. The control and age therefore had no interaction effect on the weight of the participants. The hypothesis that there will be no significant interaction effect of treatment and age on weight of the participants was accepted.

Fig. 4.25: Line graph showing effect of treatment (aerobic dance) and age on weight



Hypothesis 7b: There will be no significant interaction effect of treatment and age on per cent body fat of beverage industry workers in Oyo and Osun States

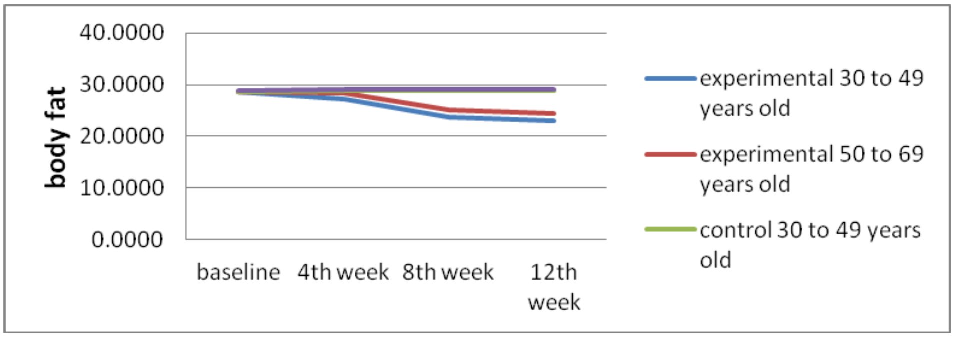
The result captured in Table 4.7 above showed that the treatment (aerobic dance) and age had no significant main effect on percent body fat of the participants ($F_{(1,70)}$ =3.597, $p>.05, \eta^2=.059$). The treatment (aerobic dance) and age contributed 5.9% on percent body fat of the participants.

Table 4.7.22 The estimated marginal means of main effect of treatment (aerobic dance) and age on body fat of the beverage industry workers in Oyo and Osun States.

TREATMENT	Age	Mean	Std. Error	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
EXPERIMENTAL	30 to 49 years old	21.097	.779	19.537	22.657
	50 to 69 years old	22.433	.466	21.500	23.367
CONTROL	30 to 49 years old	27.259	.774	25.710	28.809
	50 to 69 years old	26.534	.479	25.574	27.493

Aerobic dance combined with age accounted for the reduction in per cent body fat. In other words, the participants had reduced per cent body fat because they were exposed to aerobic dance. The opposite was the case for the control group. The treatment and age therefore had no interaction effect on the body fat of the participants. The hypothesis that there will be no significant interaction effect of treatment and age on body fat of the participants was accepted.

Fig 4.26: Graph showing effect of treatment (aerobic dance) and age on body fat



Hypothesis 7c: There will be no significant interaction effect of treatment and age on resting heart rate on beverage industry workers in Oyo and Osun States.

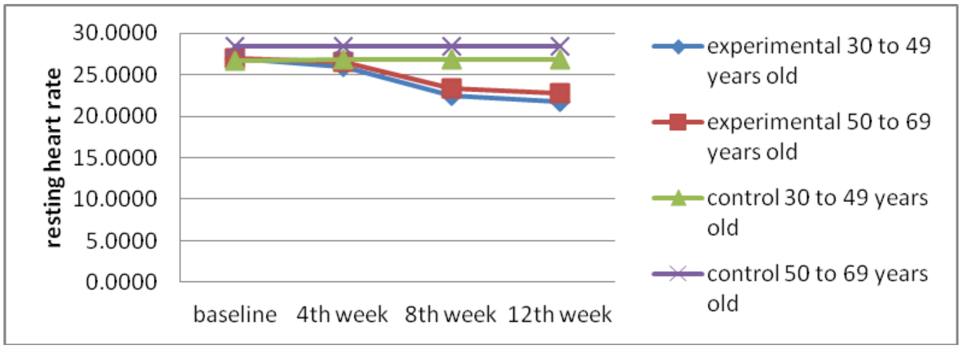
The result presented in Table 4.7 above showed that the treatment (aerobic dance) and age had no significant main effect on resting heart rate of the participants ($F_{(1,70)}$ =.718, p>.05,η^2=.012). The treatment (aerobic dance) and age contributed 1.20% to resting heart rate of the participants.

Table 4.7.23 The estimated marginal means of main effect of treatment (aerobic dance) and age on resting heart rate of the beverage industry workers in Oyo and Osun States

TREATMENT	Age	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
EXPERIMENTAL	30 to 49 years old	75.826	.667	74.490	77.161
	50 to 69 years old	76.052	.399	75.253	76.851
CONTROL	30 to 49 years old	84.453	.662	83.127	85.780
	50 to 69 years old	83.891	.410	83.070	84.713

Aerobic dance, combined with age, accounted for the reduction in resting heart rate. In other words, the participants had reduced resting heart rate because they were both exposed to aerobic dance; the opposite was the case for their counterparts that were exposed to aerobic dance as well as the control group. The treatment and age, therefore, had an interaction effect on the resting heart rate of the participants. The hypothesis that there will be no significant interaction effect of treatment and age on resting heart rate of the participants was accepted.

Fig. 4.27: Graph showing effect of treatment (aerobic dance) and age on resting heart rate



Hypothesis 7d: There will be no significant interaction effect of treatment and age on systolic blood pressure on beverage industry workers in Oyo and Osun States.

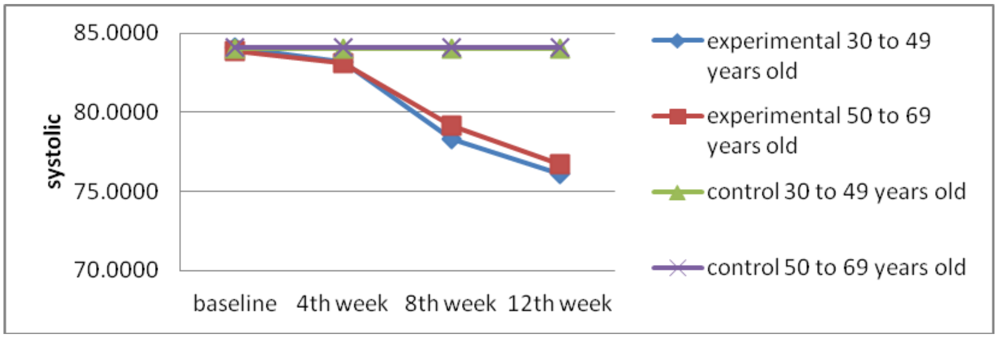
The table 4.7 above shows that the treatment (aerobic dance) and age had no significant main effect on systolic blood pressure of the participants ($F_{(1,70)}$ =1.773, p>.05,η^2=.030). The treatment (aerobic dance) and age contributed 3.0% to the systolic blood pressure of the participants.

Table 4.7.24 The estimated marginal means of main effect of treatment (aerobic dance) and age on systolic blood pressure of the beverage industry workers in Oyo and Osun States

TREATMENT	Age	Mean	Std. Error	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
EXPERIMENTAL	30 to 49 years old	116.956	1.071	114.811	119.100
	50 to 69 years old	116.741	.641	115.459	118.024
CONTROL	30 to 49 years old	124.660	1.064	122.531	126.790
	50 to 69 years old	126.436	.6591	125.117	127.756

Aerobic dance, combined with age, had no effect on systolic blood pressure. Therefore, the hypothesis that there will be no significant interaction effect of treatment and age on systolic blood pressure of the participants was accepted.

Fig. 4.28: Graph showing effect of treatment (aerobic dance) and age on systolic blood pressure



Hypothesis 7e There will be no significant interaction effect of treatment and age on diastolic blood pressure on beverage industry workers in Oyo and Osun States.

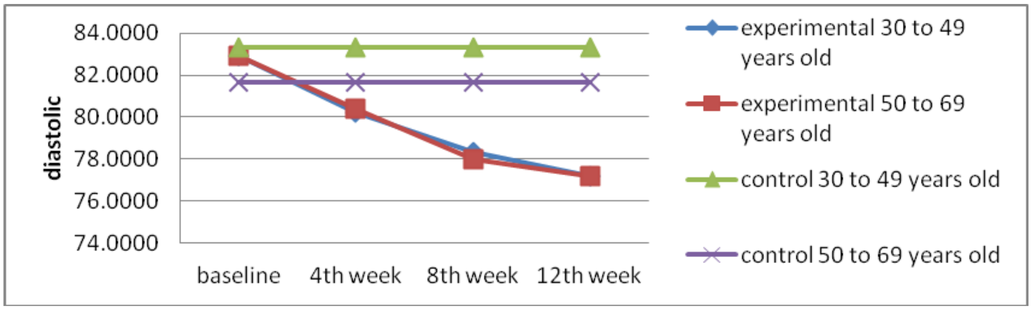
The result found in Table 4.7 above indicated that the treatment (aerobic dance) and age had no significant main effect on diastolic of the participants ($F_{(1,70)}$ =.541, p>.05,η^2=.009). The treatment (aerobic dance) and age contributed 0.9% to the diastolic blood pressure of the participants.

Table 4.7.25 The estimated marginal means of main effect of treatment (aerobic dance) and age on diastolic blood pressure of the beverage industry workers in Oyo and Osun States

TREATMENT	Age	Mean	Std. Error	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
EXPERIMENTAL	30 to 49 years old	77.104	1.194	74.713	79.496
	50 to 69 years old	77.563	.714	76.713	78.994
CONTROL	30 to 49 years old	83.217	1.186	80.842	85.593
	50 to 69 years old	82.450	.735	80.979	83.922

Aerobic dance, combined with age, accounted for the reduction in diastolic blood pressure. In other words, the participants had reduced diastolic blood pressure because they were both exposed to aerobic dance and they were younger in age. The opposite was the case for their older counterparts that were exposed to aerobic dance as well as the control group. The treatment and age, therefore, had no interaction effect on the diastolic blood pressure of the participants. The hypothesis that there will be no significant interaction effect of treatment and age on diastolic of the participants was rejected.

Fig 4.29: Graph showing effect of treatment (aerobic dance) and age on diastolic blood pressure.



Hypothesis 7f: There will be no significant interaction effect of treatment and age on hand strength of beverage industry workers in Oyo and Osun States.

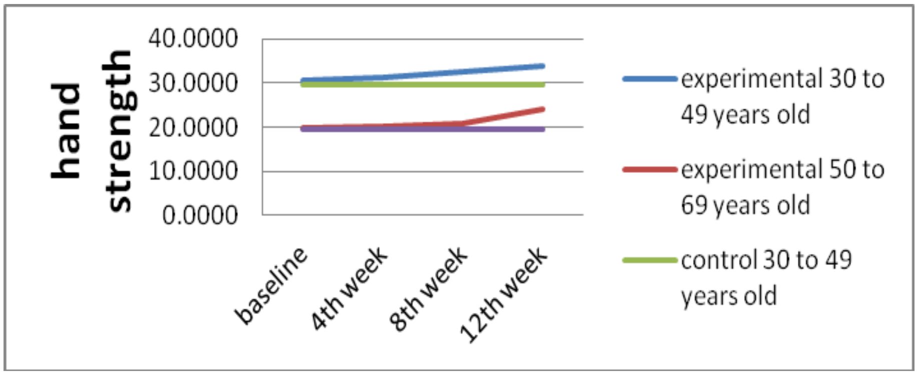
Table 4.7 above reveals that the treatment (aerobic dance) and age had no significant main effect on hand strength of the participants ($F_{(1,70)}$ =.037, p>.05,η^2=.001). The treatment (aerobic dance) and age contributed 0.1% to the hand strength of the participants.

Table 4.7.26 The estimated marginal means of main effect of treatment (aerobic dance) and age on hand strength of the beverage industry workers in Oyo and Osun States

TREATMENT	Age	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
EXPERIMENTAL	30 to 49 years old	30.775	.518	29.736	31.813
	50 to 69 years old	30.787	.310	30.166	31.408
CONTROL	30 to 49 years old	26.550	.515	25.519	27.581
	50 to 69 years old	26.700	.319	26.062	27.339

Aerobic dance, combined with age, had no effect on hand strength. Therefore, the hypothesis that there will be no significant interaction effect of treatment and age on hand strength of the participants was accepted.

Fig. 4.30: Graph showing effect of treatment (aerobic dance) and age on hand strength



Hypothesis 7g: There will be no significant interaction effect of treatment and age on flexibility of beverage industry workers in Oyo and Osun States.

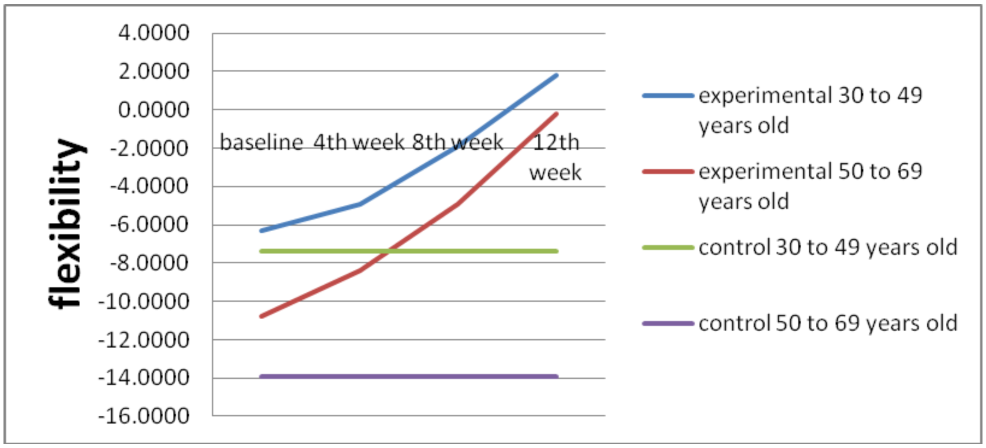
The result captured in Table 4.7 above showed that the treatment (aerobic dance) and age had a significant main effect on flexibility of the participants ($F_{(1,70)}$ =4.748, $p<.05, \eta^2=.077$). The treatment (aerobic dance) and age contributed 7.7% to the flexibility of the participants.

Table 4.7.27 The estimated marginal means of main effect of treatment (aerobic dance) and age on flexibility of the beverage industry workers in Oyo and Osun States

TREATMENT	Age	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
EXPERIMENTAL	30 to 49 years old	-7.680	.970	-9.622	-5.738
	50 to 69 years old	0.543	.584	-.627	1.713
CONTROL	30 to 49 years old	-0.897	.977	-2.853	1.058
	50 to 69 years old	-9.210	.601	-10.413	-8.006

Aerobic dance, combined with age, accounted for increase in flexibility. In other words, the participants had increase because they were exposed to aerobic dance. But the opposite was the case for the control group, which was not exposed to aerobic dance. The treatment and age, therefore, had an interaction effect on the flexibility of the participants. The hypothesis that there will be no significant interaction effect of treatment and age on flexibility of the participants was rejected.

Fig. 4.31: Graph showing effect of treatment (aerobic dance) and age on flexibility



Hypothesis 8a: There will be no significant interaction effect of treatment and gender on weight on beverage industry workers in Oyo and Osun States.

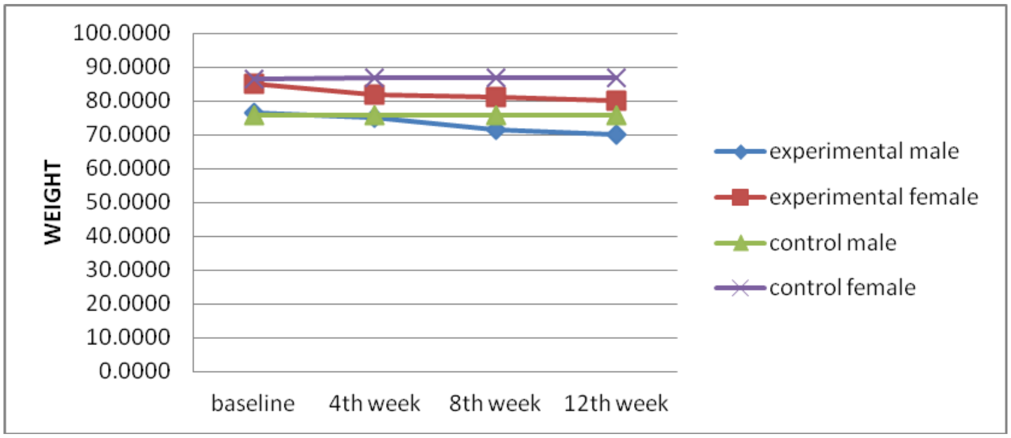
The result in Table 4.7 showed that the treatment (aerobic dance) and gender had a significant main effect on weight of the participants ($F_{(1,70)}$ =10.674, p<.05,η^2=.158). The treatment (aerobic dance) and gender contributed 15.8% to the weight of the participants.

Table 4.7.28 The estimated marginal means of main effect of treatment (aerobic dance) and gender on weight of the beverage industry workers in Oyo and Osun States

TREATMENT	Gender	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
EXPERIMENTAL	Male	74.187	.325	73.535	74.838
	Female	72.814	.471	71.870	73.758
CONTROL	Male	79.476	.313	78.848	80.103
	Female	80.106	.473	79.158	81.054

Aerobic dance, combined with gender, accounted for the reduction in weight. That is, the participants had reduced weight because they were both exposed to aerobic dance and they were female. The opposite was the case for their male counterparts who were exposed to aerobic dance as well as the control group. The treatment and gender, therefore, had an interaction effect on the weight of the participants. The hypothesis that there will be no significant interaction effect of treatment and gender on weight of the participants was rejected.

Fig. 4.32: Graph showing effect of treatment (aerobic dance) and gender on weight on the beverage industry workers in Oyo and Osun States



Hypothesis 8b There will be no significant interaction effect of treatment and gender on percent body fat on beverage industry workers in Oyo and Osun States.

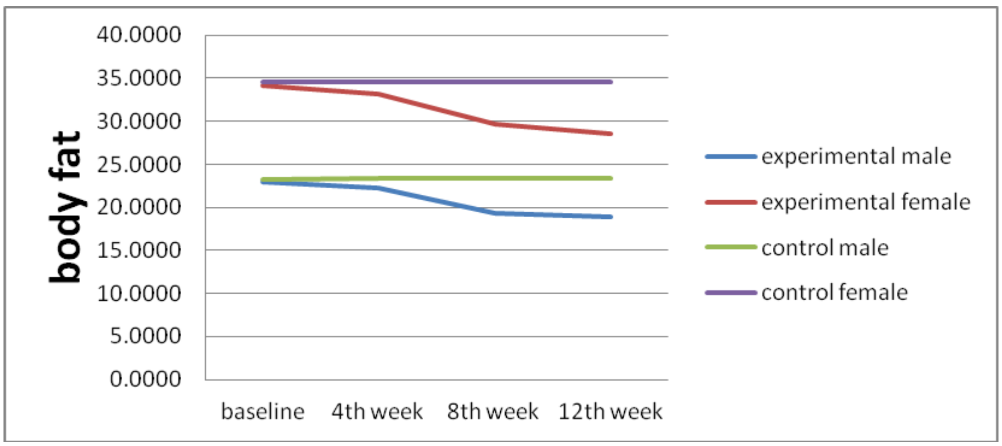
As evident in Table 4.7 above, the treatment (aerobic dance) and gender had no significant main effect on body fat of the participants ($F_{(1,70)}$ =1.793, p>.05,η^2=.030). The treatment (aerobic dance) and gender contributed 3.0% to the body fat of the participants.

Table 4.7.29 The estimated marginal means of main effect of treatment (aerobic dance) and gender on body fat of the beverage industry workers in Oyo and Osun States

Treatment	Gender	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Experimental	Male	22.116	.579	20.959	23.277
	Female	21.413	.839	19.733	23.092
Control	Male	26.519	.558	25.402	27.635
	Female	27.274	.842	25.587	28.961

Aerobic dance, combined with gender, accounted for the reduction in per cent body fat. In other words, the participants had reduced body fat because they are both exposed to aerobic dance and they were female. The opposite was the case for their male counterparts that are exposed to aerobic dance and control group. The treatment and gender, therefore, had no interaction effect on the per cent body fat of the participants. The hypothesis that there will be no significant interaction effect of treatment and gender on body fat of the participants was accepted.

Fig. 4.33: Graph showing effect of treatment (aerobic dance) and gender on body fat on the beverage industry workers in Oyo and Osun States



Hypothesis 8c There will be no significant interaction effect of treatment and gender on resting heart rate on beverage industry workers in Oyo band Osun States.

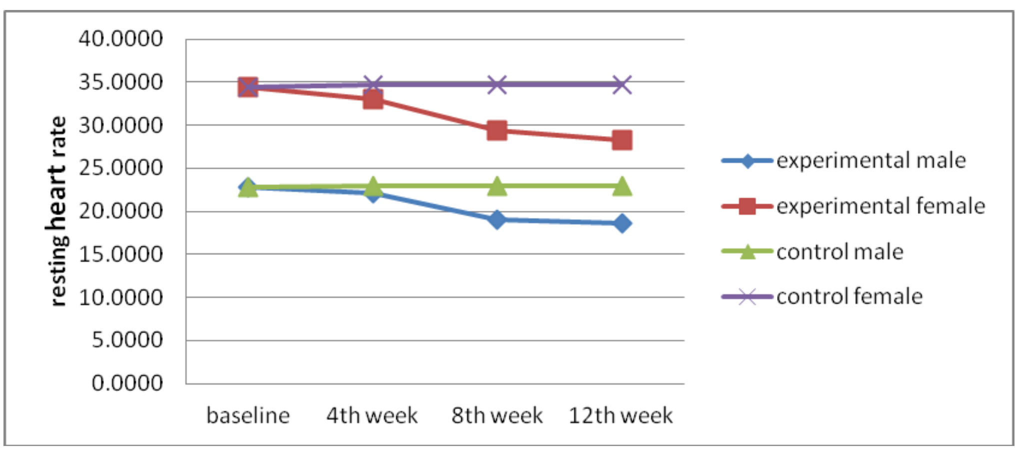
Table 4.7 above indicated that the treatment (aerobic dance) and gender had a significant main effect on resting heart rate of the participants ($F_{(1,70)}$ =7.316, p<.05,η^2=.114). The treatment (aerobic dance) and gender contributed 11.4% to the resting heart rate of the participants.

Table 4.7.30 The estimated marginal means of main effect of treatment (aerobic dance) and gender on resting heart rate of the beverage industry workers in Oyo and Osun States

Treatment	Gender	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Experimental	Male	76.987	.496	75.995	77.980
	Female	74.891	.718	73.453	76.328
Control	Male	83.958	.477	83.002	84.914
	Female	84.387	.721	82.942	85.831

Aerobic dance, combined with gender, accounted for the reduction in resting heart rate. In other words. The participants had reduced resting heart rate because they were exposed to aerobic dance and they were female. The opposite was the case for their male counterparts who were exposed to aerobic dance as well as the control group. The treatment and gender, therefore, had an interaction effect on the resting heart rate of the participants. The hypothesis that there will be no significant interaction effect of treatment and gender on resting heart rate of the participants was rejected.

Fig. 4.34: Graph showing effect of treatment (aerobic dance) and gender on resting heart rate on the beverage industry workers in Oyo and Osun States.



Hypothesis 8d There will be no significant interaction effect of treatment and gender on systolic blood pressure on beverage industry workers in Oyo and Osun States.

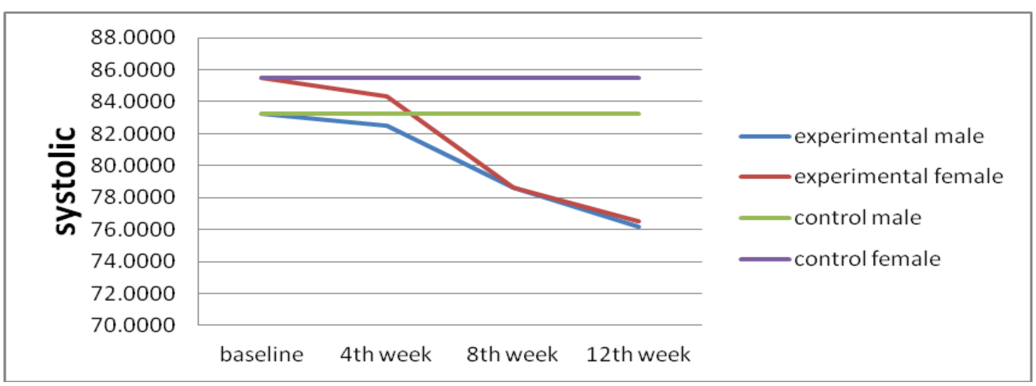
The result in Table 4.7 above revealed that the treatment (aerobic dance) and gender had no significant main effect on systolic blood pressure of the participants ($F_{(1,70)}$ =.892, p>.05,η^2=.015). The treatment (aerobic dance) and gender contributed 1.5% to the systolic blood pressure of the participants.

Table 4.7.31 The estimated marginal means of main effect of treatment (aerobic dance) and gender on systolic blood pressure of the beverage industry workers in Oyo and Osun States

Treatment	Gender	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Experimental	Male	118.142	.796	116.548	119.735
	Female	115.555	1.153	113.247	117.864
Control	Male	126.133	.766	124.598	127.668
	Female	124.963	1.158	122.644	127.282

Aerobic dance, combined with gender, accounted for the reduction in systolic. In other words, the participants had reduced systolic blood pressure because they were both exposed to aerobic dance and they were female. The opposite was the case for their male counterparts that are exposed to aerobic dance as well as the control group. The treatment and gender, therefore, had no interaction effect on the systolic of the participants. The hypothesis that there will be no significant interaction effect of treatment and gender on systolic of the participants was accepted.

Fig. 4.35: Graph showing effect of treatment (aerobic dance) and gender on systolic blood pressure of beverage industry workers in Oyo and Osun States



Hypothesis 8e There will be no significant interaction effect of treatment and gender on diastolic blood pressure on beverage industry workers in Oyo band Osun States.

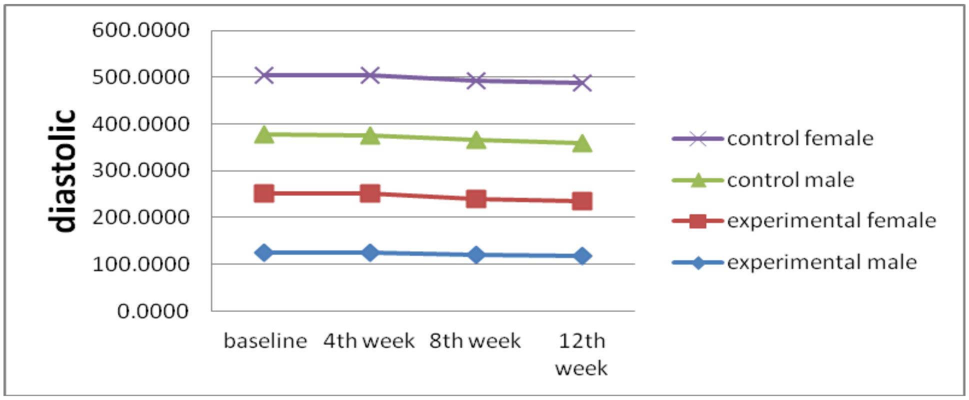
As noticed in Table 4.7 above, the treatment (aerobic dance) and gender had no significant main effect on diastolic of the participants ($F_{(1,70)}$ =2.747, p>.05,η^2=.046). The treatment (aerobic dance) and gender contributed 4.6% to the diastolic blood pressure of the participants.

Table 4.7.32 The estimated marginal means of main effect of treatment (aerobic dance) and gender on diastolic blood pressure of the beverage industry workers in Oyo and Osun States

Treatment	**Gender**	**Mean**	**Std. Error**	**95% Confidence Interval**	
				Lower Bound	**Upper Bound**
Experimental	Male	76.647	.887	74.870	78.424
	Female	78.021	1.286	75.446	80.595
Control	Male	83.533	.855	81.821	85.245
	Female	82.135	1.292	79.548	84.721

Aerobic dance, combined with gender, accounted for the reduction in diastolic. This means that the participants had reduced diastolic blood pressure because they were both exposed to aerobic dance. The opposite was the case for the control group, which was not exposed to aerobic dance. The treatment and gender, therefore, had no interaction effect on the diastolic of the participants. The hypothesis that there will be no significant interaction effect of treatment and gender on diastolic blood pressure of the participants was accepted.

Fig. 4.36: Graph showing effect of treatment (aerobic dance) and gender on diastolic blood pressure of the beverage industry workers in Oyo and Osun States



Hypothesis 8f There will be no significant interaction effect of treatment and gender on hand strength of beverage industry workers in Oyo and Osun States.

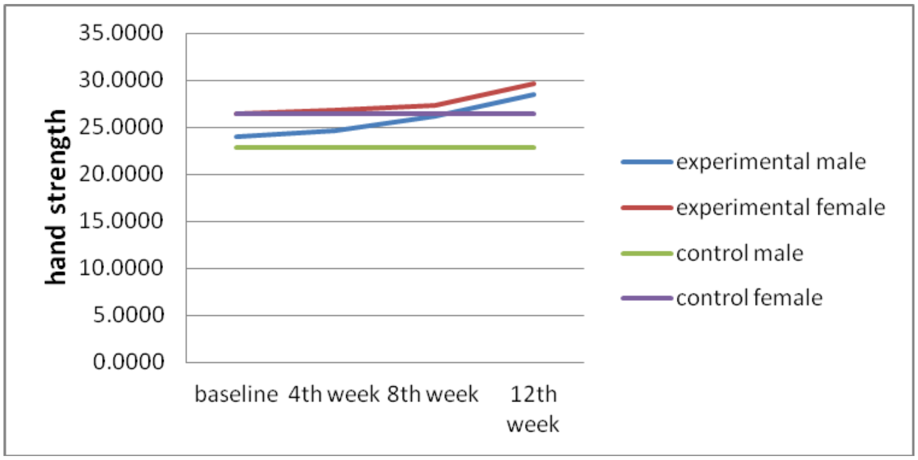
As obvious in Table 4.7 above the treatment (aerobic dance) and gender had no significant main effect on the hand strength of the participants ($F_{(1,70)}$ =1.350, p>.05,η^2=.023). The treatment (aerobic dance) and gender contributed 2.3% on the hand strength of the participants.

Table 4.7.33 The estimated marginal means of main effect of treatment (aerobic dance) and gender on hand strength of the beverage industry workers in Oyo and Osun States

Treatment	Gender	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Experimental	Male	30.909	.385	30.138	31.680
	Female	30.653	.558	29.535	31.770
Control	Male	26.332	.371	25.589	27.075
	Female	26.918	.561	25.796	28.041

Aerobic dance, combined with gender, accounted for increase in hand strength in the experimental group though it was not significant. Therefore, the hypothesis that there will be no significant interaction effect of treatment and gender on hand strength of the participants was accepted.

Fig. 4.37: Graph showing effect of treatment (aerobic dance) and gender on hand strength of the beverage industry workers in Oyo and Osun States



Hypothesis 8g There will be no significant interaction effect of treatment and gender on flexibility of beverage industry workers in Oyo band Osun States.

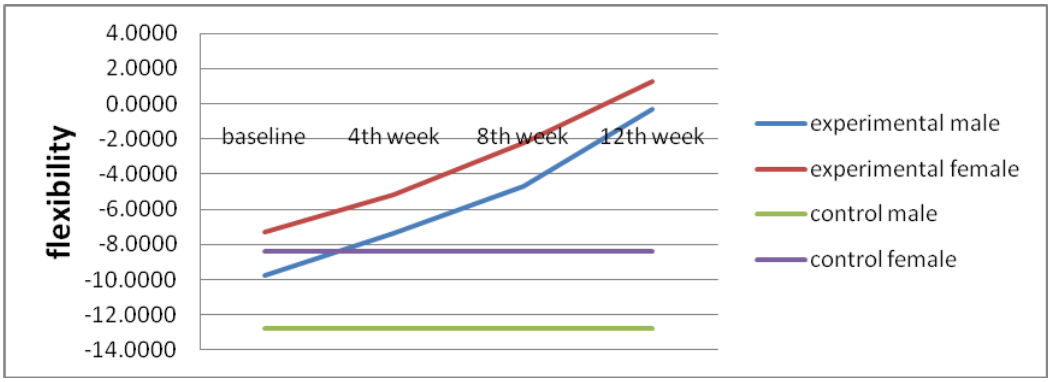
Table 4.7 indicates that the treatment (aerobic dance) and gender had significant main effect on the flexibility of the participants ($F_{(1,70)}$ =.795, p>.05,η^2=.014). The treatment (aerobic dance) and gender contributed 1.4% on the flexibility of the participants.

Table 4.7.34 The estimated marginal means of main effect of treatment (aerobic dance) and gender on flexibility of the beverage industry workers in Oyo and Osun States

Treatment	Gender	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Experimental	Male	-1.183	1.051	-3.288	.923
	Female	.828	.726	--.625	2.281
Control	Male	-8.049	.699	-9.449	-6.649
	Female	- 8.841	1.056	-10.956	-6.726

Aerobic dance, combined with gender, accounted for increase in flexibility in the experimental group, though it was not significant. Therefore, the hypothesis that there will be no significant interaction effect of treatment and gender on hand strength of the participants was accepted.

Fig. 4.38: Graph showing effect of treatment (aerobic dance) and gender on flexibility of the beverage industry workers in Oyo and Osun States



Hypothesis 9a: There will be no significant interaction effect of treatment and age on workplace accident rate of beverage industry workers in Oyo and Osun States.

Table 4.8 above indicate that the interaction effect of treatment and age on workplace accident rate was not significant on the participants ($F_{(1,70)}$ =.111, p>.05,η^2=.002). Therefore the null hypothesis was accepted. Partial eta squared of 0.002 implies that interaction of treatment and age accounted for 0.2% of the observed variance on workplace accident rate of beverage industry workers.

Table 4.8.13: Estimated marginal mean scores of the interaction effect of treatment and age on workplace accident rate of the beverage industry workers in Oyo and Osun States.

Dependent variable	Treatment	Age	Mean	Std. Error	95% Confidence Interval	
					Lower Bound	Upper Bound
Work Place Accident	Experimental	30-49	17.201	.387	16.426	17.975
		50-69	16.330	.939	14.449	18.211
	Control	30-49	12.514	.612	11.289	13.739
		50-69	12.960	348	12.264	13.656

Table 4.813: reveals that the participants with 30-49 age range in the experimental group had the highest means score of 17.201 compared to their 50-69 age range counterparts in the same group as well as those in 30-49 and the 50-69 age ranges in the

control group. Also, the 50-69 years old participants in experimental group had the highest mean score of 16.330 compared to their counterparts 30-49 and 50-69 age in the control group. It could, therefore, be inferred that the 30-49 age range participants in the experimental group had better reduced workplace accident rate than their 50-69 age range counterparts in the same group and those in the 30-49 and 50-69 age in the control group.

Hypothesis 9b: There will be no significant interaction effect of treatment and age on factory fault products rate of beverage industry workers in Oyo and Osun States.

Table 4.8 above shows that the interaction effect of treatment and age on factory fault products rate was not significant on the participants ($F_{(1,70)}$ =.930, p>.05,η^2=.016).Therefore, the null hypothesis was accepted. Partial eta squared of 0.016 implies that interaction of treatment and age accounted for 1.6% of the observed variance on the factory fault products rate of the beverage industry workers.

Table4.8:14 Estimated marginal mean scores of the interaction effect of treatment and age on factory fault products rate of the beverage industry workers in Oyo and Osun States

Dependent variable	Treatment	Age	Mean	Std. Error	95% Confidence Interval	
					Lower Bound	Upper Bound
Factory Fault Products	Experimental	30-49	11.808	.206	11.396	12.221
		50-69	10.931	.362	10.205	11.656
	Control	30-49	9.752	.556	8.638	10.866
		50-69	9.898	.229	9.439	10.357

Table 4.8.14: reveals that the participants with 30-49 age range in the experimental group had the highest means score of 11.808 compared to their 50-69 years old counterparts in the same group as well as those 30-49 and 50-69 years old in the control group. Also, the 50-69 age range participants in the experimental group had the highest mean score of 10.931 compared to their 30-49 and 50-69 years old counterparts in the control group. It could, therefore, be inferred that the 30-49 years old participants in the experimental group had reduced factory fault products rate compared to their 50-69

years old counterparts in the same group and those 30-49 and 50-69 years old in the control group.

Hypothesis 9c: There will be no significant interaction effect of treatment and age on absenteeism of beverage industry workers in Oyo and Osun States.

Table 4.8 indicates that the interaction effect of treatment and age on absenteeism was not significant on the participants ($F_{(1,70)}$ =.001, p>.05,η^2=.001). Therefore, the null hypothesis was accepted. Partial eta squared of 0.001 implies that interaction of treatment and age accounted for 0.1% of the observed variance on absenteeism of beverage industry workers.

Table 4.8:15 Estimated marginal mean scores of the interaction effect of treatment and age on absenteeism of the beverage industry workers in Oyo and Osun States

Dependent variable	Treatment	Age	Mean	Std. Error	95% Confidence Interval	
					Lower Bound	Upper Bound
Absenteeism	Experimental	30-49	44.564	1.296	41.969	47.160
		50-69	42.750	3.147	36.448	49.051
	Control	30-49	29.939	2.049	25.835	34.042
		50-69	31.736	1.165	29.403	34.068

Table 4.8.15: reveals that the participants with 30-49 age range in the experimental group had the highest means score of 44.564 compared to their 50-69 years old counterparts in the same group as well as those 30-49 and 50-69 year old in the control group. Also, the 50-69 years old participants in the experimental group had the highest mean score of 42.750 compared to those 30-49 and 50-69 years old in the control group. It could, therefore, be inferred that 30-49 age range participants in experimental group had reduced absenteeism than their 50-69 years old in the same group and those 30-49 and 50-69 years old in the control group.

Hypothesis 9d: There will be no significant interaction effect of treatment and age on health care cost of beverage industry workers in Oyo and Osun States.

Table 4.8 above indicates that the interaction effect of treatment and age on health care cost was not significant on the participants ($F_{(1,70)}$ =.171, p>.05,η^2=.003). Therefore, the null hypothesis was accepted. Partial eta squared of 0.003 implies that interaction of treatment and age accounted for 0.3% of the observed variance on health care cost of beverage industry workers.

Table 4.8:16 Estimated marginal mean scores of the interaction effect of treatment and age on health care cost of the beverage industry workers in Oyo and Osun States

Dependent variable	Treatment	Age	Mean	Std. Error	95% Confidence Interval	
					Lower Bound	Upper Bound
Health Care Cost	Experimental	30-49	11.690	.418	10.853	12.527
		50-69	10.674	.736	9.201	12.147
	Control	30-49	7.719	1.129	5.457	9.981
		50-69	8.098	.465	7.166	9.029

Table 4.8:16 reveals that the participants with 30-49 age range in experimental group had the highest means score of 11.690 compared to their 50-69 years old counterparts in the same group and those 30-49 and 50-69 years old in the control group. Also, the 50-69 years old participants in the experimental group had the highest mean score of 10.674 compared to their 30-49 and 50-69 years old counterparts in the control group. It could, therefore, be inferred that the 30-49 years old participants in the experimental group had reduced health care cost compared to their 50-69 years old counterparts in the same group and those 30-49 and 50-69 years old in the control group.

Hypothesis 10a: There will be no significant interaction effect of treatment and gender on workplace accident rate of beverage industry workers in Oyo and Osun States.

Table 4.8 reveals that the interaction effect of treatment and gender on workplace accident rate was not significant on the participants ($F_{(1,70)}$ =.658, p>.05,η^2=.019). Therefore null hypothesis was accepted. Partial eta squared of 0.019 implies that interaction of treatment and gender accounted for 1.9% of the observed variance on workplace accident rate of the beverage industry workers.

Table 4.8.17: Estimated marginal mean scores of the interaction effect of treatment and gender on workplace accident rate of the beverage industry workers in Oyo and Osun States.

Dependent variable	Treatment	Gender	Mean	Std. Error	95% Confidence Interval	
					Lower Bound	Upper Bound
Work Place Accident Rate	Experimental	Male	16.706	.375	15.956	17.456
		Female	16.824	.899	15.024	18.625
	Control	Male	13.156	.369	12.417	13.895
		Female	12.318	.578	11.162	13.475

Table 4.8.17: reveals that the female participants in the experimental group had the highest means score of 16.824 compared to their male counterparts in the same group as well as their male and female participants in the control group. Also, the male participants in the experimental group had the highest mean score of 16.706 compared to their male and female counterparts in the control group. It could, therefore, be inferred that female participants in experimental group had better reduced workplace accident rate than their male counterparts in the same group and male and female counterparts in the control group.

Hypothesis 10b: There will be no significant interaction effect of treatment and gender on factory fault products rate of beverage industry workers in Oyo and Osun States.

Table 4.8 also shows that the interaction effect of treatment and gender on factory fault products rate was not significant on the participants ($F_{(1,70)}$ =.100, p>.05,η^2=.002). Therefore, the null hypothesis was accepted. Partial eta squared of 0.002 implies that interaction of treatment and gender accounted for 0.2% of the observed variance on factory fault products rate of the beverage industry workers.

Table 4.8.18: Estimated marginal mean scores of the interaction effect of treatment and gender on factory fault products rate of the beverage industry workers in Oyo and Osun States

Dependent variable	Treatment	Gender	Mean	Std. Error	95% Confidence Interval	
					Lower Bound	Upper Bound
Factory Fault Products	Experimental	Male	11.494	.219	11.056	11.931
		Female	11.245	.342	10.560	11.930
	Control	Male	9.839	.222	9.395	10.283
		Female	9.811	.533	8.745	10.878

Table 4.8.18: reveals that the male participants in the experimental group had the highest means score of 11.494 compared to their female counterparts in the same group as well as their male and female counterparts in the control group. Also, the female participants in the experimental group had the highest mean score of 11.245 compared to their male and female counterparts in the control group. It could, therefore, be inferred that the male participants in the experimental group had better reduced factory fault products rate than their female counterparts in the same group and their male and female counterparts in the control group.

Hypothesis 10c: There will be no significant interaction effect of treatment and gender on absenteeism of beverage industry workers in Oyo and Osun States.

Table 4.8 above shows that the interaction effect of treatment and gender on absenteeism was not significant on the participants ($F_{(1,70)}$ =.506, p>.05,η^2=.009). Therefore, the null hypothesis was accepted. Partial eta squared of 0.009 implies that interaction of treatment and gender accounted for 0.9% of the observed variance on absenteeism of beverage industry workers.

Table 4.8:19 Estimated marginal mean scores of the interaction effect of treatment and gender on absenteeism of the beverage industry workers in Oyo and Osun States.

Dependent variable	Treatment	Gender	Mean	Std. Error	95% Confidence Interval	
					Lower Bound	Upper Bound
Absenteeism	Experimental	Male	44.621	1.255	42.109	47.134
		Female	42.692	3.013	36.659	48.726
	Control	Male	30.397	1.236	27.921	32.873
		Female	31.277	1.935	27.403	35.152

Table 4.8.19: indicates that the male participants in the experimental group had the highest means score of 44.621 compared to their female counterparts in the same group as well as their male and female counterparts in the control group. Also, the female participants in the experimental group had the highest mean score of 42.692 compared to their male and female counterparts in the control group. It could, therefore, be inferred that the male participants in the experimental group had better reduced absenteeism than their female counterparts in the same group and their male and female counterparts in the control group.

Hypothesis 10d: There will be no significant interaction effect of treatment and gender on Health Care Cost of beverage industry workers in Oyo and Osun states.

Table 4.8 reveals that the interaction effect of treatment and gender on health care cost was not significant on the participants ($F_{(1,70)}$ =.020, p>.05,η^2=.001). Therefore, the null hypothesis was accepted. Partial eta squared of 0.001 implies that interaction of treatment and gender accounted for 0.1% of the observed variance on health care cost of the beverage industry workers.

Table 4.8:20 Estimated marginal mean scores of the interaction effect of treatment and gender on health care cost of the beverage industry workers in Oyo and Osun States

Dependent variable	Treatment	Gender	Mean	Std. Error	95% Confidence Interval	
					Lower Bound	Upper Bound
Health Care Cost	Experimental	Male	11.335	.444	10.446	12.224
		Female	11.030	.694	9.939	12.420
	Control	Male	7.959	.450	7.058	8.861
		Female	7.857	1.081	5.692	10.023

As seen Table 4.8:20 the male participants in the experimental group had the highest means score of 11.335 compared to their female counterparts in the same group as well as their male and female counterparts in the control group. Also, the female participants in experimental group had the highest mean score of 11.030 compared to their male and female counterparts in the control group. It could, therefore, be inferred that the male participants in the experimental group had better reduced health care cost than their female counterparts in the same group and male and female counterparts in the control group.

Hypothesis 11a There will be no significant interaction effect of age and gender on weight on beverage industry workers in Oyo and Osun States.

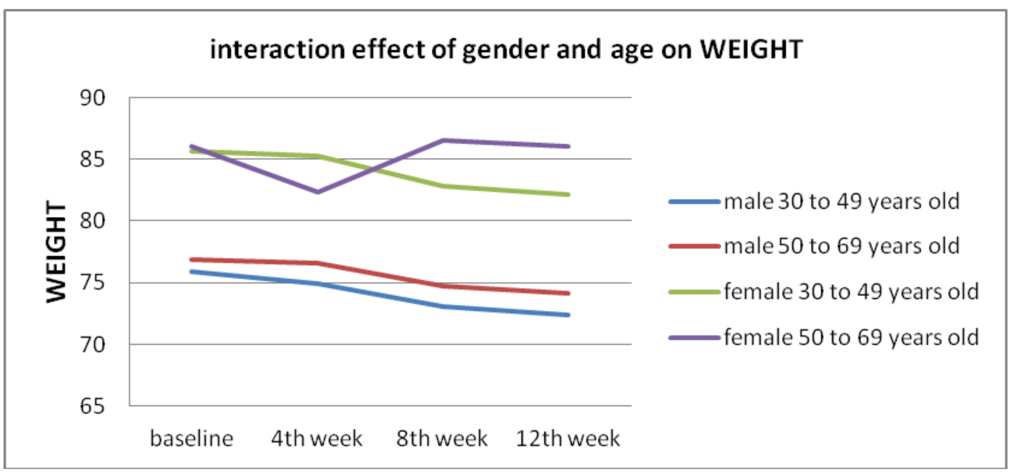
The result presented in Table 4.7 above showed that age and gender had no significant main effect on weight of the participants ($F_{(1,70)}$ =3.533, p>.05,η^2=.058). Age and gender contributed 5.8% to weight of the participants.

Table 4.7.35 The estimated marginal means of main effect of age and gender on weight of the beverage industry workers in Oyo and Osun States

Gender	Age	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Male	30 to 49 years old	77.198	.467	76.262	78.134
	50 to 69 years old	76.464	.258	75.948	76.980
Female	30 to 49 years old	76.221	.576	75.067	77.374
	50 to 69 years old	76.699	.402	75.894	77.504

Gender, combined with age, accounts for the reduction in weight. In other words, the participants had reduced weight because they were in younger age they were female. The opposite was the case for their counterparts that were older they were male. Gender and age, therefore, had no interaction effect on the weight of the participants. The hypothesis that there will be no significant interaction effect of gender and age on weight of the participants was accepted.

Fig. 4.39: Graph showing effect of age and gender on weight of the beverage industry workers in Oyo and Osun States



Hypothesis 11b: There will be no significant interaction effect of age and gender on body fat of beverage industry workers in Oyo and Osun States.

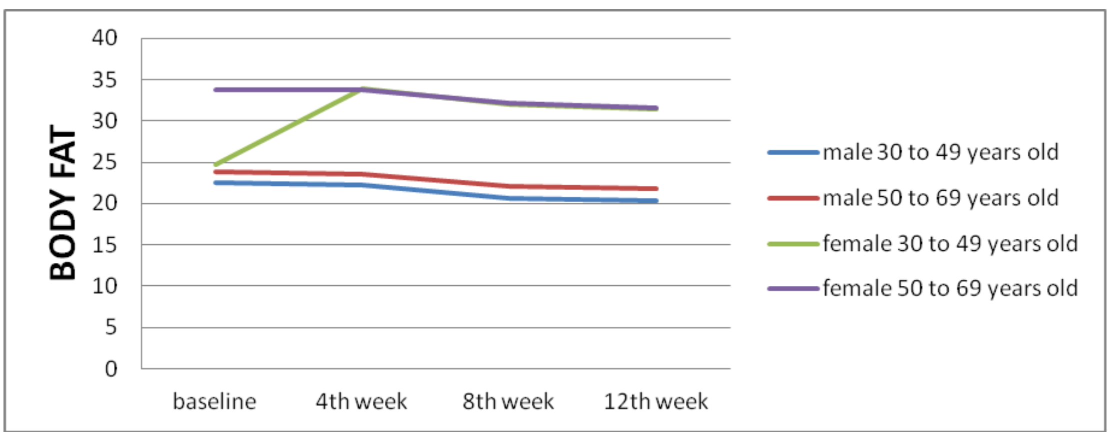
The result captured Table 4.7 above showed that age and gender had no significant main effect on body fat of the participants ($F_{(1,70)}$ =.555, p>.05,η^2=.010). Age and gender contributed 1.0% on body fat of the participants.

Table 4.7.36 The estimated marginal means of main effect of age and gender on body fat of the beverage industry workers in Oyo and Osun States.

Gender	Age	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Male	30 to 49 years old	23.952	.831	22.287	25.617
	50 to 69 years old	24.685	.458	23.767	25.603
Female	30 to 49 years old	24.404	1.025	22.352	26.457
	50 to 69 years old	24.282	.715	22.850	25.714

Gender, combined with age, accounted for the reduction in body fat. In other words, the participants had reduced per cent body fat though it was not significant; but in marginal mean there was reduction. Gender and age, therefore, had no interaction effect on the body fat of the participants. The hypothesis that there will be no significant interaction effect of gender and age on body fat of the participants was accepted.

Fig. 4.40: Graph showing effect of age and gender on body fat of the beverage industry workers in Oyo and Osun States.



Hypothesis 11c There will be no significant interaction effect of age and gender on resting heart rate on beverage industry workers in Oyo and Osun States.

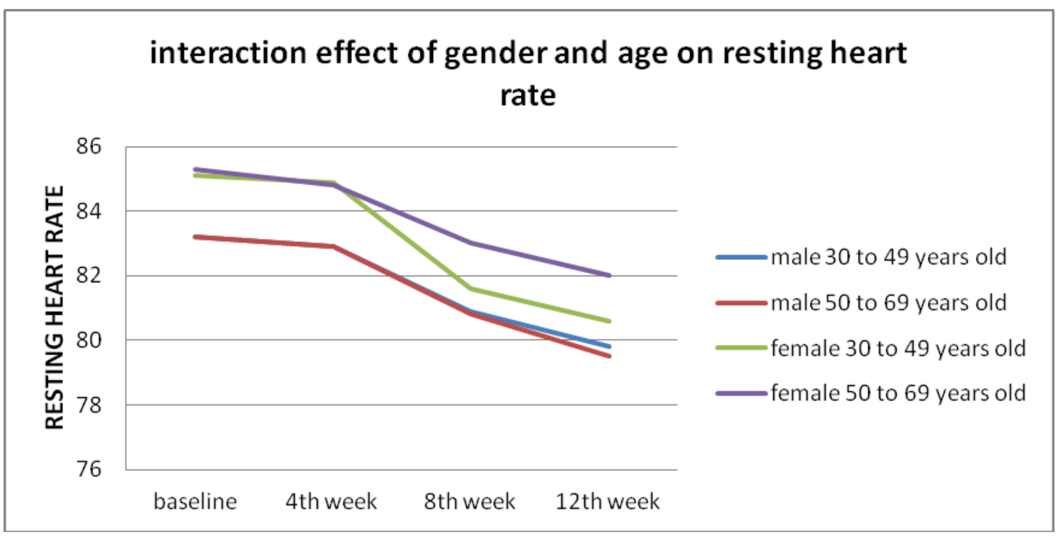
The result presented in Table 4.7 above showed that age and gender had no significant main effect on resting heart rate of the participants ($F_{(1,70)}$ =1.097, p>.05,η^2=.019). Age and gender contributed 1.9% to the resting heart rate of the participants.

Table 4.7.37 The estimated marginal means of main effect of age and gender on resting heart rate of the beverage industry workers in Oyo and Osun States.

Gender	Age	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Male	30 to 49 years old	80.813	.712	79.388	82.239
	50 to 69 years old	80.132	.393	79.346	80.918
Female	30 to 49 years old	79.465	.878	77.708	81.222
	50 to 69 years old	79.812	.612	78.586	81.038

Gender, combined with age, accounted for the reduction in resting heart rate. In other words, the participants had reduced resting heart rate in marginal mean score because they were in younger age and they were female .The opposite was the case for their counterparts that were older and were male. Gender and age, therefore, had no interaction effect on the resting heart rate of the participants. The hypothesis that there will be no significant interaction effect of gender and age on resting heart rate of the participants was accepted.

Fig. 4.41: Graph showing effect of age and gender on resting heart rate of the beverage industry workers in Oyo and Osun States



Hypothesis 11d: There will be no significant interaction effect of age and gender on systolic blood pressure on beverage industry workers in Oyo and Osun States.

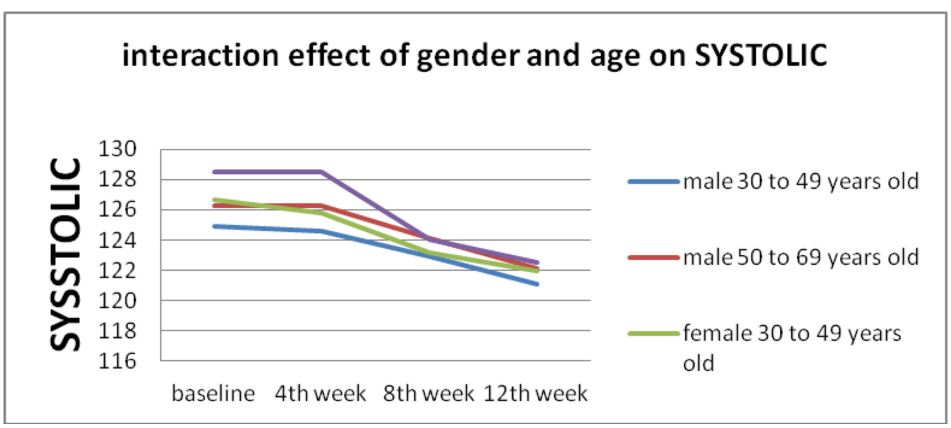
The result presented in Table 4.7 above revealed that age and gender had no significant main effect on the systolic blood pressure of the participants ($F_{(1,70)}$ =.777, p>.05,η^2=.013). Age and gender contributed 1.3% to the systolic blood pressure of the participants.

Table 4.7.38 The estimated marginal means of main effect of age and gender on systolic blood pressure of the beverage industry workers in Oyo and Osun States

Gender	Age	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Male	30 to 49 years old	121.399	1.143	119.111	123.688
	50 to 69 years old	122.876	.630	121.614	124.138
Female	30 to 49 years old	120.216	1.409	117.395	123.038
	50 to 69 years old	120.302	.983	118.333	122.271

Gender, combined with age, accounted for the reduction in the systolic blood pressure. In other words, the participants had reduced systolic blood pressure because they are in younger age and they were female. The opposite was the case for their counterparts that were older and were male. Gender and age, therefore, had no interaction effect on the systolic blood pressure of the participants. The hypothesis that there will be no significant interaction effect of gender and age on systolic of the participants was accepted.

Fig. 4.42: Graph showing effect of age and gender on systolic of the beverage industry workers in Oyo and Osun States



Hypothesis 11e: There will be no significant interaction effect of age and gender on diastolic blood pressure on beverage industry workers in Oyo and Osun States

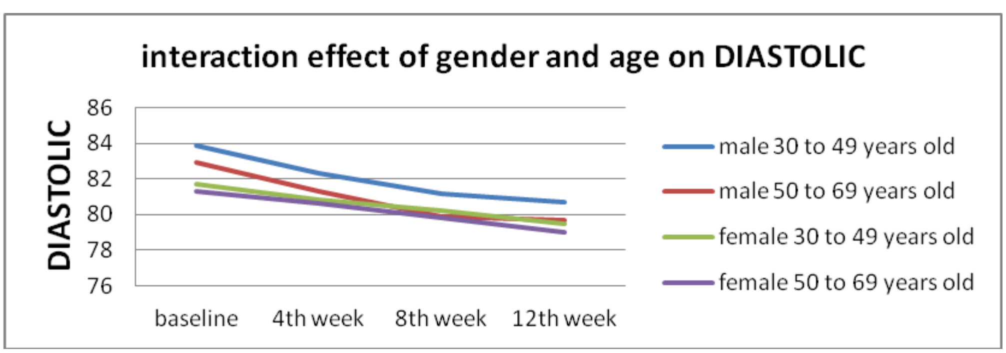
The result presented in Table 4.7 above showed that age and gender had no significant main effect on diastolic blood pressure of the participants ($F_{(1,70)}$ =.002, p>.05,η^2=.001). Age and gender contributed 0.1% on diastolic blood pressure of the participants.

Table 4.7.39 The estimated marginal means of main effect of age and gender on diastolic blood pressure of the beverage industry workers in Oyo and Osun States

Gender	Age	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Male	30 to 49 years old	80.146	1.275	77.594	82.699
	50 to 69 years old	80.033	.703	78.626	81.441
Female	30 to 49 years old	80.176	1.571	77.029	83.322
	50 to 69 years old	79.980	1.096	77.784	82.176

Gender ,combined with age, accounted for the reduction in the diastolic blood pressure. In other words, the participants had reduced diastolic blood pressure in marginal mean score. Gender and age, therefore, had no interaction effect on the diastolic blood pressure of the participants. The hypothesis that there will be no significant interaction effect of gender and age on diastolic blood pressure of the participants was accepted.

Fig. 4.43: Graph showing effect of age and gender on diastolic blood pressure of beverage industry the workers in Oyo and Osun States



Hypothesis 11f: There will be no significant interaction effect of age and gender on hand strength of the beverage industry workers in Oyo and Osun States

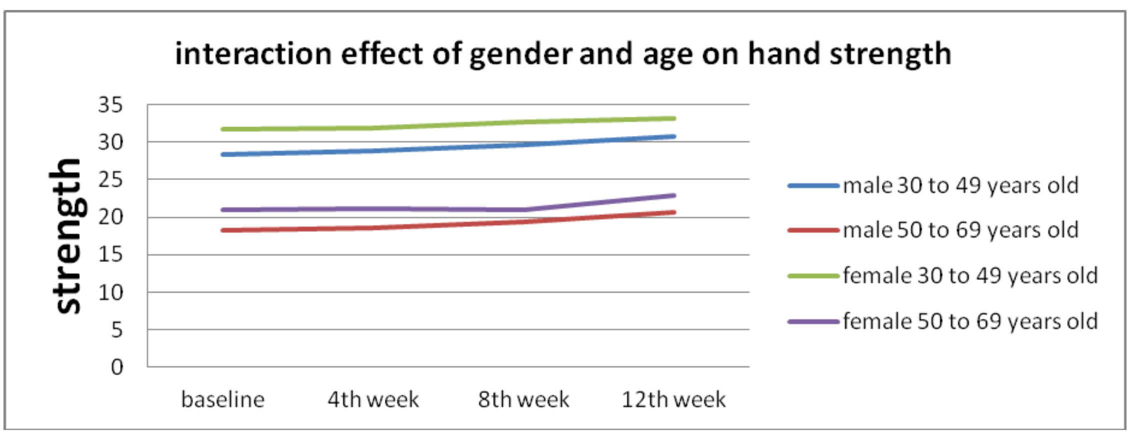
The result Table 4.7 above showed that age and gender had no significant main effect on hand strength of the participants ($F_{(1,70)}$ =.021, $p>.05, \eta^2=.001$). Age and gender contributed 0.1% to the hand strength of the participants.

Table 4.7.40 The estimated marginal means of main effect of age and gender on hand strength of the beverage industry workers in Oyo and Osun States.

Gender	Age	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Male	30 to 49 years old	28.552	.553	27.444	29.660
	50 to 69 years old	28.688	.305	28.078	29.299
Female	30 to 49 years old	28.772	.682	27.406	30.138
	50 to 69 years old	28.799	.476	27.846	29.252

Age, combined with gender had no effect on hand strength; therefore, the hypothesis that there will be no significant interaction effect of age and gender on hand strength of the participants was accepted.

Fig. 4.44: Graph showing effect of age and gender on hand strength of the beverage industry workers in Oyo and Osun States



Hypothesis 11g: There will be no significant interaction effect of age and gender on flexibility of beverage industry workers in Oyo and Osun States.

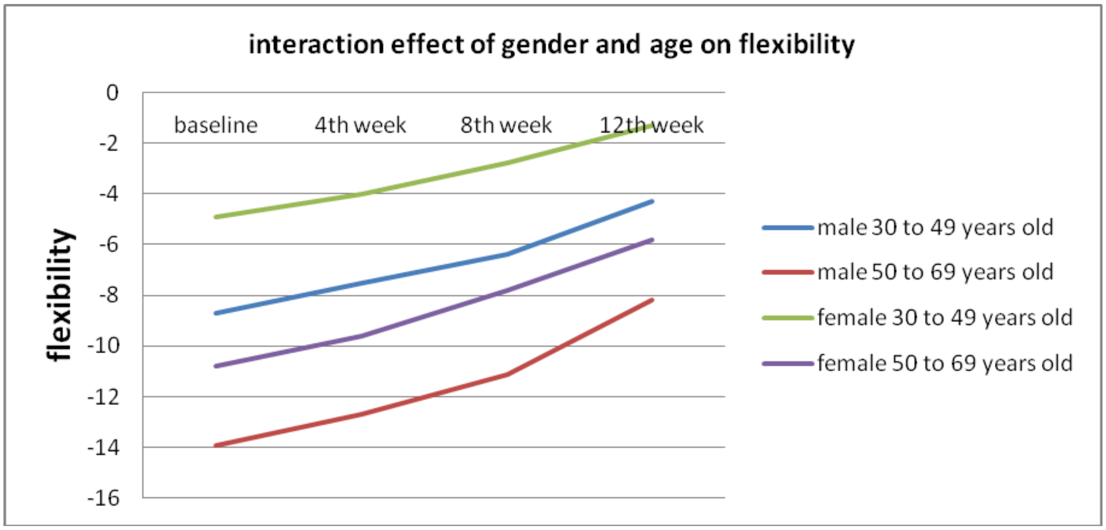
As evident in Table 4.7 above age and gender had no significant main effect on the flexibility of the participants ($F_{(1,70)}$ =.041, p>.05,η^2=.001). Age and gender contributed 0.1% on the flexibility of the participants.

Table 4.7.41 The estimated marginal means of main effect of age and gender on flexibility of the beverage industry workers in Oyo and Osun States

Gender	Age	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Male	30 to 49 years old	-3.515	1.042	-5.602	-1.428
	50 to 69 years old	-3.706	.575	-4.857	-2.555
Female	30 to 49 years old	-5.063	1.285	-7.636	-2.490
	50 to 69 years old	-4.961	.897	-6.756	-3.165

Age, combined with gender, had no effect on flexibility; therefore, the hypothesis that there will be no significant interaction effect of age and gender on flexibility of the participants was accepted.

Fig. 4.45: Graph showing effect of age and gender on flexibility of the beverage industry workers in Oyo and Osun States



Hypothesis 12a: There will be no significant interaction effect of gender and age on workplace accident rate of beverage industry workers in Oyo and Osun States.

Table 4.8 above reveals that the interaction effect of gender and age on workplace accident rate was not significant on the participants ($F_{(1,70)}$ =1.396, p>.05,η^2=.024). Therefore, the null hypothesis was accepted. Partial eta squared of 0.024 implies that interaction of gender and age accounted for 2.4% of the observed variance on workplace accident rate of the beverage industry workers.

Table 4.8:21 Estimated marginal mean scores of the interaction effect of gender and age on workplace accident rate of the beverage industry workers in Oyo and Osun States

Dependent variable	Gender	Age	Mean	Std. Error	95% Confidence Interval	
					Lower Bound	Upper Bound
Work Place Accident	Male	30-49	15.258	.402	14.452	16.064
		50-69	13.885	1.020	11.843	15.927
	Female	30-49	14.959	.419	14.121	15.797
		50-69	14.903	.315	14.271	15.534

Table 4.8.21: reveals that the male participants in the 30-49 age range had the highest means score of 15.258 compared to their 50-69 male counterparts. Also, the female participants in the 30-49 age range had the highest mean score of 14.959 compared to their female counterparts in the 50-69 age range. It could, therefore, be inferred that the male and female participants in the 30-49 age range had better reduced workplace accident rate than their male and female counterparts in the 50-69 age range.

Hypothesis 12b: There will be no significant interaction effect of gender and age on factory fault products rate of beverage industry workers in Oyo and Osun States.

Table 4.8 above equally shows that the interaction effect of gender and age on factory fault products rate was not significant on the participants ($F_{(1,70)}$ =1.292, $p>.05, \eta^2=.022$) . Therefore, the null hypothesis was accepted. Partial eta squared of 0.022 implies that interaction of gender and age accounted for 2.2% of the observed variance on factory fault products rate of beverage industry workers.

Table 4.8:21 Estimated marginal mean scores of the interaction effect of gender and age on factory fault products rate of the beverage industry workers in Oyo and Osun States

Dependent variable	Gender	Age	Mean	Std. Error	95% Confidence Interval	
					Lower Bound	Upper Bound
Factory Fault Products	Male	30-49	10.719	.187	10.344	11.093
		50-69	10.614	.248	10.117	11.110
	Female	30-49	10.988	.238	10.510	11.465
		50-69	10.069	.604	8.859	11.278

Table 4.8.21: reveals that the male participants in the 30-49 age range had the highest means score of 10.719 compared to their 50-69 male counterparts. Also, the female participants in the 30-49 age range had the highest mean score of 10.988 compared to their female counterparts in the 50-69 age range. It could, therefore, be inferred that the male and female participants in the 30-49 age range had better reduced factory fault products rate than their male and female counterparts in the 50-69 age range.

Hypothesis 12c: There will be no significant interaction effect of gender and age on absenteeism of beverage industry workers in Oyo and Osun States.

Table 4.8 above shows that the interaction effect of gender and age on absenteeism was not significant on the participants ($F_{(1,70)}$ =.543, p>.05,η^2=.009). Therefore, the null hypothesis was accepted. Partial eta squared of 0.009 implies that interaction of gender and age accounted for 0.9% of the observed variance on absenteeism of beverage industry workers.

Table 4.8:22 Estimated marginal mean scores of the interaction effect of gender and age on absenteeism of the beverage industry workers in Oyo and Osun States.

Dependent variable	Gender	Age	Mean	Std. Error	95% Confidence Interval	
					Lower Bound	Upper Bound
Absenteeism	Male	30-49	38.635	1.348	35.935	41.335
		50-69	35.335	3.416	28.494	42.176
	Female	30-49	37.665	1.057	35.549	39.781
		50-69	37.353	1.402	34.545	40.162

Table 4.8.22: reveals that the male participants in the 30-49 age range had the highest means score of 38.635 compared to their 50-69 male counterparts. Also, the female participants in the 30-49 age range had the highest mean score of 37.665 compared to their female counterparts in the 50-69 age range. It could, therefore, be inferred that the male and female participants in the 30-49 age range had better reduced absenteeism than their male and female counterparts in the 50-69 age range.

Hypothesis 12d: There will be no significant interaction effect of gender and age on health care cost of beverage industry workers in Oyo and Osun States.

Table 4.8 above indicates that the interaction effect of gender and age on health care cost was not significant on the participants ($F_{(1,70)}$ =.014, p>.05,η^2=.001). Therefore, the null hypothesis was accepted. Partial eta squared of 0.001 implies that interaction of gender and age accounted for 0.1% of the observed variance on health care cost of beverage industry workers.

Table 4.8:23 Estimated marginal mean scores of the interaction effect of gender and age on health care cost of the beverage industry workers in Oyo and Osun States.

Dependent variable	Gender	Age	Mean	Std. Error	95% Confidence Interval	
					Lower Bound	Upper Bound
Health Care Cost	Male	30-49	9.953	.379	9.193	10.712
		50-69	9.342	.503	8.334	10.349
	Female	30-49	9.835	.484	8.866	10.804
		50-69	9.052	1.226	6.596	11.507

Table 4.8.23: reveals that the male participants in the 30-49 age range had the highest means score of 9.953 compared to their 50-69 male counterparts. Also, the female participants in the 30-49 age range had the highest mean score of 9.835 compared to their female counterparts in the 50-69 age range. It could therefore be inferred that male and female participants in the 30-49 age range had better reduced health care cost than their male and female counterparts in the 50-69 age range.

Hypothesis 13a There is no significant interaction effect of treatment, age and gender on weight on beverage industry workers in Oyo and Osun States.

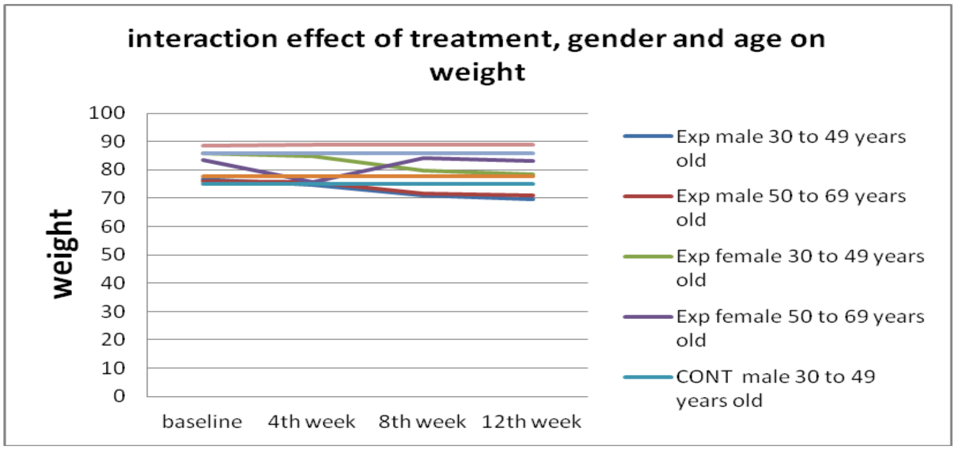
The result presented in Table 4.7 above showed that treatment (aerobic dance), age and gender had significant main effect on weight of the participants ($F_{(1,70)}$ =5.061, $p<.05, \eta^2=.082$). Treatment (aerobic dance), age and gender contributed 8.2% to the weight of the participants.

Table 4.7.42 The estimated marginal means of main effect of treatment, age and gender on weight of the beverage industry workers in Oyo and Osun States

Treatment	Gender	Age	Mean	Std. Error	95% Confidence Interval	
					Lower Bound	upper Bound
Experimental	Male	30 to 49 years old	74.803	.550	73.703	75.903
		50 to 69 years old	73.570	.327	72.915	74.226
	Female	30 to 49 years old	72.137	.728	70.679	73.596
		50 to 69 years old	73.491	.468	72.553	74.428
Control	Male	30 to 49 years old	79.593	.535	78.522	80.664
		50 to 69 years old	79.358	.330	78.698	80.019
	Female	30 to 49 years old	80.304	.728	78.846	81.762
		50 to 69 years old	79.907	.473	78.959	80.855

When a 30-49-year old female participant underwent aerobic dance, she had a reduction in weight. In other words, the participants had reduced weight because of the interaction effect of treatment (aerobic dance), age and gender. The opposite was the case for their counterparts 50- 69 years old male who experienced aerobic dance on the one hand and their counterparts of both genders in the control group, young and old participants, who were not exposed to aerobic dance. The interaction effect of aerobic dance, gender and age, therefore, had an effect on the weight of participants. The hypothesis that there will be no significant interaction effect of treatment, age and gender on weight of beverage industry workers in Oyo and Osun States was rejected.

Fig. 4.46: Graph showing effect of treatment, age and gender on weight of the beverage industry workers in Oyo and Osun States.



Hypothesis 13b There is no significant interaction effect of treatment, age and gender on percent body fat on beverage industry workers in Oyo and Osun States.

The result presented in Table 4.7 above indicated that treatment (aerobic dance), age and gender had no significant main effect on percent body fat of the participants ($F_{(1,70)}$ =2.209, p>.05,η^2=.037). Treatment (aerobic dance), age and gender contributed 3.7% to the body fat of the participants.

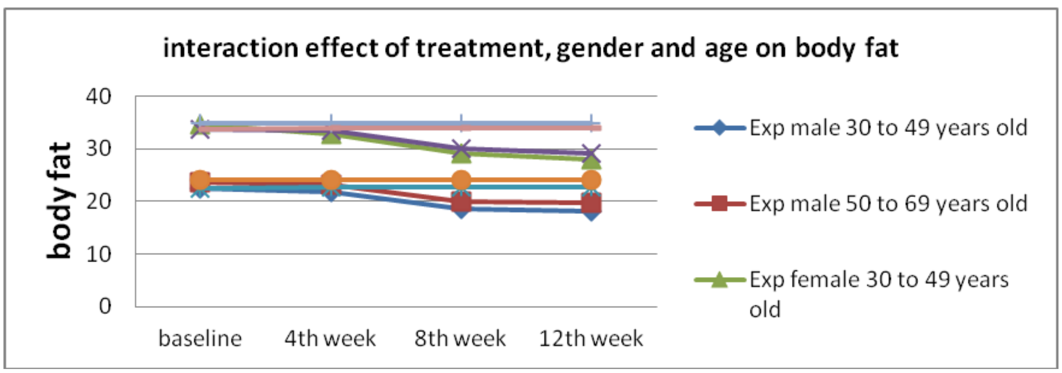
Table 4.7.43 The estimated marginal means of main effect of treatment, age and gender on

percent body fat of beverage industry workers in Oyo and Osun States.

Treatment	Gender	Age	Mean	Std. Error	95% Confidence Interval	
					Lower Bound	Upper Bound
Experimental	Male	30 to 49 years old	21.640	.978	19.681	23.598
		50 to 69 years old	22.596	.582	21.430	23.762
	Female	30 to 49 years old	20.554	1.296	17.959	23.149
		50 to 69 years old	22.271	.833	20.603	23.939
Control	Male	30 to 49 years old	26.264	.952	24.358	28.170
		50 to 69 years old	26.774	.587	25.598	27.949
	Female	30 to 49 years old	28.254	1.293	25.659	30.849
		50 to 69 years old	26.294	.842	24.607	27.980

When a 30-4- year old female participant underwent aerobic dance she had a reduction in percent body fat. In other words, the participants had reduced body fat in marginal mean score because of the interaction effect of treatment (aerobic dance), age and gender. The opposite was the case for their counterparts who were 50 -69 years old male who experienced aerobic dance and their counterparts of both genders, in the control group, young and old, who were not exposed to aerobic dance. The interaction effect of aerobic dance, gender and age therefore had an effect on the body fat of participants. The hypothesis that there will be no significant interaction effect of treatment, age and gender on body fat of beverage industry workers in Oyo and Osun States was accepted.

Fig. 4.47: Graph showing effect of treatment, age and gender on body fat of the beverage industry workers in Oyo and Osun States



Hypothesis 13c There is no significant interaction effect of treatment, age and gender on resting heart rate on beverage industry workers in Oyo and Osun States.

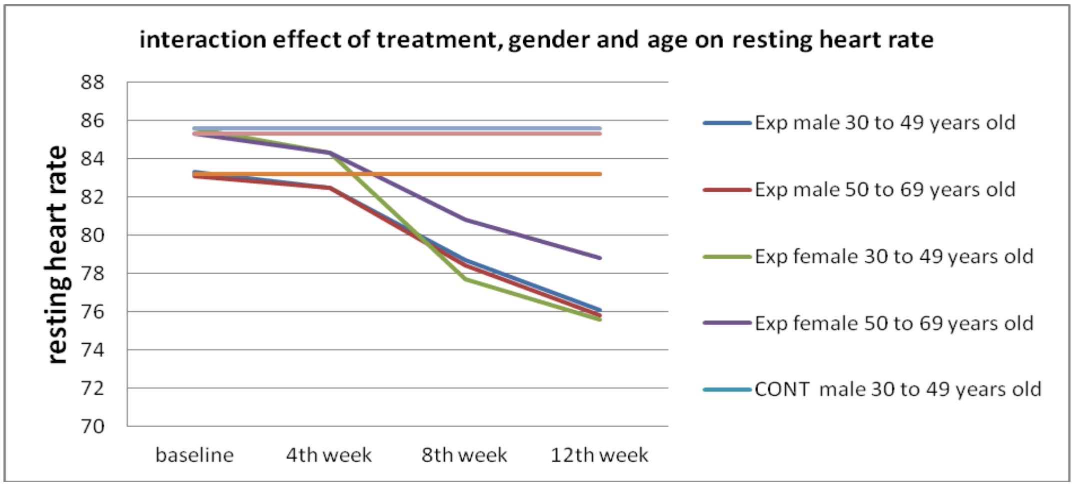
The result captured in Table 4.7 above showed that treatment (aerobic dance), age and gender had no significant main effect on resting heart rate of the participants ($F_{(1,70)}$ =.906, $p>.05, \eta^2=.016$). Treatment (aerobic dance), age and gender contributed 1.6% to the resting heart rate of the participants.

Table 4.7.44:T he estimated marginal means of main effect of treatment, age and gender on resting heart rate of the beverage industry workers in Oyo and Osun States

Treatment	**Gender**	**Age**			**95% Confidence Interval**	
			Mean	**Std. Error**	**Lower Bound**	**upper Bound**
Experimental	Male	30 to 49 years old	77.353	.837	75.676	79.029
		50 to 69 years old	76.62	.499	75.624	77.621
	Female	30 to 49 years old	74.299	1.110	72.077	76.520
		50 to 69 years old	75.483	.713	74.055	76.911
Control	Male	30 to 49 years old	84.274	.815	82.643	85.906
		50 to 69 years old	83.641	.502	82.635	84.647
	Female	30 to 49 years old	84.632	1.110	82.410	86.854
		50 to 69 years old	84.142	.721	82.698	85.585

When a 30-49-year old female participant underwent aerobic dance, she had a reduction in resting heart rate. In other words, the participants had reduced resting heart rate because of the interaction effect of treatment (aerobic dance) in the marginal mean score, age and gender. The opposite was the case for their 50-69 years old male counterparts who experienced aerobic dance and their counterparts of both genders in the control group, young and old, who were not exposed to aerobic dance. The interaction effect of aerobic dance, gender and age, therefore, had no effect on the resting heart rate of participants. The hypothesis that there will be no significant interaction effect of treatment, age and gender on the resting heart rate of beverage industry workers in Oyo and Osun States was accepted.

Fig 4.48: Graph showing effect of treatment, age and gender on the resting heart rate of the beverage industry workers in Oyo and Osun States



Hypothesis 13d There is no significant interaction effect of treatment, age and gender on systolic blood pressure on beverage industry workers in Oyo and Osun States

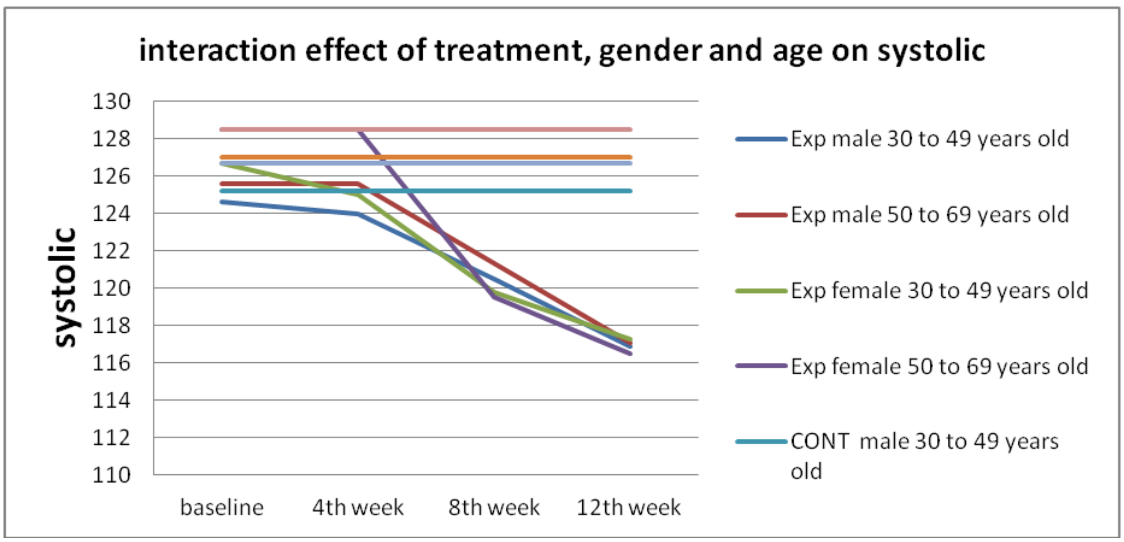
The result presented in Table 4.7 above revealed that treatment (aerobic dance), age and gender had no significant main effect on the systolic blood pressure of the participants ($F_{(1,70)}$ =.306, $p>.05, \eta^2=.005$). Treatment (aerobic dance), age and gender contributed 0.5% to the systolic blood pressure of the participants.

Table 4.7.48 The estimated marginal means of main effect of treatment, age and gender on systolic of beverage industry workers in Oyo and Osun States.

Treatment	Gender	Age	Mean	Std. Error	95% Confidence Interval Lower Bound	95% Confidence Interval upper Bound
Experimental	Male	30 to 49 years old	117.695	1.344	115.003	120.386
		50 to 69 years old	118.589	.801	116.986	120.192
	Female	30 to 49 years old	116.216	1.781	112.649	119.784
		50 to 69 years old	114.894	1.145	112.602	117.187
Control	Male	30 to 49 years old	125.104	1.308	112.485	127.724
		50 to 69 years old	127.162	.807	125.547	128.778
	Female	30 to 49 years old	124.216	1.781	120.649	127.784
		50 to 69 years old	125.710	1.157	123.392	128.028

When a 30-49-year old female participant underwent aerobic dance, she had a reduction in systolic in marginal mean score. In other words, the participants had reduced systolic blood pressure because of the interaction effect of treatment (aerobic dance), age and gender. The opposite was the case for their 50-69 years old male counterparts who experienced aerobic dance and their counterparts of both genders in the control group, young and old, who were not exposed to aerobic dance. The interaction effect of aerobic dance, gender and age, therefore, had no effect on the systolic blood pressure of the participants. The hypothesis that there will be no significant interaction effect of treatment, age and gender on the systolic blood pressure of beverage industry workers in Oyo and Osun States was accepted.

Fig. 4.49: Graph showing effect of treatment, age and gender on systolic blood pressure of the beverage industry workers in Oyo and Osun States



Hypothesis 13e There is no significant interaction effect of treatment, age and gender on diastolic blood pressure on beverage industry workers in Oyo and Osun States.

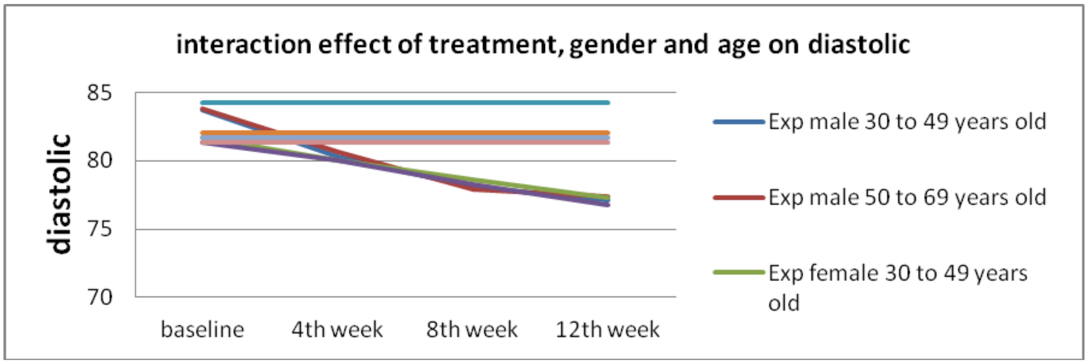
The result presented in Table 4.7 above showed that treatment (aerobic dance), age and gender had no significant main effect on diastolic blood pressure of the participants ($F_{(1,70)}$ =1.621, p>.05,η^2=.028). Treatment (aerobic dance), age and gender contributed 2.8% to the diastolic blood pressure of the participants.

Table 4.7.49 The estimated marginal means of main effect of treatment, age and gender on diastolic blood pressure of the beverage industry workers in Oyo and Osun States

Treatment	Gender	Age	Mean	Std. Error	95% Confidence Interval	
					Lower Bound	upper Bound
Experimental	Male	30 to 49 years old	75.867	1.499	72.865	78.869
		50 to 69 years old	77.427	.893	75.640	79.215
	Female	30 to 49 years old	78.342	1.987	74.364	82.321
		50 to 69 years old	77.699	1.277	75.142	80.256
Control	Male	30 to 49 years old	84.426	1.459	81.505	87.348
		50 to 69 years old	82.639	.900	80.838	84.441
	Female	30 to 49 years old	82.009	1.987	78.030	85.987
		50 to 69 years old	82.261	1.291	79.676	84.846

When a 30-49-year old male participant underwent aerobic dance, he had a reduction in diastolic blood pressure. That is to say, the participants had reduced diastolic blood pressure because of the interaction effect of treatment (aerobic dance), age and gender. The opposite was the case for the counterparts. The interaction effect of Aerobic dance, gender and age therefore had no effect on the diastolic blood pressure of the participants. The hypothesis that there will be no significant interaction effect of treatment, age and gender on the diastolic blood pressure of beverage industry workers in Oyo and Osun States was accepted.

Fig. 4.50: Graph showing effect of treatment, age and gender on the diastolic blood pressure of the beverage industry workers in Oyo and Osun States



Hypothesis 13f There is no significant interaction effect of treatment, age and gender on hand strength of beverage industry workers in Oyo and Osun States

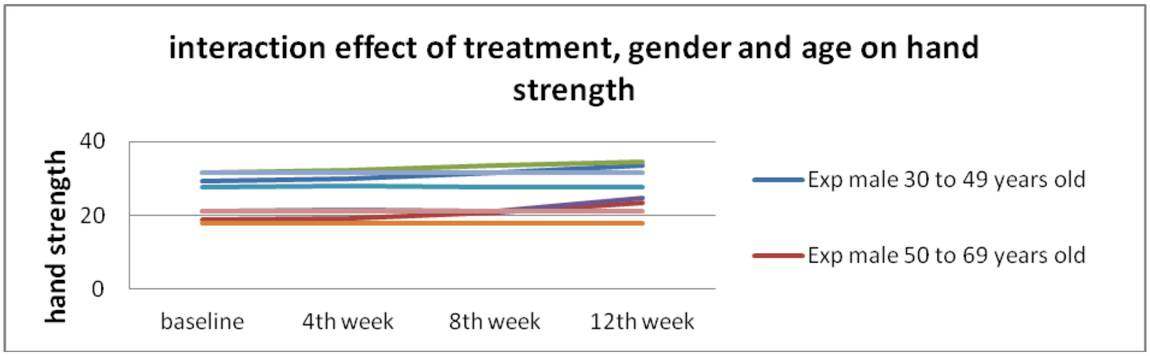
The result Table 4.7 above showed that treatment, age and gender had no significant main effect on hand strength of the participants ($F_{(1,70)}$ =.007, p>.05,η^2=.001). Treatment, age and gender contributed 0.1% to the hand strength of the participants.

Table 4.7.50 The estimated marginal means of main effect of treatment, age and gender on hand strength of the beverage industry workers in Oyo and Osun States.

Treatment	Gender	Age	Mean	Std. Error	95% Confidence Interval Lower Bound	95% Confidence Interval upper Bound
Experimental	Male	30 to 49 years old	30.860	.651	29.557	32.163
		50 to 69 years old	30.958	.388	30.182	31.734
	Female	30 to 49 years old	30.689	.862	28.962	32.416
		50 to 69 years old	30.616	.554	29.507	31.726
Control	Male	30 to 49 years old	26.244	.633	24.976	27.512
		50 to 69 years old	26.419	.391	25.637	27.202
	Female	30 to 49 years old	26.856	.862	25.129	28.582
		50 to 69 years old	26.981	.560	25.859	28.104

Treatment and age, combined with gender, had no effect on hand strength; therefore, the hypothesis that there will be no significant interaction effect of treatment, age and gender on hand strength of the participants was accepted.

Fig. 4.51: Graph showing effect of treatment, age and gender on hand strength of the beverage industry workers in Oyo and Osun States.



Hypothesis 13g There is no significant interaction effect of treatment, age and gender on flexibility on beverage industry workers in Oyo and Osun States.

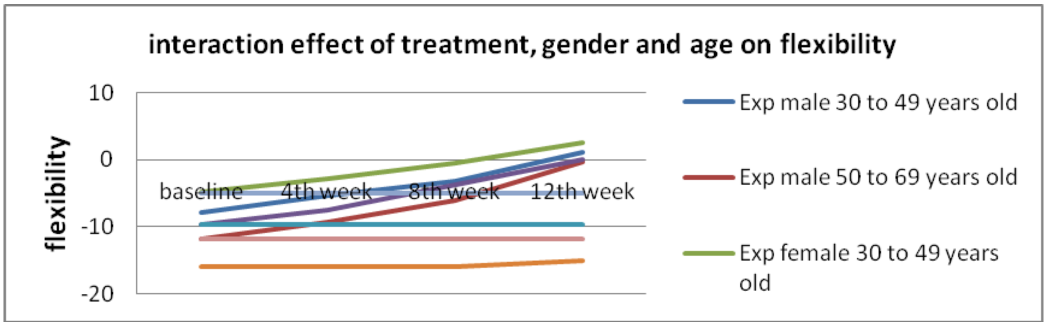
As evident in Table 4.7 above, treatment, age and gender had no significant main effect on flexibility of the participants ($F_{(1,70)}$ =.525, p>.05,η^2=.009). Treatment, age and gender contributed 0.9% to the flexibility of the participants.

Table 4.7. 51. The estimated marginal means of main effect of treatment, age and gender on flexibility of the beverage industry workers in Oyo and Osun States

Treatment	Gender	Age	Mean	Std. Error	95% Confidence Interval Lower Bound	95% Confidence Interval upper Bound
Experimental	Male	30 to 49 years old	-6.51E-02	1.226	-2.521	2.389
		50 to 69 years old	1.722	.730	.260	3.184
	Female	30 to 49 years old	-1.729	1.625	-4.983	1.524
		50 to 69 years old	-.636	1.044	-2.727	1.455
Control	Male	30 to 49 years old	-6.964	1.193	-9.353	-4.575
		50 to 69 years old	-9.134	.736	-10.607	-7.660
	Female	30 to 49 years old	-8.396	1.625	-11.649	-5.143
		50 to 69 years old	-9.286	1.056	-11.400	-7.172

Treatment and age combined with gender had no effect on flexibility; therefore, the hypothesis that there will be no significant interaction effect of treatment, age and gender on flexibility of the participants was accepted.

Fig. 4.52: Graph showing effect of treatment, age and gender on flexibility of the beverage industry workers in Oyo and Osun States



Hypothesis 14a: There will be no significant interaction effect of treatment, gender and age on workplace accident rate of beverage industry workers in Oyo and Osun States.

Table 4.8 above indicates that the interaction effect of treatment, gender and age on workplace accident rate was not significant on the participants ($F_{(1,70)}$ =.344, p>.05,η^2=.006). Therefore, the null hypothesis was accepted. Partial eta squared of 0.006 implies that interaction of treatment, gender and age accounted for 0.6% of the observed variance on workplace accident rate of beverage industry workers.

Table 4.8:24 Estimated marginal mean scores of the interaction effect of treatment, gender and age on workplace accident rate of the beverage industry workers in Oyo and Osun States

Dependent variable	Treatment	Gender	Age	Mean	Std. Error	95% Confidence Interval	
						Lower Bound	Upper Bound
Work Place Accident Rate	Experimental	Male	30-49	17.797	.598	16.600	18.995
			50-69	15.852	1.744	12.360	19.343
		Female	30-49	16.807	.566	15.674	17.941
			50-69	16.604	.500	15.603	17.604
	Control	Male	30-49	13.111	.622	11.864	14.357
			50-69	13.201	.391	12.418	13.984
		Female	30-49	11.918	1.045	9.825	14.011
			50-69	12.719	.586	11.546	13.892

Table 4.8.24: reveals that the male participants in the 30-49 age range of the experimental group had the highest means score of 17.797 compared to their 50-69 years old counterparts and their female counterparts in the same group as well as their male and female counterparts in the control group. The female participants in the 30-49 age range of the experimental group had the highest mean score of 16.807 compared to their 50-69 years old counterparts in the same group as well as their male and female counterparts in the control group. It could, therefore, be inferred that both male and female in the 30-49 age range of the experimental group had better reduced workplace accident rate than their 50-69 age range of the same group as well as their counterparts in the control group.

Hypothesis 14b: There will be no significant interaction effect of treatment, gender and age on factory fault products rate of beverage industry workers in Oyo and Osun States.

Table 4.8 above indicates that the interaction effect of treatment, gender and age on factory fault products rate was not significant on the participants ($F_{(1,70)}$ =.236, p>.05,η^2=.004). Therefore, the null hypothesis was accepted. Partial eta squared of 0.004 implies that interaction of treatment, gender and age accounted for 0.4% of the observed variance on factory fault products rate of beverage industry workers.

Table 4.8:25 Estimated marginal mean scores of the interaction effect of treatment, gender and age on factory fault products rate of the beverage industry workers in Oyo and Osun States

Dependent variable	Treatment	Gender	Age	Mean	Std. Error	95% Confidence Interval	
						Lower Bound	Upper Bound
Factory Fault Products	Experimental	Male	30-49	11.817	.231	11.353	12.281
			50-69	11.170	.369	10.432	11.909
		Female	30-49	11.799	.347	11.105	12.494
			50-69	10.691	.619	9.451	11.931
	Control	Male	30-49	10.057	.335	9.386	10.729
			50-69	9.620	.296	9.028	10.213
		Female	30-49	9.446	1.033	7.378	11.514
			50-69	10.176	.354	9.467	10.885

Table 4.8.25: reveals that the male participants in the 30-49 age range of the experimental group had the highest means score of 11.817 compared to their 50-69 years old counterparts and their female counterparts in the same group as well as their male and female counterparts in the control group. The female participants in the 30-49 age range of the experimental group had the highest mean score of 11.799 compared to their 50-69 age range counterparts in the same group as well as their male and female counterparts in the control group. It could, therefore, be inferred that both males and females in the 30-49 age range of the experimental group had better reduced factory fault products rate than their 50-69 years old counterparts of the same group as well as their counterparts in the control group.

Hypothesis 14c: There will be no significant interaction effect of treatment, gender and age on absenteeism of beverage industry workers in Oyo and Osun States.

Table 4.8 above indicates that the interaction effect of treatment, gender and age on absenteeism was not significant on the participants ($F_{(1,70)}$ =.179, p>.05,η^2=.003). Therefore the null hypothesis was accepted. Partial eta squared of 0.003 implies that interaction of treatment, gender and age accounted for 0.3% of the observed variance on the absenteeism of the beverage industry workers.

Table 4.8.26: Estimated marginal mean scores of the interaction effect of treatment, gender and age on absenteeism of the beverage industry workers in Oyo and Osun States

Dependent variable	Treatment	Gender	Age	Mean	Std. Error	95% Confidence Interval	
						Lower Bound	Upper Bound
Absenteeism	Experimental	Male	30-49	44.895	1.896	41.098	48.692
			50-69	44.348	1.674	40.996	47.700
		Female	30-49	44.780	2.003	40.770	48.791
			50-69	40.604	5.842	28.906	52.302
	Control	Male	30-49	29.812	2.085	25.636	33.988
			50-69	30.983	1.309	28.360	33.605
		Female	30-49	30.066	3.502	23.053	37.078
			50-69	32.489	1.962	28.560	36.418

Table 4.8.26: reveals that the male participants in the 30-49 age range of the experimental group had the highest means score of 44.895 compared to their 50-69 years

old counterparts and their female counterparts in the same group as well as their male and female counterparts in the control group. The female participants in the 30-49 age range of the experimental group had the highest mean score of 44.780 compared to their 50-69 age range counterparts in the same group as well as their male and female counterparts in the control group. It could, therefore, be inferred that both males and females in the 30-49 age range of the experimental group had reduced absenteeism compared to their 50-69 years old counterparts of the same group and those in the control group.

Hypothesis 14d: There will be no significant interaction effect of treatment, gender and age on health care cost of beverage industry workers in Oyo and Osun States.

Table 4.8 above indicates that the interaction effect of treatment, gender and age on health care cost was not significant on the participants ($F_{(1,70)}$ =.110, p>.05,η^2=.002). Therefore the null hypothesis was accepted. Partial eta squared of 0.002 implies that interaction of treatment, gender and age accounted for 0.2% of the observed variance on the health care cost of the beverage industry workers.

Table 4.8:27 Estimated marginal mean scores of the interaction effect of treatment, gender and age on health care cost of the beverage industry workers in Oyo and Osun States

Dependent variable	Treatment	Gender	Age	Mean	Std. Error	95% Confidence Interval	
						Lower Bound	Upper Bound
Health Care Cost	Experimental	Male	30-49	11.703	.704	10.292	13.113
			50-69	10.356	1.257	7.839	12.873
		Female	30-49	11.677	.470	10.736	12.618
			50-69	10.992	.748	9.494	12.491
	Control	Male	30-49	7.691	.681	6.328	9.054
			50-69	8.228	.601	7.025	9.431
		Female	30-49	7.747	2.097	3.549	11.946
			50-69	7.967	.719	6.528	9.407

Table 4.8.27: reveals that the male participants in the 30-49 age range of the experimental group had the highest means score of 11.703 compared to their 50-69 years old counterparts and their female counterparts in the same group as well as their male and female counterparts in the control group. The female participants in the 30-49 age range of the experimental group had the highest mean score of 11.677 compared their 50-69 years old counterparts in the same group as well as their male and female counterparts in the control group. It could, therefore, be inferred that both males and females in the 30-49 age range of the experimental group had reduced health care cost compare to their 50-69 years old counterparts of the same group as well as their counterparts in the control group.

Discussion of findings

The finding of this study revealed that treatment (aerobic dance exercise) had significant effect on weight, percentage body fat, resting heart rate, systolic blood pressure, diastolic blood pressure, hand strength and flexibility. This finding is in line with American College of Sports Medicine (2008), which discovered that, for athlete and other exercising individuals to benefit from aerobic training, they must undergo minimum frequency of three times per week in order to provide sufficient stimulus for physiological adaptation and the subsequent improvement in performance. Also, American College of Medicine (2013) documented that, if participants who engage in aerobic training do not have sufficient rest and the exercise stresses alone or combined with other stressors (physical, nutritional, environmental or physiological) are too great, the athlete or individual may fail to adapt (maladapted) and become overreached. If insufficient rest continues when overreached and the training individual is exposed to further stressors, then a state of chronic fatigue, and immune depression may occur. This is classified as overtraining syndrome (OTS) and is sometimes referred to as unexplained underperformance.

Similarly, Orbach (2008) found that physical activity contributes to a loss of body weight (WHO 1999). This study found a statistically significant reduction ($P<0.05$) in the total body weight of participants after 12 weeks' aerobic dance training programme. The finding supported the work of Williams, Albers, Kraus and Wood (1990), which showed that continuous aerobic exercise lasting over ten weeks reduced body weight significantly. Also the study of Emeghara (2001) showed a significant decrease in the body weight of cardiac patient after three months' aerobic exercise. Also the finding of this study showed that the total body weight of beverage industry workers who participated in aerobic dance training reduced at the end of the training.

On the per cent body fat of beverage industry workers the findings of the study showed that there was a significant decrease in the pretest posttest and per cent body fat of beverage industry workers in the experimental and control groups after aerobic dance training for 12 weeks. This showed that aerobic dance had a significant effect on the percent body fat of the participants. The analysis revealed that the reduction in per cent body fat was in the experimental group which differed significantly from the control group. This finding is in line with Pollock et al. (1992), who found a significant decrease in per cent body fat of 32 young people who participated in aerobic fitness programme. It is also supported by Emeahara (2001) ,who also found a significant reduction of per cent body fat of cardiac patient after a 3-month aerobic exercise training. This significant reduction may have been due to the significant decrease in total body weight.

This study also sought to find out the effect of 12-week aerobic dance training on resting heart rate of beverage industry workers. Significant difference ($P< 0.05$) was observed in resting heart rate. The analysis showed that the reduction in resting heart rate in the experimental group differed significantly from that of the control group. This is in line with the position of Brook et al. (2000) who reported that aerobic dance training reduced resting and submaximal exercise, systolic and diastolic arterial blood pressure. Kelley and Kelley (2000) claim that after 10 weeks of resistance training systolic and diastolic pressure decreased. With regard to the effect of treatment (aerobic dance) on work productivity variables (work place accident rate, factory fault product, absenteeism, and health care cost) the finding of this study revealed that was significant effect of treatment (aerobic dance) on work productivity variables examined the effect of a 12-week aerobic dance training on absenteeism of workers. The analysis revealed that the reduction in absenteeism in the experimental group differed significantly from that of the control group. The estimated mean value of the participants who took part in the training was higher than that of the control group. This is in line with the position of Brook et al. (2000), who reported that work-site fitness programmes are gaining popularity because of the potential to lower absenteeism and job turnover and increase job productivity and morale. The programme will have a positive effect on the physiological variables that may positively influence workers' performance. Furthermore, companies' hope to reduce direct expenditure as a result of aforementioned potential benefit of work site fitness services, positive relationships between regular exercise and workers' productivity have been indicated in past studies, but the results were subjective and only identified exercise adherence levels by self-evaluation rather than fitness levels via objective assessment. Another aspect related to employee productivity is to increase job satisfaction. If employees feel better about their job, they will want to be productive in their position.

Initial research linking involvement in corporate health and fitness programme to measure of absenteeism generally found an inverse relationship between membership in a company health and fitness programme and absenteeism. In his review of 39 studies linking physical fitness and absenteeism, Shephard (2009) reported that average impact of fitness programmes on absenteeism was between 0.5 and 2.0 days' improvement in attendance/ years, while other previous research suggested that fitness levels are associated with improved, and productivity, satisfaction and attendance relationships are vulnerable, as only employee participation at fitness centre and not fitness levels were assessed.

The findings of this study showed reduction in workplace accident rate and compared favourably with Proper (2003) who found strong evidence that workplace physical exercise/activity programmes increased the level of physical activity and reduced risk of musculoskeletal disorders. Most of the evidence in the field of workplace intervention currently available seems to be related to the effect of regular physical exercise rather than to the relationship between dose and response on health related changes, like body mass, skin folds, aerobic power, muscle strength, flexibility, systolic blood pressure, and serum cholesterol. This study acknowledges the importance of linking exercise to business objectives; training employees regarding health behaviour change, self-care, injury and disease prevention; and promoting quality of life and well-being of employees and maximize performance and productivity. Physical exercise intervention in the workplace promotes employee's physical and psychosocial well being. Proper et al, (2002; 2003) found that exercise programmes conferred more significant benefits on the physical functioning of their participants, especially musculoskeletal symptoms, than on psychological functioning. Also the benefits of exercise interventions were connected more to the physiological body functions and activities and participation.

Findings from this study further showed that workplace accident rate of the participants in the experimental groups had significant improvement, while no change was found in the control group. This finding is consistent with the result of previous studies reported that exercise contributes to increase in endurance, which means that the workers can work longer without getting tired, helps reduce stress, tension, anxiety and depression; and improves circulation; helps the body use oxygen better; increases energy; and reduces accident rate in the factory. American Heart Association (2007) found that employees reported feeling better, eating healthier, and less stress. The participants reported improved productivity, higher job satisfaction. After three months of an uninterrupted exercise, there was improvement in production and less accident rate.

The outcome of this study showed that aerobic dance exercise training is effective in reducing factory fault product. Participant in the experimental groups demonstrated higher level of mental alertness in reducing fault product than those in the control. This means that aerobic dance training can help to reduce the number of factory fault product in the company. Health care cost of the company reduced significantly as against the increase found in the control group post-study. This is consistent with the findings of previous studies that exercise contributes to reduction in the health-related complications among individuals with elevated blood sugar (Manson, Nathan, Kroleswski, Starmpfe, Willett, Hennekens, 1992; Nusselder, 2006).

On health-related variables, the finding of this study revealed that there was no significant effect of age on health-related variables (weight, per cent body fat, resting heart rate, systolic and diastolic blood pressure, hand strength and flexibility). This finding is in line with that of Underhay et al. (2002) who, after an 8-week Modern Balinese Baris Dancing Exercise, (MBBDE)-UUMS (1994), found that 60 healthy male youths (30-49) had their diastolic blood pressure reduced. Also,Udayana University School of Medicine (1994) reported that the systolic blood pressure of 60 healthy men aged 30-49 years reduced significantly after an 8-week MBBDE. This population was very close to the population of this study and the finding of this study was expected.

Similarly, in this study, there was no significant effect of age on work productivity variables (work place accident rate, factory fault product, absenteeism, and health care cost). This finding is in line with that of Ashford (2013), who found that prime-age workers and older workers did not seem to have different patterns of job-related temporary disabilities. However, those aged 65 and older appear more likely to suffer work-related permanent disabilities and fatalities on the job. Age effect was robust on the control group for industry and occupation, implying that they are not simply reflecting life cycle differences in workers' jobs.

On the effect of gender on health-related variables (weight, per cent body fat, resting heart rate, systolic and diastolic blood pressure, hand strength and flexibility, the finding of this study revealed that there was no significant effect of gender on health-related variables (weight, per cent body fat, resting heart rate, systolic and diastolic blood pressure, hand strength and flexibility). This finding is at variance with that of American Journal on physical and Medical Rehabilitation (2006), which affirmed that aerobic training displayed a significant improvement in health-related variables (weight, per cent body fat, resting heart rate, systolic and diastolic blood pressure, hand strength and flexibility) in a research conducted on various measures on females. However participants who fell within the age bracket 30-49 had a higher marginal mean value than those within the 50-69 age brackets. The result of this study also revealed that there was significant main effect of treatment and gender on flexibility of the participants. It was observed, in Reddy, 2012 that regular physical activity, fitness and exercise are critically important for the health and well- being of all people. Regular aerobic exercise will produce beneficial effects for any age group provided the exercise is specific and appropriate for the level of fitness of the individual.

Moreover, there was significant interaction effect of treatment and gender on health-related variables of weight and resting heart rate; while the interaction effect was not significant on other health-related variables (per cent body fat, systolic and diastolic blood pressure, hand strength and flexibility). This finding is in line with that of Haslofça, (2000); Steinbeck, 2001; Korsten et al. 2007 and Karacabey, 2009) who found that 12 weeks of aerobic training improved weight and resting heart rate, This results is also in line with the previous literature that found improvements in health-related parameters of obese participants as a result of regular exercise participation.

There was also significant three way interaction effect of treatment, gender and age on weight, but it was not significant on other health-related variables (per cent body fat, resting heart rate, systolic and diastolic blood pressure, hand strength and flexibility). This finding is in line with that of… On the effect effects of treatment, gender and age on health-related variables of weight, the study revealed that there was significant effect of treatment, gender and age on weight,. This finding is in line with that of American Journal on Physical and Medical Rehabilitation (2006) who affirmed that aerobic training displayed a significant improvement on weight in a research conducted on various measures in females.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

Summary

Aerobic dance training is one of the modalities of aerobic exercise that individuals of a population enjoy. It has been found effective in fitness programme. This study investigated the effects of 12-week aerobic dance training on health-related variables and work productivity among beverage industry workers in Oyo and Osun States. The health-related variable selected were weight, per cent body fat, resting heart rate, systolic blood pressure, diastolic blood pressure, hand strength and flexibility. The work productivity variables were absenteeism, workplace accident rate, factory fault product and health care cost.

Fourteen hypotheses were drawn and tested for the study. Seven hypotheses were formulated on the health-related variables, while another seven hypotheses were formulated on work productivity. Related literature was reviewed for each of the selected health-related and work productivity variables.

The pretest-posttest control group quasi experimental design was used for the study. The population for this study were beverage industry workers in Oyo and Osun States. The purposive samples selected from the department that had higher cases of health-related fitness complications were assigned to experimental and control groups. Pretest measurements were taken from each of the groups, after which the experimental group was given a treatment in the form of 12-week aerobic dance training. The aerobic dance training was administered in three distinct phases during each session: warm-up or preliminary phase (10 minutes), conditioning bout or exercise phase (aerobic dance) (30 minutes), and cool down or recovery phase (10 minutes). The control group only received lecture on lifestyle education; it did not receive any form of treatment. After the 12-week treatment period, posttest measures were obtained from the groups.

The data collected were subjected to statistical analysis. The descriptive statistics of range, mean and standard deviation were used to report the pretest and posttest measures of the participants. The inferential statistics of ANCOVA was used to determine the significance of the effect of the 12-week aerobic dance training programme on the selected health-related variables and work productivity. All significant levels were set at 0.05. Following the computation of Cochran Q test and ANCOVA for the fourteen hypotheses on the health-related variables (weight, percent body fat, resting heart rate, systolic and diastolic blood pressure, and flexibility) and work productivity (absenteeism workplace accident rate, factory fault product and health care cost) were rejected. This was because their f-ratios were significant at 0.05 alpha level.

Significant F- ratio was not obtained for hand strength; hence the hypothesis on hand strength was accepted. The result from the seven hypotheses on health-related variables showed that there was no significant difference between male and female participant in resting heart rate, systolic blood pressure, diastolic blood pressure and hand strength; while, on age hand strength and flexibility were not significant. The computation of ANCOVA for the remaining seven hypotheses on work productivity was significant with treatment.

The result of this study showed that there was no significant difference between the male and female participants in workplace accident rate, factory fault product, absenteeism and health care cost; and all these also were not significant in age.

Conclusion

From the findings of the study, the following conclusions were drawn:

- Aerobic dance programme performed three (3) times per week for 12 consecutive weeks reduced the per cent body fat, body weight, diastolic blood pressure. It could also significantly lower systolic blood pressure.
- Participation in the aerobic dance training programme did not cause any significant reduction in the hand strength of beverage industry workers.
- Age and gender did not show significant interaction effect of treatment on hand strength and flexibility
- Gender showed significant interaction effect of treatment on weight, per cent body fat and flexibility
- Aerobic dance as a mode of exercise is safe and easy to perform. It is easy to administer and can be performed anywhere there is enough room to allow one to move the body to any direction. Aerobic dance is thus useful to those who are interested in personal exercise programme with minimal supervision and yet desirable changes could be obtain in their fitness levels.
- Aerobic dance training programme can be a very useful adjunct to the modern way of improving weight, health-related variables, and work productivity. This is

because of the significant reduction in per cent body fat, weight, diastolic blood pressure and flexibility recorded in this study.

This study showed that the aerobic dance training significantly improved body weight diastolic blood pressure, per cent body fat systolic blood pressure and flexibility of the beverage industry workers, which is contrary to the widely held view that aerobic dance only benefits adolescents. Aerobic dance exercise improved health-related variable of the beverage industry workers, and also improved their productivity and reduced the health care cost of the industry. This study showed that the aerobic dance training significantly reduced absenteeism, workplace accident rate, factory fault product and the health care cost of the companies.

Recommendations

The findings of this study did not support the assumption of (Boone 2007) that aerobic dance training only benefits the adolescent population. Hence adults should participate in aerobic dance training programme for physiological efficiency. In view of the foregoing, the following recommendations are important.

- Aerobic dance should form an integral part of physical fitness programme in beverage industry and other similar establishments. This will enable more workers to participate and gain the benefits of aerobic dance exercise.
- Management of industries and government agencies should be enlightened to understand the benefits and nature of aerobic dance. This can be done through seminars, workshops and conferences. This will help them to give their workers the freedom to participate and enjoy the benefit of aerobic dance.
- Similar studies should be carried out for a longer period. This will help the participants to master more movement patterns and also ascertain further the strength of aerobic dance.
- Studies like this should be carried out when the workers are on holiday to have total control of the; this could also prevent undue interference with their factory programme.
- Researchers interested in aerobic dance should select appropriate musical tunes that are popular among the population or the ones that will appeal to them so quickly. This will help maintain their interest in the programme.

- Similar study should be carried out but for a longer period of time. This will help the participants to master more movement patterns and also ascertain further the strength of aerobic dance.
- Further studies should be carried out to determine the effect of the aerobic dance training programme on other physiological profile of adults or workers not observed in this study.
- Managements need to look beyond obvious physical hazards and look for hazards that are part of the way work is carried out in the workplace.
- The health committee that was set up during the course of this training should meet frequently in other to provide solution to industrial accident that may occur.

Contribution to knowledge

This study has contributed to the body of knowledge on the effectiveness of aerobic dance exercise training in bringing about improvement in body weight, per cent body fat, systolic and diastolic blood pressure, hand strength and flexibility. It also improved the health of the beverage industry workers, also improved their productivity and reduced the health care cost. Also, the study revealed that the aerobic dance training significantly reduced absenteeism, workplace accident rate and factory fault product.

Suggestions for further studies

- Times series design can be adopted in future studies to enable researcher to monitor the rate of improvement in the course of intervention
- Other variables may also be considered to serve as moderators in future study.
- Effect of aerobic dance on other physiological and metabolic variables apart from those adopted in this study can also be considered.

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INFORMED CONSENT FORM

IRB RESEARCH approval number: ID: 17071564

This approval will elapse on: 08/30/18

Effect of a 12-week aerobic dance exercise programme on selected health related variables and work productivity of beverage industry workers in Oyo and Osun States

The study was conducted by Mrs Racheal Bolanle Ajala of the University of Ibadan.

The purpose of this research is to examine the effect of twelve-week graded aerobic exercise programme on selected health related variables and work productivity of Beverage industry workers in Oyo and Osun States.

The researcher used purposive Sampling technique to select participants in this study into 2 groups. Experimental group was exposed to aerobic dance exercise programme 60 minutes session of 3days per week for 12 weeks,(Tuesday, Thursday and Saturdays) while control group was not exposed to treatment but be placed on placebo of 20 ,minutes contact of 3days per week for 12weeks (Monday, Wednesday and Fridays). In total. 72 participants were recruited for this study in Oyo and Osun States.

The goal of this research is to find ways of reducing cardiovascular injuries and increases in work productivity but it is not certain.

All information collected in this study was given code numbers and no name was recorded. This was not linked to you in anyway and your name or any identifier was not used in any publication or reports from this study.

Your participation in the research is entirely voluntary.

If you choose not to participate, this will not affect your treatment in this study.

You will be compensated for the cost of transportation and sport wear but will not be paid any fees for participating in this research.

You can also choose to withdraw from the research at anytime. Please note that some of the information that has been obtained about you before you choose to withdraw may have been modified or used in reports and publications. These cannot be removed anymore. However the researcher promises to make effort in good faith to comply with your wishes as much as it is applicable.

If you suffer any injury as a result of your participation in this research, you will be treated and the researcher will bear the cost of the treatment.

The researcher will inform you of the outcome of the research through a news bulletin. During the course of this research, you will be informed about any information that may affect your continued participation or your health.

If this research leads to commercial products, University of Ibadan shall own it. There is no plan to contact any participants now or in future about such commercial benefits.

I have fully explained this research to--and have given sufficient information, including about risks and benefits, to make an informed decision

DATE--------------------------------- SIGNATURE---------------------------------------

NAME ---

I have read the description of the research, I have also discussed with the doctor to my satisfaction. I understand that my participation is voluntary. I know enough about the purpose, methods, risks and benefits of the research study to judge that I want to take part in it. I understand that I may freely stop being part of this study at anytime. I have received a copy of this consent form and additional information sheet to keep for myself.

DATE--- SIGNATURE----------------------

NAME ---

WITNESS' SIGNATURE (if applicable):---

WITNESS' NAME (If applicable):---

This research has been approved by the Ethics Committee of the University of Ibadan and the Chairman of this Committee can be contacted at Department of Sociology, Faculty of the Sciences, University of Ibadan,

E-mail: **sayjegede@ yahoo.com.**

In addition, if you have any question about your participation in this research, you can contact the principal investigation,

Name--------------------------------------Department---------------------------------------

Phone------------------------------E-mail---

You can also contact the Head of the University of Ibadan at--

APPENDIX 11

PHYSICAL ACTIVITY READINESS QUESTIONNAIRE (PAR-Q)

QUESTIONS

S/N		**YES**	**NO**
1	Has your doctor ever said that you have a heart condition and that you should only perform physical activity recommended by doctor?		
2	Do you feel pain in your chest when you perform physical activity?		
3	In the past month, have you had chest pain when you were not performing any physical activity?		
4	Do you lose your balance because of dizziness or do you ever lose consciousness?		
5	Do you have a bone or joint problem that could made worse by a change in your physical activity?		
6	Is your doctor currently prescribing any medication for your blood pressure or for a heart condition?		
7	Do you know of any other reason why you should not engage in physical activity?		
	Recreational Questions		
1	Do you partake in any recreational activities (hockey, tennis, playing ball, etc)?		
2	Do you have any hobbies (reading, gardening, washing your parents' cars, exploring the internet, etc.)?		
	Medical Questions		
1	Have you ever had any pain or injuries (ankle, knee, hip, back, shoulder, etc.)?		
2	Have you ever had any surgeries?		
3	Has a medical doctor ever diagnosed you with a chronic disease, such as coronary heart disease, hypertension (high blood pressure) high cholesterol or diabetes?		

APPENDIX III

CONTROL GROUP

Week 1 and 2

Topic	Training Objective	Activities	Duration
Exercise and Health	Examining the relevance of exercise to health	Discuss good reasons why exercise should be encouraged	40mins

Weeks 3 and 4

Topic	Training Objective	Activities	Duration
Physical fitness	Examining concept of physical fitness Identifying components of physical fitness	Discuss the definition and components of physical fitness i.e health-related and skill-related physical fitness	40mins

Weeks 5 and 6

Topic	Training Objective	Activities	Duration
Nutrition & Health	To identify food that are good for adult	Discuss the definition of nutrition Explain eating habits that are common among adults and their health implications	40mins

Weeks 7 and 8

Topic	Training Objective	Activities	Duration
Healthy	Examining the	Discuss personal philosophy Explain life style that	40mins

lifestyle	concepts of HELP philosophy	are common among adults and their health implications e.g drinking of alcohol and cigarette smoking	

Weeks 9 and 10

Topic	Training Objective	Activities	Duration
Body Composition	To examine how to measure body composition	Explain BMI and WHR, how to measure them and to determine the level of body fat	40mins

Weeks 11 and 12

Topic	Training Objective	Activities	Duration
Health & Work productivity	To examine how health effect work productivity	Explain health related variables, how to measure them and to determine the level of wellness and productivity	40mins

APPENDIX IV

AEROBIC DANCE TRAINING PROGRAMME FOR TREAMENT GROUP

Weeks 1 and 2

Warm – up (10 minutes)

- Jog – in – place
- Arm circles
- Back Lunge (8 counts)
- Triangle (8 counts)

Conditioning Bout (30 mins)

Exercise modality	Movement counts Week 1 and 2
➢ Toe and heel	10
Back lunge (low)	10
➢ Alternating knee lift	10
➢ Lateral elbow lift	10
➢ Triceps kick back	10
➢ Right leg side kick	10
➢ Left leg side kick	10
➢ Gravepine	10
➢ Squarts	10
➢ Alternating side stepping	10
➢ Alternating side elbow lift	10
➢ Biceps curl Repeaters	10

(Every movement will start from basal match)

Cool down (10 min)

Match – in – place, Toe tapping, trunk bender, walking.

Week 3 and 4

Warm – up (10 min)

- Jump and hop
- Half moon
- Shoulder press
- Side lunge

Conditioning Bout (35 min)

Exercise modality	Movement counts.
Basal match	15
Alternating knee lift	15
Kneel and toe	15
Basal lunge (low)	15
Basal match/Toe tapping	15
Grapevine	15
Squarts	15
Basal match	15
Lateral elbow lift	15
Tricepts kickbacks	15
Right leg side stepping	15
Left leg side stepping	15
Basal match/Toe tapping	15
Alternating side elbow lift	15
Basal match	15
Alternating side elbow lift	15
Basal match and repeaters	15

Cool down (5 min) –

- Arm lift, matching, walking, shoulder push

Week 5 and 6

Warm – up (10 min)-

Jog – in – place, side lungs, arm circle, kickers.

Conditioning Bout (30 min)

Exercise modality	Movement counts
➢ Alternating knee lift	20
➢ Toe and heel	20
➢ Basal match	20
➢ Back lunge (middle)	20
➢ Basal match/Toe tapping	20
➢ Grapevine and Squarts	20
➢ Basal match	20
➢ Lateral elbow lift	20
➢ Triceps kickbacks	20
➢ Single lunge	20
➢ Right leg side stepping	20
➢ Left leg side stepping	20
➢ Double forward stepping	20
➢ Basal match	20
➢ Alternating side elbow lift	20
➢ Biceps curl and heel	20
➢ Basal match and repeaters	20

Cool – down (10 min)-

Walking (forward and backward), Quadricepts stretch, half-moon, toe tapping (sideways)

Week 7 and 8

Warm – up (10min)-

- Jump and hop, sidekicks, shoulder stretch, back lunge and half-moon.

Conditioning Bout (35mins)

Exercise modality	Movement counts
Basal match	25
Power knee (low)	25
Toe and heel	25
Back lunge (high)	25
Basal match/Toe tapping	25
Grapevine and squart	25
Basal match	25
Lateral elbows lift	25
Triceps kickbacks and back heel	25
Single lunge	25
Basal match/toe tapping	25
Right leg side stepping	25
Left leg side stepping	25
Side elbow lift	25
Basal match	25
Double forward stepping and double knee	25
Biceps curl and cross heel	25
Basal match and repeaters	25

Cool down (5min)

- Walking, trunk bender, triangle and squarts.

Week 9and 10

Warm – up (10min) –

- Jog – in – place, triangle, shoulder stretch, arm circle and shoulder push.

Conditioning bout (40min)

Exercise modality	Movement counts
➢ Power knee (low)	30
➢ Toe and heel	30
➢ Back lunge(high)	30
➢ Basal match/toe tapping	30
➢ Grapevine and squart	30
➢ Basal match	30
➢ Lateral elbow lift	30
➢ Triceps kickbacks and back heel	30
➢ Single lunge	30
➢ Basal match/toe tapping	30
➢ Right leg side stepping	30
➢ Left leg side stepping	30
➢ Side elbow lift	30
➢ Basal match	30
➢ Double forward stepping and double knee	30
➢ Biceps curl and cross heel	30
➢ Basal match and repeaters	30

Cool down (5min)

- Match – in – place, Walk and kick, lift, squarts.

Week 11 and 12

Warm – up (10min)-

- Jump and hop, shoulder stretch, kickers, half-moon and lunges

Conditioning Bout (45 min)

Exercise modality	Movement counts
➢ Power knee (low)	35
➢ Toe and heel	35
➢ Back lunge(high)	35
➢ Basal match/toe tapping	35
➢ Grapevine and squart	35
➢ Basal match	35
➢ Lateral elbow lift	35
➢ Triceps kickbacks and back heel	35
➢ Double lunge	35
➢ Basal match/toe tapping	35
➢ Right leg side stepping	35
➢ Left leg side stepping	35
➢ Side elbow lift	35
➢ Basal match	35
➢ Double forward stepping and triple knee	35
➢ Biceps curl and cross heel	35
➢ Basal match and repeaters	35

Cool down (5 min)

- Walking, kicking, shade out, shoulder press.

(Adapted from: Jane Fonda, (1997). Praise aerobics. U.S.A: Biltop Studios.)

APPENDIX V

QUESTIONNAIRE

The questionnaire is meant to assess some demographic variables and work productivity of beverage industry workers. The questionnaire consists of 3 Sections: Section A is for participants' demographic data, while section B is to assess worksite health promotion programme. Section C is for participants' Work Productivity Scale. You are enjoined to answer every question with utmost sincerity. Please tick ( ) the box most appropriate to you.

SECTION A
DEMOGRAPHIC DATA

1. Age: 20-29( ) 30-49( ) 50-69( )

2. Sex: Male ( ) Female ( )

3. Height __________ m

4. Weight___________kg

5. Department: Human resource ( ) Procurement ( ) Marketing ( ) Account ( ) Salary & wages ( ) Audit ( ) Packaging ( ) Brewing ( ) Utility ( ) Main- Store ( ) General working ( ) Raw Material Store ( ) Empty Beer Store ( ) Laboratory ( ) Corporate Affairs ( ).

6. Length of employment. 5-10 yrs ( ) 11-15 yrs ( ) 16-20 yrs ( ) 21-25 yrs ( ) 25-30 yrs ( ) above 30 yrs ( ).

SECTION B
CHECKLIST ON AVAILABLE WORKSITE HEALTH PROMOTION PROGRAMME

S/NO	ITEM	YES	NO
1	Do your establishment have state of the art sporting facilities, fitness programme or recreation park.?		
2	Do you regularly participate in the programme?		
3	Are your dependants incorporated in to the programme?		
4	Is the industry have coordinator for the programme?		

5	Do you have any other hobbies like cycling, gathering, washing cars?		
6	Do you have programme for stress management?		
7	Do you have programme for back management?		
8	Are you smoking?		
9	Does you industry have programme for stress management?		
10	Does your organization have programme for weight control?		

CHECKLIST ON AVAILABLE HEALTH COMPLICATIONS

S/N	ITEM	YES	NO
1	In the last 12 weeks did you have a heart attack?		
2	In the last 12 weeks did you have problems?		
3	In the last 12 weeks did you have chest pain?		
4	In the last 12 weeks did you have high blood pressure?		
5	In the last 12 weeks did you have any surgical operation?		
6	In the last 12 weeks did you have diabetes?		
7	In the last 12 weeks did you have muscle pain?		
8	In the last 12 weeks did you have bone pain?		
9	In the last 12 weeks did you have asthma?		
10	In the last 12 weeks did you have arthritis?		

CHECKLIST ON CAUSES OF LOW PRODUCTIVITY

No	ITEM	SA	A	N	D	SD
1	Ailments lead to absenteeism					
2	The company offers educational and motivational programme					
3	Aging has effects on work performance					
4	The company offers heath promotion events					
5	The company offers health subsidy to retain workers					
6	The company operates Health					

	Insurance scheme for workers					
7	Provision of HIS promotes the company's Image					
8	Increase media coverage is necessary for Innovation					
9	Health promotion programme improves the company productivity					
10	WHP are the solution to the problems of health care costs in the company.					

SECTION C

WORK PRODUCTIVITY SCALE

The following questions ask about your work productivity, **Please choose the answer that appears most appropriate.**

The following questions ask about your experience or if you were able to do certain things in the last six weeks.

	Items	**None**	**One**	**More than one (Specify Number)**
1	How many full days of work did you miss in the past twelve weeks not including vacation or maternity leave?			
2	How many of these days were in the past week?			
3	How many days of the past twelve weeks did you miss because of problems with your own health?			
4	How many of the past twelve weeks did you miss because of problems with workmates health?			
5	How many days in the past twelve weeks did you either come in late for work or leave early?			

6	How many hours did you miss on that day or on average for each of those days			
7	For how many days of the past twelve weeks was your reduced time at work because of problems with your own health?			
8	How many days in the twelve weeks did you either in early, work late on your day off in order to catch up on your work?			

WORK PLACE ACCIDENT RATE QUESTIONNAIRE

SN	ITEMS	Rarely	Sometimes	Usually	Always
1	Work environment is always noisy				
2	Work environment is always hot				
3	Lighting is always adequate				
4	There are fumes, vapours, or mists in the air				
5	Employees are exposed to substances that are toxic or caustic (burning)				
6	Employees injured themselves through improper lifting				
7	There are cases of falls in my department.				
8	Employees may be caught in on or between machinery				
9	Employees in high risk area wear proper clothing, safety gloves, hard hats, goggles, proctectives shoes.				
10	Are safety recorded posted?				

FACTORY FAULT PRODUCTS QUESTIONNAIRE

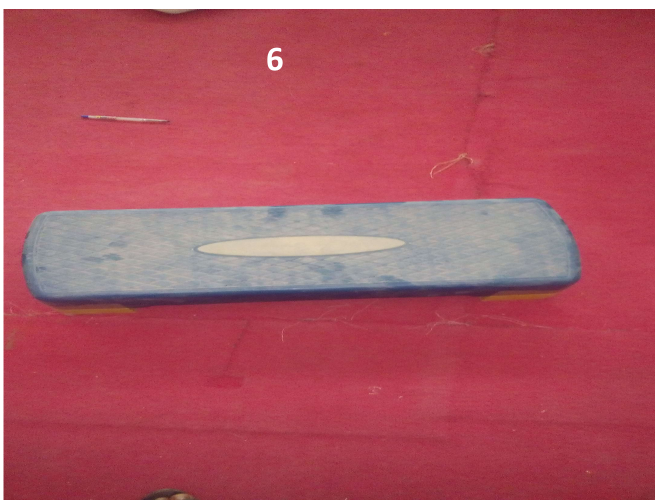
S/N	ITEMS	SA	A	N	D	SD
1	Faults are caused by poor handling of equipment by the staff.					
2	There are reprinted factory fault attributed to my department					
3	There are reported factory fault attributed to employee					
4	Lack of qualify personnel contributes to factory fault products					
5	Lacks of technical know –how contribute to factory fault products					
6	The lighting is adequate					
7	The work environment is hot					
8	There are fumes, vapours or mists in the air					
9	Employees are exposed to substances that are toxic or caustic					
10	Employee can be caught in, on or between machinery					

HEALTH CARE COST QUESTIONNAIRE

S/N	ITEMS	SA	A	D	SD
1	In the last twelve weeks I visit factory clinic regularly.				
2	In the last twelve weeks I visit factory clinic occasionally				
3	In the last twelve weeks I did not visit factory clinic				
4	In the last twelve weeks my health complications affect my production				
5	In the last twelve weeks the company spend much on my health				
6	In the last twelve weeks management experienced reduction in total cost of health matters.				
7	In the last twelve weeks I am healthy.				

Source: Self Developed

APPENDIX VI



NB: 1. Sit and reach box
2. Weighing scale
3. Sphgmanometre
4. Skinfold calliper
5. Hand grip
6. Harvard step
7. Stadiometer

APPENDIX VII

Muscular strength test

Objective: To assess muscular strength.

Equipment: Hand grip dynamometer.

Procedure: The hand strength of the participants will be measured using the hand grip Dynamometer. The participant will place his/ her forearm between angles of 90-180 to the Upper arm; the participant will then squeeze as hard as possible. The procedure will be repeated twice or thrice for each hand and alternating between the hands. The middle recording/ the mean of the recording will be used as the score.

Scoring and interpretation: After each test, the maximum force generated will be recorded in Kilogram.

Muscular endurance test (Sit –up in 1min)

Objective: To perform the maximum number of sit –up in 1minute.

Equipment: Mat and stopwatch.

Procedure: The participant will perform the test with knees bent, feet flat on the floor about 18 inches (45.7cm) from the buttocks and the hands touching the side of the head.

A partner will hold the participants feet as the test is being performed. The elbow to the alternate knee with beach sits up and the participant will perform as many sit –ups in 1 minute as possible.

Scoring and interpretation: The number of correct repetitions will be compared and recorded.

Flexibility test (sit and reach)

Objective: To monitor the development of the trunk flexibility.

Equipments: Metre rule, tape measure and assistant.

Procedures: The participant will warm up for one minute and then remove his/her shoes, the assistant will secure the ruler to the box top with the tape so that the front edge of the box will line up with the 15cm (16 inches) mark on the ruler and the zero end of the ruler will point towards the participant. The participant will sit on the floor with his/her legs fully extended with the heel against the box. The participant will place one hand on the top of the other, slowly bend forward to reach along the top of the ruler as far as possible holding the stretch for two seconds.

Scoring and interpretation: The distance reached by the participant finger tip will be recorded. Three performances will be allowed: the average of the three distances will be recorded as the participant's performance.

Cardiovascular endurance test (YMCA 3 minute step test)

Purpose: To assess aerobic fitness.

Objective: To step up and down to a set cadence for 3 minute and take the resulting heart rate.

Equipment: 12in. (30.5cm) high bench.

- Metronome sets at 96beat/ min.
- Stop watch.
- Stethoscope

Procedures: The participant will listen to the metronome to become familiar with the cadence and begin when ready and the time will start. The participant will step up and down to the 96beat/min cadence, which allows 24 steps/min. This will continue for three minutes. After the final step down, the participant will sit down and the heart rate will be counted for one minute.

Scoring and interpretation: the one minute recovery heart rate is the score for the test.

Body composition test (YMCA skin fold test)

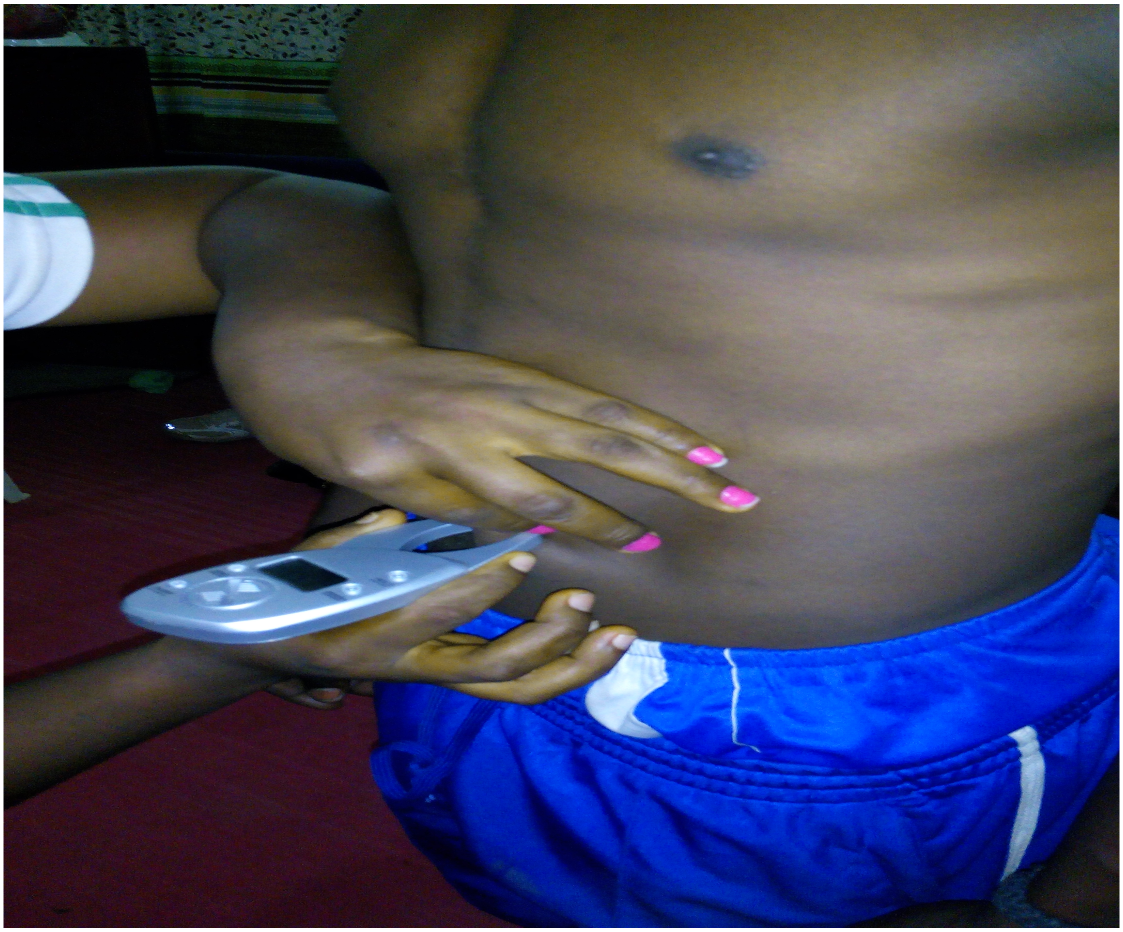
Purpose: To estimate a person's percent body fat.

Objective: To provide a method of accurately estimating body composition.

Equipment: Skin fold calliper.

Procedures: Measurements will be taken on the left side of the body in the following order:

- Mark participant up.
- Pull fat away from muscles.
- Place the calliper halfway between top and bottom of the mark.
- Allow calliper to settle (1-2 seconds)



Scoring and interpretation: The process will be repeated at least three times; the measure should not vary by more than 1mm. The median value should be used as the measurement.

APPENDIX VIII

NB: 1. Toes and heel
2. Back lunge
3. Alternate knee lift
4. Lateral elbow lift
5. Right leg side kick
6. Right triceps kick back
7. Triceps kick back

APPENDIX IX

RESEARCHER AND PARTICIPANTS

RESEARCHER, SUPERVISOR AND PARTICIPANTS

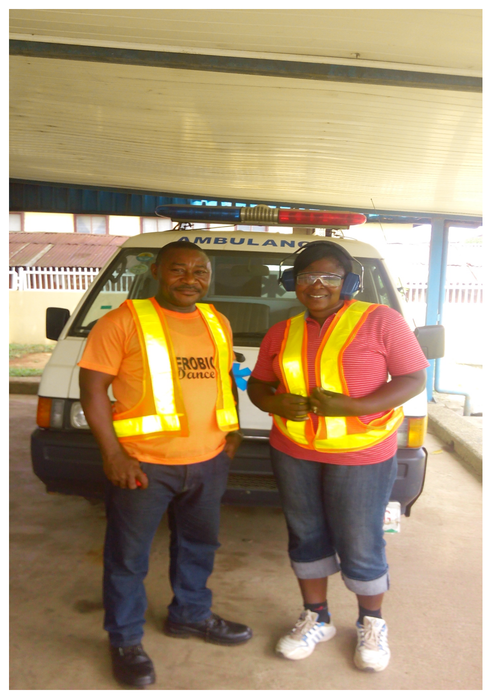
FROM THE RIGHT: HUMAN RESOURCES, WELFARE OFFICER, HEAD OF THE CLINIC, RESEARCHER, SUPERVISOR, NURSE AND RESOURCE PERSON

CYCLERS OF THE COMPANY

FROM LEFT: HUMAN RESOURCES, COCA-COLA, ASEJIRE PLANT, **RESEARCHER AND RESOURCE**

PERSON

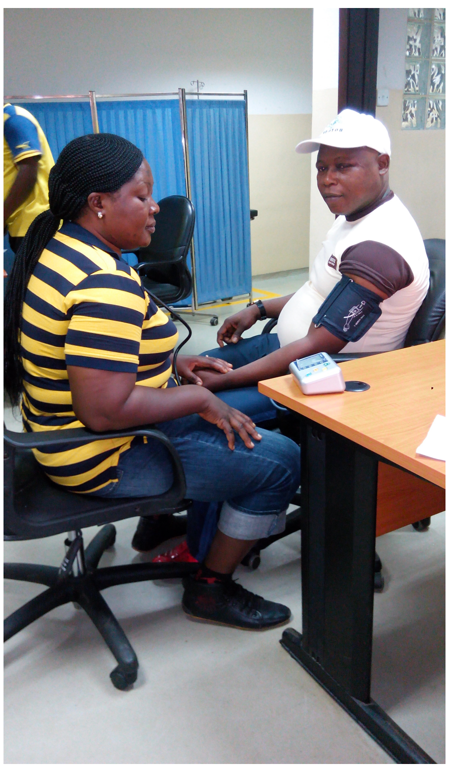
RESEARCHER AND WELFARE OFFICER

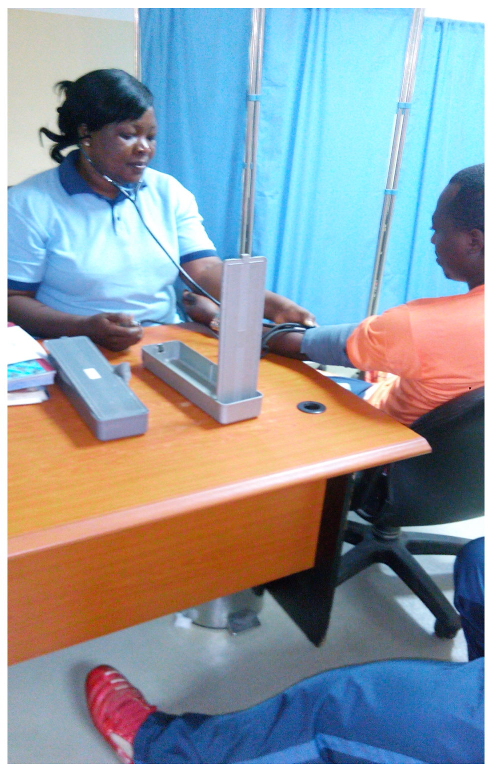


RESEARCHER IN THE BREW HOUSE

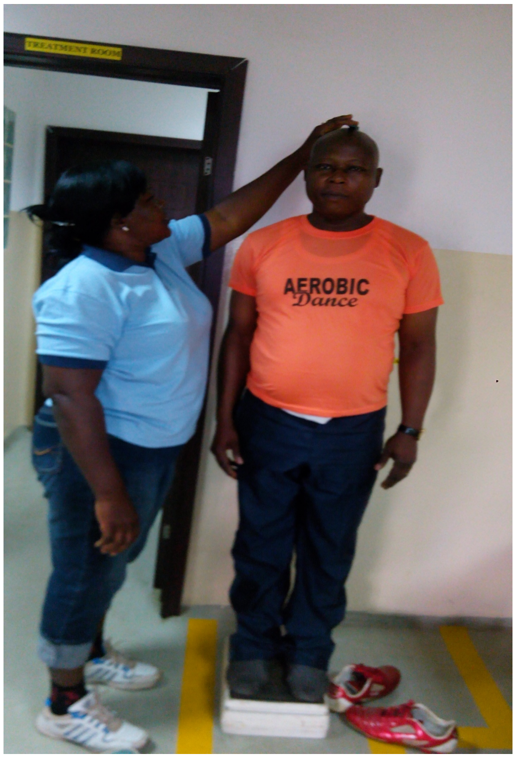
RESEARCHER AND HEAD OF PACKAGING AND STORE

TAKING THE WEIGHT OF THE PARTICIPANTS





RESEARCHER MEASURING THE BLOOD PRESSURE OF THE PARTICIPANTS



RESEARCHER MEASURING THE HEIGHT OF THE PARTICIPANT

PARTICIPANT PERFORMING FLEXIBILITY TEST

PAR TICIPANT MEASURING THE HAND'S STREN

MEASURING THE BLOOD PRESSURE OF THE PARTICIPANT