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# "THE EFFECTS OF ZUMBA DANCE AND LOW-IMPACT AEROBIC EXERCISE ON BODY FAT PERCENTAGE IN PATIENTS WITH OBESITY -A COMPARATIVE STUDY."

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## ABSTRACT

**BACKGROUND:** Obesity is a complex disease involving an excessive amount of body fat. Obesity isn't just a cosmetic concern. An obese patient is at risk of developing diseases such as: Coronary heart disease , High blood pressure, Heart failure, Diabetes mellitus, Stroke, Body fat abnormalities, Metabolic syndrome, Menstrual issues, leading to infertility, osteoarthritis, and hypoxemia. Zumba is a fitness program that involves cardio and Latin-inspired dance. Zumba choreography is composed using all or some of sixteen core steps. There are four basic rhythms: salsa, reggaeton, merengue, and cumbia each basic rhythm has four core steps. Aerobic exercise is any type of cardiovascular conditioning. It can include activities like brisk walking, swimming, running, or cycling. Your breathing and heart rate will increase during aerobic activities.

**METHODOLOGY:** It is a comparative study with pre-test and post-test design. 30 subjects in between the age of 25 to 40 years with obesity were allocated into two different groups. The body mass index (BMI) was

evaluated before and after the test. All the participants performed low-impact aerobic exercise and zumba dance for 4 weeks.

**RESULT:** At the end of the study, the BMI mean and SD of group1 is 19.512 and 1.839 respectively, whereas the mean BMI and SD of group 2 is 21.158 and 1.727 respectively, and their difference mean BMI and SD is 2.006 and 0.112 respectively.

**CONCLUSIONS:** At the end of the study, it has been concluded that low-impact aerobic exercise is more effective than Zumba dance on body fat percentage in patients with obesity.

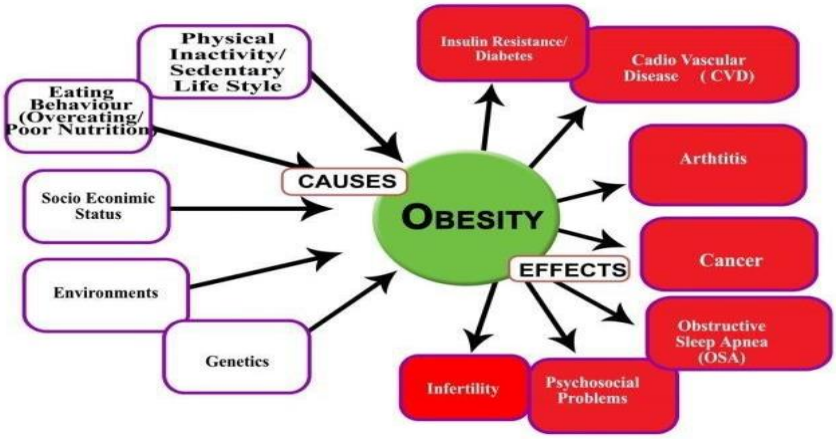
# *INTRODUCTION*

## INTRODUCTION

Obesity is a problem affecting many countries of the world irrespective of their levels of development. And it is the major public health condition with comorbidities leading to reduction in life expectancy. Therefore, obesity should not only be seen as a condition that develops through an unhealthy lifestyle but one which creates significant risk to health [1].

Approximately 1.2 billion people in the world are over-weight and at least 300 million people of them are obese. This is a major threat to public health because it increases the risk of chronic diseases. Thus, it is one of the problems that need serious attention .Unhealthy food intake such as those with low nutrient density, sweet drinks and the likes, leading to the condition while changes in the eating and snacking at home, improved sedentary lifestyles and the likes are some of the things that can get rid of it within the population [1].

Besides physical discomfort, an obese individual is at risk of developing diseases such as: Coronary heart



disease, High blood pressure, Heart failure, Diabetes mellitus, Stroke, Body fat abnormalities, Metabolic syndrome, Menstrual issues, leading to infertility, osteoarthritis, and hypoxemia [2].

Fig 1: Effects and causes of obesity

Obesity has, in the recent years become a global phenomenon. This has serious implications, particularly in countries like India, where one-fourth of the population is diabetic. Factors such as age, sex, ethnicity, and muscle mass can influence the relationship between BMI and body fat. Also, BMI doesn't distinguish between excess fat, muscle, or bone mass, nor does it provide any indication of the distribution of fat among individuals [2].

Common specific causes of obesity include: genetics, which can affect how your body processes food into energy and how fat is stored, growing older, which can lead to less muscle mass and a slower metabolic rate, making it easier to gain weight, not sleeping enough, which can lead to hormonal changes that make you feel hungrier and crave certain high-calorie foods, pregnancy, as weight gained during pregnancy may be difficult to lose and might eventually lead to obesity [3].

Certain health conditions can also lead to weight gain, which may lead to obesity. These include:

polycystic ovary syndrome (PCOS), a condition that causes an imbalance of female reproductive hormones, Prader-Willi syndrome, a rare condition present at birth that causes excessive hunger, Cushing syndrome, a condition caused by having high cortisol levels (the stress hormone) in your system, hypothyroidism (underactive thyroid), a condition in which the thyroid gland doesn't produce enough of certain important hormones, osteoarthritis (OA) and other conditions that cause pain that may lead to reduced activity [4].

Depression can sometimes lead to weight gain, as some people may turn to food for emotional comfort. Certain antidepressants can also increase the risk of weight gain. Quitting smoking is always a good thing, but quitting may lead to weight gain too. In some people, it may lead to excessive trusted source weight gain. For that reason, it's important to focus on diet and exercise while you're quitting, at least after the initial withdrawal period. Medications, such as steroids or birth control pills, can also raise your risk for weight gain [5].

Obesity prevention requires a complex approach, including interventions at community, family, and

individual levels.

Obesity can lead to more than simple weight gain. Having a high ratio of body fat to muscle puts strain on your bones as well as your internal organs. It also increases inflammation in the body, which is thought to be a risk factor for cancer. Obesity is also a major risk factor for type 2 diabetes [5].

Obesity has been linked to a number of health complications, some of which can be life threatening if not treated: type 2 diabetes, heart disease, high blood pressure, certain cancers (breast, colon, and endometrial), stroke, gallbladder disease, fatty liver disease, high cholesterol, sleep apnea and other breathing problems, arthritis, infertility.

A sedentary lifestyle plays a significant role in obesity. Worldwide there has been a large shift towards less physically demanding work, and currently at least 30% of the world's population gets insufficient exercise. This is primarily due to increasing use of mechanized transportation and a greater prevalence of labor-saving technology in the home. In children, there appear to be declines in levels of physical activity), likely due to safety concerns, changes in social, and inadequate urban design. World trends in active leisure time physical activity are less clear [5].

The main treatment for obesity consists of weight loss via lifestyle interventions, including prescribed diets and physical exercise. Although it is unclear what diets might support long-term weight loss, and although the effectiveness of low-calorie diets is debated, lifestyle changes that reduce calorie consumption or increase physical exercise over the long term also tend to produce some sustained weight loss, despite slow weight regain over time[6] .

Although 87% of participants in the National Weight Control Registry were able to maintain 10% body weight loss for 10 years, the most appropriate dietary approach for long term weight loss maintenance is still unknown. In the USA, intensive behavioral interventions combining both dietary changes and exercise are recommended. Intermittent fasting has no additional benefit of weight loss compared to continuous energy restriction. Adherence is a more important factor in weight loss success than whatever kind of diet an individual undertakes.

Several hypo-caloric diets are effective. In the short-term low carbohydrate diets appear better than low fat diets for weight loss. In the long term, however, all types of low-carbohydrate and low-fat diets appear

equally beneficial [6].

Exercise is also like a medicine in that it has an appropriate dosage, indications, contraindications, and adverse effects associated with its use. The importance of proper technique in strength training and flexibility exercise, the appropriate guidance in aerobic activity progression, the role of kinetic chain and movement pattern analysis are all essential to an accurate and safe exercise prescription for obese people[7].

Looking at the state of sport development today, it is an advanced state, especially the aerobic dance that is common among young generation. Other benefits this gives the body include increasing the work rate of the heart increasing muscle strength, burning fat, etc. aerobic dance is one of the most common exercise practices in the world. This is because there have been many gymnastic club have been established and now almost every agency or office also organizes aerobic dance exercises.

The fact that low-impact aerobic dance exercise has been well adapted to keep and improve health in a wide range of the population. And that regular aerobic dance exercise can prevent obesity and build muscles [8].

Zumba is a dance-based activity based on a variety of Latin dance styles :salsa, reggaeton, cumbia, etc, and including steps in multiple directions. Also, it is an alternative activity that helps the body in burning excessive fats and a systematic review has shown that zumba has beneficial effects on reducing body weight. Therefore, both exercises help in reducing the body fat percentage [9].

The WHO recommended the body mass index (BMI) as a simpler marker to reflect total body fat and is used as a measure of over-weight and obesity [10]. This can also be used to determine the ideal body weight.

The relationship between BMI, BF%, and body fat distribution were different between populations.Hence, the subjects in this study were grouped based on those that have mild or severe obesity by calculating the BMI of each participant [11]..

## ***REVIEW OF LITERATURE***

## REVIEW OF LITERATURE:

**1.Comparison of the effects of Yoga, Zumba, Aerobic exercises in controlling blood pressure in Indian population. Jerusha Santa Packyanathan and S.Preetha Et Al(2009)[12].**

This study is designed to analyze the effects of Yoga, Zumba, and Aerobic exercises in controlling blood pressure and to determine which of these three is better to treat hypertension without using hypertensive drugs. It is concluded that comparing the three activities, it is found that the drop in the blood pressure was greatest among participants who practiced yoga, followed by participants who performed Zumba dance and finally among participants of aerobics.

**2. The effectiveness of an 8 weeks Zumba program for weight reduction in a group of over-weight and obese patients. Charles Miscallef Et Al(2014)[13].**

The study investigated the before–after effects of a Zumba program on the weight and body mass index (BMI) of 36 females, mean age 34.25 ± 8.50 years and mean BMI 32.98 ± 5.32 kg/m2. Methods: The intervention involved 16 hourly Zumba sessions held twice weekly over 8 weeks. The exercises comprised a mixture of merengue, salsa, reggaeton and bachata with warm-up and cool-down activities. They were of low-impact style, but were maintained at vigorous intensity that was still bearable for the obese subjects.

**3 .An 8 weeks exercise intervention based on Zumba improves Aerobic fitness. Anne A Delextrat, Sarah Warner Et Al(2014)[14].** The objective of this study was to investigate the effects of Zumba on physiological and psychological outcomes in healthy women. Zumba provided significant positive changes in maximal aerobic fitness (+3.6%), self-perception of physical strength (+16.3%) and muscular development (+18.6%), greater autonomy (+8.0%), and purpose in life (+4.4%). No significant changes were observed in the control group. These results highlight that Zumba is beneficial to improve fitness and well-being in healthy women, but does not change body composition.

**4. Effects of Pilates and Aerobic exercises on blood pressure, heart rates, and serum lipids in sedentary females . SemraSetin, CumaEce, Murat Sen Et Al(2019)[15].**

The aim of this study was to determinate the effects of 12 weeks pilates and aerobic exercise on blood pressure, heart rates, and blood serum lipids in sedentary females. 18 sedentary women with an average age of 45.52 years, height of 161.14 cm and weight of 72.5 kg have been selected and put through a plates and aerobic exercise programmer one hour a day for three days a week. In this study, together Pilates and aerobic exercise was effective in sedentary women with initially high total cholesterol, triglyceride, and Low density lipoprotein levels. At end of the cycles of 12 weeks Pilates and aerobic exercises, has a positive effect of waist to hip ratio, blood pressure, and heart beats in sedentary females. Risk of heart and vascular disease is reduced. Pilates and aerobic exercises are recommended for decrease risk.

**5. Effects of Zumba fitness program on body composition of women. Adriana Ljubojevic Et Al (2014)[16].**

The aim of this research was to determine the effects of zumba fitness program on changes of women body composition. 12 women aged 25-35 participated in the conducted research. The zumba fitness program was estimated after eight weeks of exercise, total of 24 training sessions. Body weight, fat percentage, fat mass, fat free mass and total body water were measured at the beginning and at the end of the research.

**6. Zumba dancing and Aerobic exercise can improve working memory, motor function, and depressive symptoms in female patients with Fibromyalgia. Ebrahim Norouzi Et Al(2019)[17].**

This study compares the impact of two different interventions, aerobic exercise training and Zumba dancing, on working memory, motor function and depressive symptoms among female patients with FM. The design also included a control condition. Method: A total of sixty middle-aged female patients with

FM (mean age: 35.76 years) and undergoing standard care took part in the study. Participants were randomly assigned to one of the following three conditions: aerobic exercise training, Zumba dancing, or control.

**7. Effects of the Aerobic Exercise Program with music on the body composition and subcutaneous fat of young women: A Systematic Review. Milijan Hadzovic Et Al (2020)[18].**

The aim of this research was to determine the effects of aerobic exercise to music on body composition and

subcutaneous fat among young women. The research results confirm the positive influence of aerobic exercise to music on the parameters of body composition and subcutaneous fat among young women, irrespective of the overall duration of the exercise programs, with the conclusion that programs lasting up to 12 weeks are more effective when it comes to the decrease and maintenance of body weight, fat reduction, increase in muscle tissue, and lead to an improvement in aerobic abilities.

**8. Benefits of Zumba Fitness among sedentary adults with components of the metabolic syndrome: A pilot study. Araneta MR, Tanori D Et Al (2014)[19].**

The aim of this study was to assess the feasibility of a 12 week Zumba Fitness® pilot study and temporal changes in components of the metabolic syndrome (MetS) among sedentary, obese women with at least two MetS components. This twelve week Zumba Fitness® intervention showed good feasibility and adherence, with significant reductions in blood pressure and triglyceride levels, despite minimal weight loss.

## *NEED OF THE STUDY*

*NEED OF THE STUDY*

### NEED OF THE STUDY

This study is required to determine the significant effects of Zumba dance and low-impact Aerobic exercises on body fat percentage in patients with obesity. With the increasing demand of Zumba dance, it is important to have knowledge about its effects on body fat percentage in obese patients in comparison to aerobic exercise.

## *AIM AND OBJECTIVES OF THE STUDY*

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### AIM OF THE STUDY:

To determine the effect of low-impact aerobic exercise and Zumba dance on body fat percentage in

patients with obesity.

## OBJECTIVE OF THE STUDY:

- To determine the effect of low-impact aerobic exercise on body fat percentage in patients with obesity.
- To determine the effect of Zumba dance on body fat percentage in patients with obesity.
- To compare the effect of both of the exercises on body fat percentage in patients with obesity and to determine which of these two is better for obese patients.

# *HYPOTHESIS*

*HYPOTHESIS*

## HYPOTHESIS

NULL HYPOTHESIS:

There will be no significant difference between the effects of low-impact aerobic exercise and zumba dance on body fat percentage in patients with obesity.

ALTERNATE HYPOTHESIS:

There will be significant difference between the effects of low-impact aerobic exercise and zumba dance on body fat percentage in patients with obesity.

# *METHODOLOGY*

## METHODOLOGY

STUDY DESIGN: A Comparative Study

SOURCE OF STUDY: Classes conducting Zumba and Aerobics

POPULATION: Subjects with obesity of age group 25 to 40 years

SAMPLING METHOD: Convenient sampling

DURATION OF STUDY: 1 Month

TREATMENT DURATION: 3 sessions per week for 4 weeks

SAMPLE SIZE: 30

A) GROUP 1: 15

B) GROUP 2: 15

**METHOD OF SELECTION OF SUBJECTS:**

INCLUSION CRITERIA:

- Age group-25 to 40 years
- Subjects with obesity

EXCLUSION CRITERIA:

- Patients suffering from back pain
- Patients having any previous spinal cord injury
- Patients with joint pain
- Patients with any neuromuscular disorder
- Patients with any cardiovascular disorder

## MATERIALS AND TOOLS USED:

1. Pen, pencil, paper
2. Consent form
3. Eraser
4. Measuring tape
5. Weighing machine

Fig :2

Fig :3

## OUTCOME MEASURES:

### BMI (BODY MASS INDEX)

**Body mass index** (**BMI**) is a value derived from the mass (weight) and height of a person. The BMI is defined as the body mass divided by the square of the body height, and is expressed in units of $kg/m^2$, resulting from mass in kilograms and height in meters. The BMI is a convenient rule of thumb used to broadly categorize a person as underweight, normal weight, overweight, or obese based on tissue mass (muscle, fat, and bone) and height. Major adult BMI classifications are underweight (under 18.5 $kg/m^2$), normal weight (18.5 to 24.9), overweight (25 to 29.9), and obese (30 or more).When used to predict an individual's health, rather than as a statistical measurement for groups, the BMI has limitations that can make it less useful than some of the alternatives, especially when applied to individuals with abdominal obesity, short stature, or unusually high muscle mass.

| Classification | BMI (kg/m$^2$) | Risk of associated illness |
|---|---|---|
| Underweight | < 18.5 | Low (but greater risk of other clinical problems) |
| Normal range | 18.5–24.9 | |
| Overweight | > 25.0 | Average |
| Pre-obese | 25.0–29.9 | Increased |
| Obese class I | 30.0–34.9 | Moderate |
| Obese class II | 35.0–39.9 | Severe |
| Obese class III | > 40.0 | Very severe |

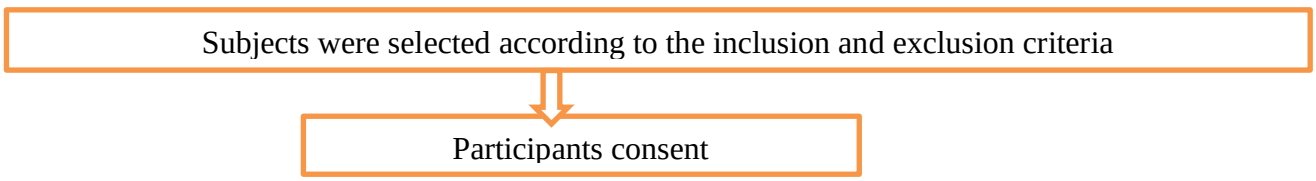
Table no.1: Classification of obesity

The clinical limitations of BMI should be considered. BMI is a surrogate measure of body fatness because it is a measure of excess weight rather than excess body fat. Factors such as age, sex, ethnicity, and muscle mass can influence the relationship between BMI and body fat. Also, BMI does not distinguish between excess fat, muscle, or bone mass, nor does it provide any indication of the distribution of fat among individuals. The following are some examples of how certain variables can influence the interpretation of BMI:

- On average, older adults tend to have more body fat than younger adults for an equivalent BMI.
- On average, women have greater amounts of total body fat than men with an equivalent BMI.
- Muscular individuals, or highly-trained athletes, may have a high BMI because of increased muscle mass

**PROCEDURE:**

All the subjects for the study were selected according to the inclusion criteria. Research objectives, procedure, and benefits are fully explained to the patients. Before the experiment, subject's measurements such as height, and weight were carried out. Mechanical scales and measuring tape were used in order to measure weight and height respectively. After that, the subjects were parted into two groups.



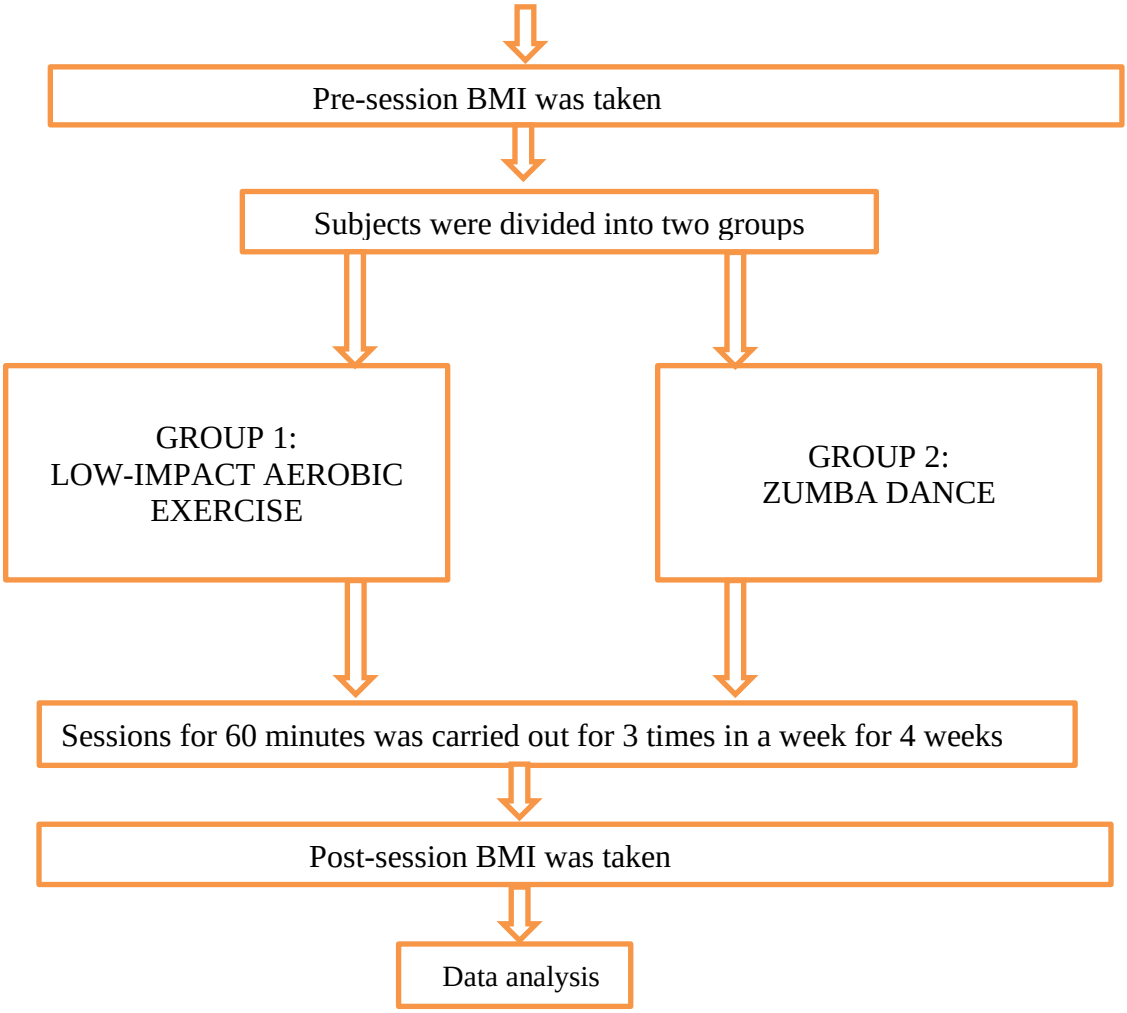



Fig no. 4: flowchart of study procedure

**GROUP 1: Low-impact aerobic exercise:**

The exercise was choreographed by an experienced Aerobic instructor. The participants were explained the procedures for implementing this treatment after which consent form was filled. The treatment period was made up of 3 sessions in a week for 4 weeks and each session lasted for 1 hour including 10 – 15 minutes warm-up phase, 30 – 35 minutes low-impact aerobic exercise and ended up with a 5 – 10 minutes cooling phase.

The aerobic exercises includes :

**>Walking**

**>Jogging**

**>Cycling**

**>Stair climbing**

**>Skipping**

**GROUP 2: Zumba dance:**

The exercise program was led by a Zumba instructor and just like what was done in the low-impact aerobic dance exercise, the participants were given the explanation regarding the procedures for implementing the treatment, its duration and location. The treatment period was made up of 3 sessions in a week for 4 weeks and each session includes three dance steps along with 15 minutes of rest period during the session.

The zumba dance includes the main three dance steps:

**>Salsa steps:** Dance with an 8 beat pattern:

Beat 1: step forward with your left foot
Beat 2: shift your weight to your right foot
Beat 3: step back to your starting position with your foot
Beat 4: pause
Beat 5: step back with right foot
Beat 6: shift your weight to your left foot
Beat 7: step your right foot back to your starting position
Beat 8: pause.
This dance step was performed for 15 minutes continuously followed by 5 minutes rest.

**>Merengue steps**: Dance with stepping on each beat:

Beat 1: shift your hips to the right and stomp with your left foot
Beat 2: shift your hips to the left and stomp with your right foot
This dance step was performed for 15 minutes continuously followed by 5 minutes rest.

>**Reggaeton steps:** Dance with stepping on each beat:

Beat 1: take a wide step with your left foot

Beat 2: tap your right foot next to your left foot while leaning to the right

Beat 3: take a wide step with your right foot

Beat 4: tap your left foot next to your right foot

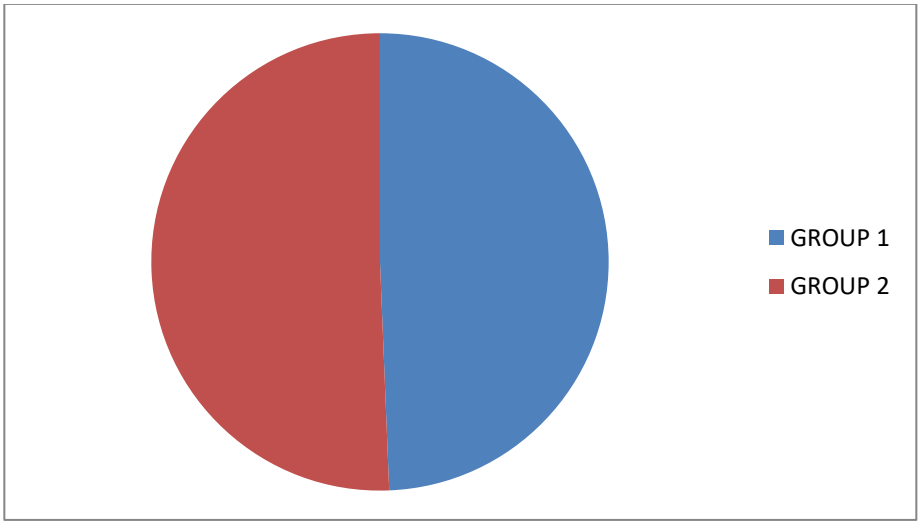
This dance step was performed for 15 minutes continuously followed by 5 minutes rest.

# ***RESULTS***

## RESULTS

**Table 2**: Age distribution of both groups

| | NO OF PATIENTS | MEAN AGE | SD |
|---|---|---|---|
| GROUP 1 | 15 | 50.033 | 3.058 |
| GROUP 2 | 15 | 51.333 | 3.498 |

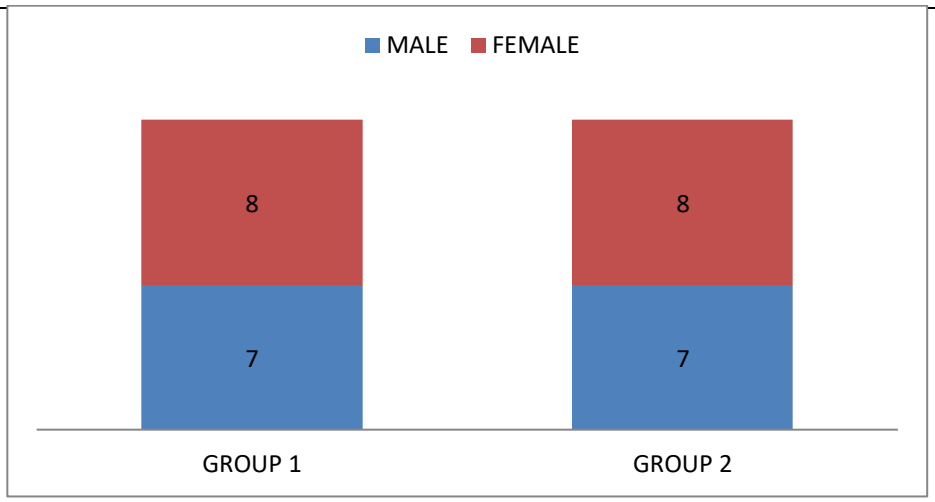



(Graph1: Age distribution in both groups)

The above pie chart represents the mean age of group 1 and group 2. It depicts that the mean age of group 1 and group 2 are 50.033 and 51.333 respectively.

**Table 3:** Gender distribution in both groups

| | MALE | FEMALE | TOTAL |
|---|---|---|---|
| GROUP 1 | 7 | 8 | 15 |
| GROUP 2 | 7 | 8 | 15 |

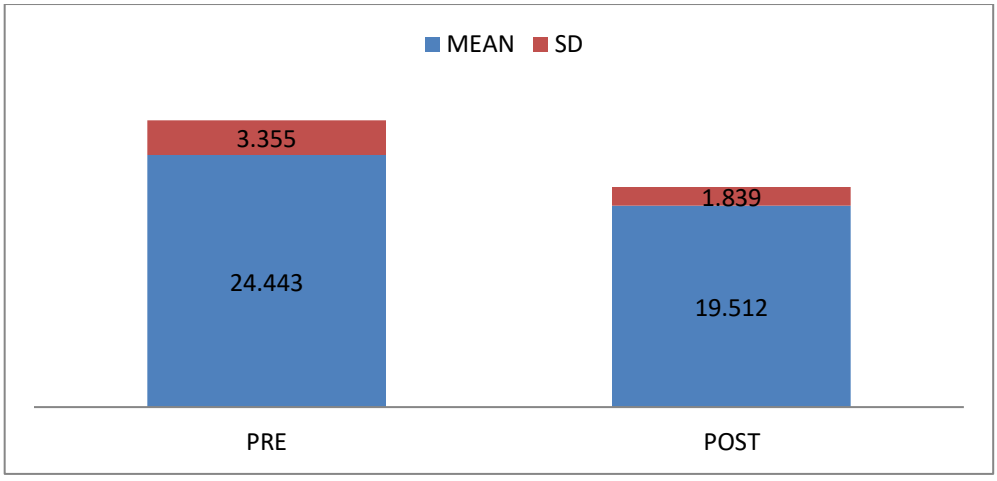



(Graph 2: Gender distribution in both groups)

The above bar graph represents the gender distribution in group1 and group 2. It shows that the number of male and female in group 1 and group 2 are 7 and 8 respectively.

**Table 4**: Comparison of pre and post BMI mean in group 1

| GROUP 1 BMI | | | | |
|---|---|---|---|---|
| | **MEAN** | **SD** | **DF** | **T-value** |
| **PRE** | **24.443** | **3.355** | **14** | **4.985** |
| **POST** | **19.512** | **1.839** | | |

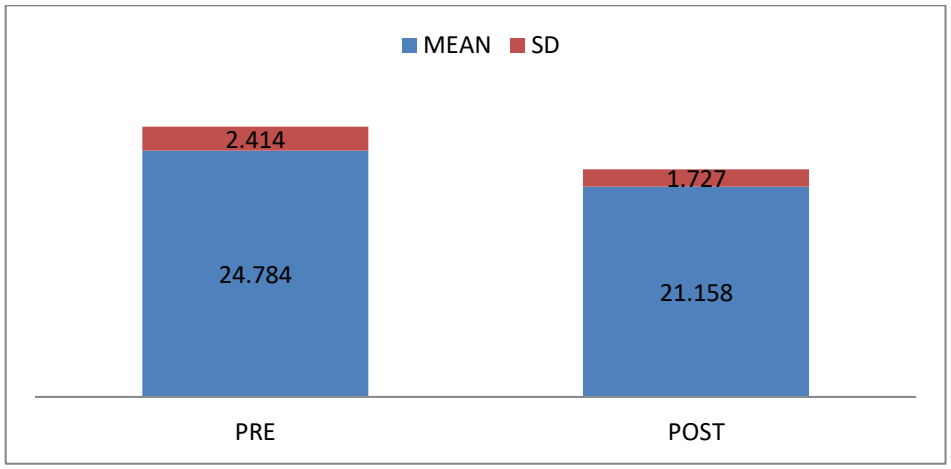



(Graph 3: comparison of pre and post-test BMI mean in group1)

The graph 3 represents the comparison of pre-test and post-test BMI mean in group 1. It shows that the pre-test BMI mean and standard deviation are 24.443 and 3.355 respectively .Whereas, the post-test BMI mean and standard deviation are 19.512 and 1.839 respectively.

**Table 5**: Comparison of pre and post BMI mean of group 2

| GROUP 2 BMI | | | | |
|---|---|---|---|---|
| | **MEAN** | **SD** | **DF** | **T-value** |
| **PRE** | **24.784** | **2.414** | **14** | **4.749** |
| **POST** | **21.158** | **1.727** | | |

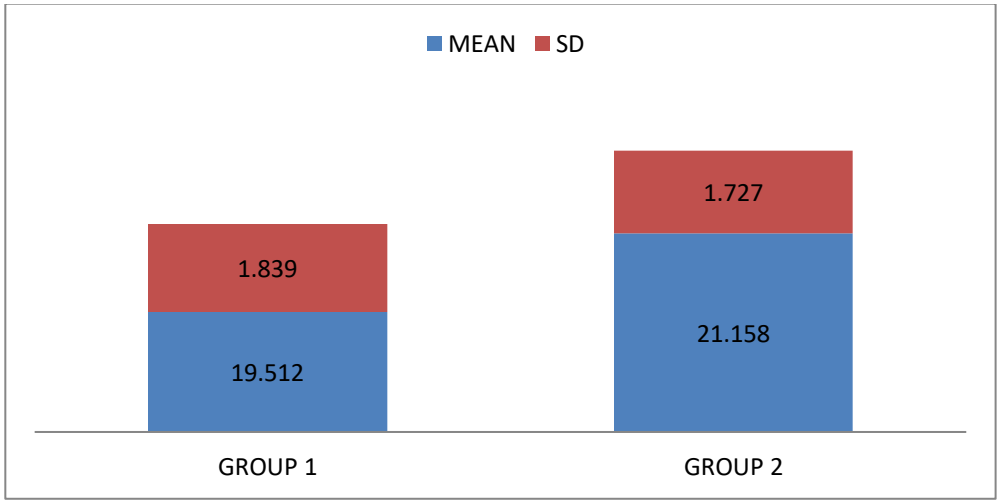



(Graph 4: Comparison of pre and post-test BMI mean in group 2)

The above graph represents the comparison of pre-test and post-test BMI mean in group 2. It shows that the pre-test BMI mean and standard deviation are 24.784 and 2.414 respectively .Whereas, the post-test BMI mean and standard deviation are 21.158 and 1.727 respectively.

**Table 6**: Comparison of post-test BMI mean in group 1 and group 2

| POST BMI OF BOTH GROUPS | | | | | |
|---|---|---|---|---|---|
| | **MEAN** | **SD** | **DF** | **T-value** | **SIG** |
| **GROUP 1** | **19.512** | **1.839** | **28** | **2.540** | **0.01** |
| **GROUP 2** | **21.158** | **1.727** | | | |




(Graph 5: Comparison of post-test BMI mean in group 1 and group 2)

The above bar graph depicts the comparison of post-test BMI mean in group 1 and group 2. It shows that the BMI mean and standard deviation in group 1 are 19.512 and 1.839. And in group 2, the mean and standard deviation are 21.158 and 1.727 respectively. It clearly represents that the subjects in group 1 showed a significant reduction in BMI in comparison to the subjects in group 2.

# ***DISCUSSION***

## DISCUSSION

The result of the study conclude that the use of low-impact aerobic exercise and zumba dance are both effective for reducing the BMI of patients with obesity. The study rejects the null hypothesis:- There is no significant difference between the effect low-impact aerobic exercise and zumba dance on BMI of patients with obesity, and accepts the experimental hypothesis:- There is significant difference between the effect of low-impact aerobic exercise and zumba dance on BMI of patients with obesity [20].

According to the study done by Jerusha Packyanathan and S.Pretha in 2020, it was concluded that, hypertension can be controlled without drug intervention. Exercises like Aerobics, Zumba dance and yoga are other interventions that can bring about a fall in hypertension. They help reduce the morbidity and mortality from cardiovascular diseases which are now on top of the lists. Comparing the three activities, it is found that the drop in the blood pressure was greatest among participants who practiced yoga, followed by participants who performed Zumba dance and finally among participants of aerobics. However, it should be noted that all the three activities produce no side effects which is evident while using drug interventions for prolonged periods. Obesity and HBP are almost risk associated with coronary artery disease and the same result is shown in thus study [21].

According to the study done by Charles Miscallef in 2014, it was investigated the before–after effects of a Zumba program on the weight and body mass index (BMI) of 36 females, mean age 34.25 ± 8.50 years and mean BMI 32.98 ± 5.32 kg/m2. Methods: The intervention involved 16 hourly Zumba sessions held twice weekly over 8 weeks. The subjects had statistically significant decreases and large effects for weight and BMI: 2.13 kg, t(35) = 13.77, P\0.0005, d = 2.30, and 0.83 kg/m2, t(35) = 13.02,

P\0.0005, d = 2.17, respectively [22].

According to a study done by Anne A Delextrat and Sarah Warner in 2014, it was concluded that Zumba provided significant positive changes in maximal aerobic fitness (+3.6%), self-perception of physical strength (+16.3%) and muscular development (+18.6%), greater autonomy (+8.0%), and purpose in life (+4.4%). No significant changes were observed in the control group. In addition, some psychological changes were significantly correlated to body fat at baseline, and changes in fitness. These results highlight that Zumba is beneficial to improve fitness and well-being in healthy women, but does not change body composition [23].

# ***CONCLUSION AND SUMMARY***

## CONCLUSION:

The result of the study conclude that the use of low-impact aerobic exercise and zumba dance are both effective for reducing the BMI of patients with obesity. But the result says that the low-impact aerobic exercise is much more effective as compared to zumba dance.

## SUMMARY:

During the course of the study, it has been concluded that low-impact aerobic exercise and zumba dance are both helpful in reducing BMI of obese patients. But it is seen that the group performing low-impact aerobic shown a significant reduction in BMI of patients with obesity than the group performing zumba dance.

# ***LIMITATIONS***

## Limitations:

- Limited sample size
- Specified age group of 25 to 40 years
- No follow ups

## Future recommendation:

- Study can be done on large population
- Study can give long term effects
- Study can be done on older people

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# ANNEXURE A

# CONSENT FORM

Study title**: THE EFFECT OF LOW-IMPACT AEROBIC EXERCISE AND ZUMAB DANCE ON BODY FAT PERCENTAGE IN PATIENTS WITH OBESITY: A COMPARATIVE STUDY.**

I Mr / Mrs_____exercising my free power of choice ; hereby giving my consent to include myself as a subject. I have been explained everything about the research in details and about the therapy which was given to me. I understand that my participation is voluntary in the study and that I am free to withdraw at any time, without giving any reason, without my medical care or legal rights being affected.

I understand that the data obtained through the study may be used for research paper publication and I also understand that my identity will not be revealed in any information released into third parties or published.

Patient's name: Date:
Sign:
Physiotherapist name:
Sign:

## ANNEXURE B

# सहमति फॉर्म

अध्ययन शीर्षक: **मोटापे के साथ रोगियों में शरीर में वसा प्रतिशत पर कम प्रभाव वाले एरोबिक व्यायाम और ज़ूमाब नृत्य का प्रभाव: एक तुलनात्मक अध्ययन।**

मैं श्री _____ अपनी पसंद की स्वतंत्र शक्ति का उपयोग कर रहा हूं; इसके द्वारा खुद को एक विषय के रूप में शामिल करने के लिए मेरी सहमति दे रहा हूं। मुझे विवरण में अनुसंधान के बारे में सब कुछ समझाया गया है और उस चिकित्सा के बारे में जो मुझे दिया गया था। मैं समझता हूं कि अध्ययन में मेरी भागीदारी स्वैच्छिक है और मैं किसी भी समय, बिना किसी कारण के, मेरी चिकित्सा देखभाल या कानूनी अधिकारों को प्रभावित किए बिना, वापस लेने के लिए स्वतंत्र हूं।

मैं समझता हूं कि अध्ययन के माध्यम से प्राप्त डेटा का उपयोग शोध पत्र प्रकाशन के लिए किया जा सकता है और मैं यह भी समझता हूं कि मेरी पहचान तीसरे पक्ष में जारी या प्रकाशित किसी भी जानकारी में प्रकट नहीं होगी।

रोगी का नाम: दिनांक:
साइन इन करें:
फिजियोथेरेपिस्ट का नाम:
साइन इन करें:

સંમતી પત્રક :
વ્યક્તિ નું નામ : _____
જાતી - સ્ત્રી / પુરુષ ઉંમર : _____
વ્યક્તિ નું સરનામું : _____
હું હુકદાર સંશોધન પ્રોજેકટ

તુલનાત્મક અભ્યાસ

હું પણ તમામ પરીક્ષણો બિનઆક્રમણ અને કોઈ આડઅસર વગર છે કે સમજાવી કરવામાં આવી છે. મારા વિધ્યાત્મકક્ષમતા અને આરોગ્યાં સિથતી વગેરે આકારણી હાથ ધરવામાં આવેશે કે જે વિવિધ પરિક્ષણે વિશે વિગતવાર સમજાવયેલ કરવામાં આવી છે.

હું અભ્યાસ માં સહયોગ સ્વૈચ્છિણ છે જે સમજવા અને તે હું અસર થઈ રહી. મારા તબીબી કાળજી અથવા કાનૂની અધિકાર વગર કોઈકારણ આપ્યા વગર, હું કોઇ પણ સમયે પાછી ખેંચી મુકત છું.

હું અભ્યાસ દ્વારા મેળવી માહિતી સંશોધન પેપેર પ્રકાશન માટે ઉપયોગ કરી શકાય છે જે સમજે છે એને હું પણ મારી ઓળખતતીય પક્ષ રજૂ અથવા પ્રકાશીત કોઇ પણ માહિતી જાહેર કરવામાં આવશે નહિ કે અમજે છે.

હસ્તાક્ષર(અથવાઅંગુઠાનીછાપ)વ્યક્તિની_____
કાયદાકીય રીતે સ્વીકાર્ય પતિનીધી :_____
સાક્ષી ની સહી :_____
તપાસનાર ની સહી :_____
સાક્ષીનું નામ:_____તારીખ : _____

## ANNEXURE B

### Data collection sheet

Group: ☐ Date: _____

Name of the patient: _____

Age: _____

Gender: _____

Weight: _____kg

Height: _____m

BMI: _____$Kg/m^2$

Address:

_____

_____

_____

Contact number: _____

Signature of the investigator

Nidhiba M Zala

## ANNEXURE C

## OUTCOME MEASURES

**BMI (Body Mass Index):**

BMI is the value deprived from the weight and height of a person.
It is defined as the body weight divided by the square of the height and is expressed in units as $kg/m^2$.

BMI = weight of the person/(height of the person)$^2$

| Classification | BMI ($kg/m^2$) | Risk of associated illness |
|---|---|---|
| Underweight | < 18.5 | Low (but greater risk of other clinical problems) |
| Normal range | 18.5–24.9 | |
| Overweight | > 25.0 | Average |
| Pre-obese | 25.0–29.9 | Increased |
| Obese class I | 30.0–34.9 | Moderate |
| Obese class II | 35.0–39.9 | Severe |
| Obese class III | > 40.0 | Very severe |

## ANNEXURE D

## MASTER CHART

### GROUP1

| SR NO. | NAME OF THE PATIENT | AGE | GENDER | WT (Kg) | HT (m) | BMI (PRE) | BMI (POST) |
|---|---|---|---|---|---|---|---|
| **1.** | Dipali Parikh | 30 | F | 50.50 | 1.5 | 21.573 | 17.573 |
| **2.** | Hiral Makwana | 32 | F | 52 | 1.6 | 19.814 | 16.814 |
| **3.** | Niyati Patel | 28 | F | 55 | 1.7 | 20.202 | 18.202 |
| **4.** | Payal Chabra | 26 | F | 56 | 1.5 | 24.889 | 19.889 |
| **5.** | Anushka Prajapati | 27 | F | 50 | 1.5 | 23.139 | 19.139 |
| **6.** | Poonam Patel | 29 | F | 60 | 1.5 | 26.667 | 20.667 |
| **7.** | Rinkal Vaghela | 28 | F | 65 | 1.5 | 27.767 | 19.919 |
| **8.** | Priya Vyas | 31 | F | 63 | 1.6 | 24.919 | 17.186 |
| **9.** | Ankit Patel | 33 | M | 55 | 1.6 | 21.186 | 20.373 |
| **10.** | Deep Goswami | 35 | M | 60 | 1.5 | 26.667 | 17.168 |
| **11.** | Sunil Prajapati | 28 | M | 53 | 1.5 | 24.527 | 21.336 |
| **12.** | Anil Roy | 36 | M | 59 | 1.4 | 32.373 | 20.372 |
| **13.** | Manish Patel | 26 | M | 54 | 1.5 | 25.337 | 21.336 |
| **14.** | Jayesh Makwana | 29 | M | 59 | 1.5 | 26.222 | 23.222 |
| **15.** | Prakash Patel | 31 | M | 52 | 1.6 | 21.367 | 19.368 |

## GROUP2

| SR NO. | NAME OF THE PATIENT | AGE | GENDER | WT (Kg) | HT (m) | BMI( PRE) | BMI (POST) |
|---|---|---|---|---|---|---|---|
| **1.** | Tara Parmar | 36 | F | 60.50 | 1.6 | 23.931 | 19.931 |
| **2.** | Aditi Raval | 28 | F | 65 | 1.5 | 27.767 | 22.767 |
| **3.** | Twinkal Trivedi | 27 | F | 55 | 1.4 | 26.524 | 21.524 |
| **4.** | Tanya Patel | 26 | F | 63 | 1.5 | 26.913 | 20.913 |
| **5.** | Anjali Rao | 28 | F | 47 | 1.5 | 21.750 | 18.750 |
| **6.** | Anisha Sharma | 32 | F | 52 | 1.6 | 21.367 | 19.378 |
| **7.** | Janal Raval | 33 | F | 56.50 | 1.5 | 25.111 | 21.111 |
| **8.** | Mahek Patel | 31 | F | 58 | 1.5 | 26.841 | 23.841 |
| **9.** | Soham Shah | 28 | M | 62 | 1.7 | 22.773 | 20.773 |
| **10.** | Kartik Patel | 35 | M | 65 | 1.6 | 26.709 | 20.709 |
| **11.** | Ayush Yadav | 26 | M | 60 | 1.5 | 26.667 | 23.667 |
| **12.** | Darshil Rao | 28 | M | 57 | 1.4 | 27.488 | 23.488 |
| **13.** | Jay Sharma | 29 | M | 49 | 1.5 | 21.778 | 20.222 |
| **14.** | Bharat Patel | 32 | M | 52 | 1.6 | 21.367 | 18.368 |
| **15.** | Himanshu Rai | 36 | M | 58 | 1.5 | 24.776 | 21.931 |