

<https://africanjournalofbiomedicalresearch.com/index.php/AJBR>

*Afr. J. Biomed. Res. Vol. 27(4s) (November 2024); 1852-1856*

Research Article

## Effectiveness Of Aerobic Exercise On Body Mass Index Among Female Medical Students In A Private Medical College.

Dr. M. Arthi<sup>1\*</sup>, Dr. Keerthika G<sup>2</sup>, Dr. Surendar Rangasamy<sup>3</sup>, Dr. S.Madhumadhi<sup>4</sup>

<sup>1\*</sup>Community Medicine, Sri Venkateshwaraa Medical College Hospital & Research Centre Ariyur, Puducherry  
drarthisakthi@gmail.com

<sup>2</sup>Emergency medicine Resident, Tirumala MEDICOVER Hospital, Vizianagaram, Andhra Pradesh  
keerthikagnanasegaran@gmail.com

<sup>3</sup>Community Medicine Sri Venkateshwaraa Medical College Hospital & Research Centre Ariyur, Puducherry  
surendar222000@gmail.com

<sup>4</sup>Community Medicine Sri Venkateshwaraa Medical College Hospital & Research Centre Ariyur, Puducherry  
madhumadhi@svmchrc.ac.in

**\*Corresponding Author:** Dr. M. Arthi

\*Associate Professor, Sri Venkateshwaraa Medical College Hospital & Research Centre, Ariyur, Puducherry.

### Abstract

**BACKGROUND:** An interventional study conducted among female medical students from 3rd to 7th semester at a Tertiary Care Teaching Hospital. **OBJECTIVES:** The aims were to assess the effectiveness of aerobic exercise (Zumba) on Body Mass Index among female medical students and to compare the effect of Zumba program with Zumba and diet modification on BMI and weight. **METHODS:** A self-administered, validated International Physical Activity Questionnaire – Short Form were used and anthropometric measurements were measured. The subjects were divided into 2 groups (47 in each group). Both groups (Z and ZD) did Zumba program for 7 weeks. ZD group followed a healthy diet program along with Zumba. **RESULTS:** After 7 weeks intervention, there was significant effectiveness of Zumba on BMI among the participants. In the Z group, significant difference was seen in weight and BMI after intervention. Mean weight had reduced from 65.02±9.33 to 62.99±9.18 with p-value <0.001. Also the BMI has been reduced from 26.39±3.47 to 25.29±3.64. Though the change in anthropometric parameters was higher in ‘ZD’ group, no statistically significant difference was noticed. This indicates that dietary modification and follow-up could be done even in a better way with a larger sample size. **CONCLUSION:** This study suggests that regular physical activity along with healthy diet helps in improving the body weight and BMI. Intervention programs would be required to enhance nutritional education, encourage people to adopt healthy eating behavior, making healthy food choices and engage in physical activity, thereby reduces risk to chronic diseases and improve their lifestyle.

**KEY WORDS:** Zumba, aerobic exercise, Body Mass Index, Intervention

\*Author for correspondence: Email: [drarthisakthi@gmail.com](mailto:drarthisakthi@gmail.com)

Received: 04/11/2024

Accepted: 15/11/2024

DOI: <https://doi.org/10.53555/AJBR.v27i4S.3951>

© 2024 The Author(s).

This article has been published under the terms of Creative Commons Attribution-Noncommercial 4.0 International License (CC BY-NC 4.0), which permits noncommercial unrestricted use, distribution, and reproduction in any medium, provided that the following statement is provided. "This article has been published in the African Journal of Biomedical Research"

## **INTRODUCTION:**

Health is a state of complete physical, mental and social wellbeing and not merely absence of disease or infirmity. Obesity and overweight are defined as abnormal or excessive fat accumulation that presents a risk to health. They are the major risk factors for a number of chronic diseases including diabetes, cardiovascular diseases and cancer<sup>1</sup>. According to World Health Organization, overweight and obesity were the fifth most common cause of death.<sup>2</sup> As per National Family Health Survey 4 (NFHS 4), one in five women is overweight in India.<sup>3</sup> Obesity is a major problem of sedentary lifestyle. The weight gain is due to decreasing energy expenditure.

The art of human living have already been geared to a sophisticated mechanized life. In this modern era, due to the scientific development, man is enjoying the highest level of physical comfort.<sup>4</sup> Elevators, automobiles, two and four wheelers have replaced walking, cycling and other natural exercises in their lives.<sup>5</sup> Today, despite the availability of leisure time, individuals are not engaging themselves into any kind of physical activity. Physical inactivity has been named the biggest public health crisis of 21<sup>st</sup> century. He rides instead of walking, sits instead of standing and such changes in life style, obviously resulted in reduced physical labour and on the other hand increased mental stress and strain. WHO defines "Physical Activity" as any bodily movement produced by skeletal muscles that requires energy expenditure. The American College of Sports Medicine (ACSM) defines aerobic exercise as any activity that uses large muscle groups, can be maintained continuously and is rhythmic in nature.<sup>6</sup> The aim of physical education is to make every human physically, mentally and emotionally fit and help him to live happily with others. Zumba is a rhythmic form of aerobic exercise which reduces body composition and improves fitness. It consists of stretching exercises in form of dance and music so that people feel enthusiastic in doing exercises and feel mind relaxed. It makes us hooked on exercise which is hard to do. It includes legs stretch, side bends, standing spinal twist, abdominal stretch, side stretch, stretching of calf and quadriceps, neck stretch, cross over stretching as per aerobic exercise protocol.<sup>7</sup> Zumba not only helps to achieve whole body coordination, but also helps in improvement of body posture by empowering bony joints.<sup>8</sup> It improves the posture thereby increasing the confidence. In young females, Zumba improves fitness, trunk strength endurance, reduces neck-shoulder pain as well as fat mass thereby improving the quality of life. It incorporates some of the basic principles of aerobic, interval and resistance training to maximize caloric

## **WEEK TRAINING IN MINUTES**

1 – 2 weeks 5 min warm up, 10 min zumba, 5 min warm down

3 – 4 weeks 5 min warm up, 15 min zumba, 10 min warm down

5 – 6 weeks 5 min warm up, 15 min zumba, 10 min warm down

7 weeks 5 min warm up, 30 min zumba, 10 min warm down

## **DIET MODIFICATIONS:**

Group ZD was asked to follow dietary modifications like restriction towards junk foods, low carbohydrate,

output, cardiovascular benefits and total body toning. Adolescence is considered critical period for worsening of obesity, as overweight adolescent are more likely to become obese adults.<sup>9</sup> so, this study is necessary for students so that they can prevent developing obesity and its consequences.

## **AIMS & OBJECTIVES:**

1. To assess the effectiveness of aerobic exercise (Zumba) on Body Mass Index among female medical students.
2. To compare the effect of Zumba program with Zumba and diet modification on BMI and weight.

## **MATERIALS AND METHODS:**

This was an interventional study conducted among female medical students from 3<sup>rd</sup> to 7<sup>th</sup> semester at a Tertiary Care Teaching Hospital. After getting approval from the Scientific Research Committee, Institution Human Ethics Committee (IEC), the study was conducted between May and July 2018. Sample size was calculated to be 94 (47+47) by Open Epi software based on the mean obtained from the previous study. Purpose of the study was explained to the participants and informed written consent was obtained. Baseline assessment was taken from all the students. Students who were on chronic co morbid illness, long term treatment and who were absent for long term due to any reason were excluded from the study. A self-administered questionnaire which contain background information like age, past and present health status that require medical clearance, frequency of junk food intake, history of weight gain in past 1 year, sleeping hours and stress due to overweight were recorded. The level of physical activity was assessed using a validated International Physical Activity Questionnaire – Short Form (IPAQ-SF). It consists of 7 questions which include the level of vigorous, moderate physical activity and walking done by the participants for past 7 days. The anthropometric measurements like height, weight, BMI were measured using standardized scales after zero calibration.

## **INTERVENTION:**

Based on the BMI, the subjects who were overweight, pre-obese and obese were selected for the intervention. They were allocated randomly into two groups – group Z & ZD comprising of 47 female medical students each. Group ZD followed a healthy diet along with Zumba program and the Group Z did only Zumba program. A seven week program conducted by a certified Zumba Instructor was scheduled for both the groups. Each class last for about 30 – 45 minutes.

low fat, high protein diet of 1500 Kcal. They were provided with healthy dietary tips like to have more of pulses, sprouts, milk and egg whites, fish, chicken for

non-vegetarians. Dietary calculation was done by using the mobile application – Healthifyme. Reminders for entry food items in the online food sheet was sent every night at 9 pm. Online entry of food items with exact proportion eaten was entered at the end of each day for all 7 days. Daily caloric and protein intake for the food items taken by the participants were then calculated using the same mobile application. The values were then shared with the investigator by the participants and entered in Excel sheet. Group Z was asked to continue with their usual diet. At the end of 7<sup>th</sup> week, assessment of weight and BMI was again done for both the groups.

#### **DATA ENTRY AND ANALYSIS:**

The data was entered and analysed using SPSS version 23. Anthropometric measurements were observed during pre and post intervention for both Z and ZD group and comparison was done within the two groups as well as between the groups. Pre and post nutrient intake was also compared within ZD group. Continuous variables like age, height, weight, BMI, WHR were represented as mean and Standard Deviation. Categorical values like BMI category, physical activity level were expressed in percentages. All the comparisons were done using paired T-test. P value of less than 0.05 was considered as statistically significant.

Physical activity scores and levels were calculated according to the guidelines for data processing and analysis of the IPAQ. The information were converted into Metabolic Equivalent Time (MET) per min per week for each of walking, moderate and vigorous intensity activities and scores were calculated as follows:

Walking = 3.3 × walking min × walking days

Moderate activity = 4.0 × moderate activity min × moderate activity days

Vigorous activity = 8.0 × vigorous activity min × vigorous activity days

Physical activity levels were also classified into 3 categories according to the scoring system provided by IPAQ.<sup>10</sup>

Low - If not moderate or vigorous, Moderate - Total physical activity of at least 600 MET-minutes/week, High - 1500 - 3000 MET-minutes/week

#### **RESULTS:**

For baseline assessment, all the subjects were included. The Mean age of the participants was 21±2 years. More than 70 % of them belonged to nuclear family. Mean sleeping hour was 6±2 hours. Majority (92%) of the participants were non-vegetarian. About 28% of them reported that they had more weight gain in past 1 year and 98% reported that they have a habit of eating junk food at least 3 times a week. About 47% (n = 64) of them reported that they started gaining weight during adolescent period and 60% (n = 82) of the participants were stressed and depressed because of their weight gain. Among them, 8% reported that they tend to over eat due to stress. About 18.2% of the participants were found to have overweight, 24.8% were pre-obese and 9.5% were obese according to classification for Asians.

Hence the participants who had BMI above 20 were included for the intervention.

About 64.23 % of the participants had low physical activity with < 600 MET-minutes/week and only 11 % had vigorous activity (scoring obtained from IPAQ-SF using MET-minutes/week).

Out of 94 participants recruited for intervention 47 participants followed only Zumba dance program (Z group) and other 47 participants followed a diet program along with Zumba dance (ZD group). The comparison of anthropometric measurements of the participants at the baseline shows that all the parameters with mean ± SD between the two groups were not statistically significant representing the homogeneity of the groups.

After intervention with Zumba program with or without diet modification program, it was observed that anthropometric characteristics showed a statistically significant difference within the groups. The mean weight of the participants had been reduced from 65.02±9.33 to 62.99±9.18 in Z and ZD groups. Also the BMI has been reduced from 26.39±3.47 to 25.29±3.64 which is statistically significant. But there was no significant difference in Waist Hip Ratio. (Table 1, 2)

At the end of intervention, anthropometric measurements between Z and ZD group was compared. Though there was more reduction in ZD group compared to Z group, no statistical significance was present. (Table 3) Zumba along with a high protein and low fat diet reduced the overall mean daily energy intake from 1870 kcal before intervention to 1556 kcal after intervention. Mean protein intake increased from 33.94g to 75.5g. All the changes were statistically significant (p=0.00) (Table 4).

#### **DISCUSSION:**

All the subjects of the experimental group involved in this study had undergone regular Zumba program for a period of seven weeks. It was evident that in case of weight and Body Mass Index, there were significant changes noticed after program. But when compared to the two groups Z and ZD, there was no significant difference between the pre and post intervention measurements in terms of weight, BMI and WHR. This may be probably due to small sample size. Also, the study involves both hosteller and day scholars. Hence effective diet intervention like supplementing with dietary food items, giving daily diet menu was not possible which is beyond the scope of our study. This became the limitations of the study. Furthermore, seven weeks of intervention significantly reduced the weight, BMI in overweight women. This goes in line with other studies which have similar significant results.<sup>11 - 13</sup> From the findings it is quite interesting to know that this study have positive influence among the sedentary students towards physical activity due to the training given and also helped to keep them healthy and fit.

#### **CONCLUSION:**

The present study showed a significant effectiveness of

zumba on Body Mass Index among female medical students. When the two groups Z and ZD were compared, change in anthropometric parameters and the mean differences were higher in 'ZD' group than 'Z' group. This suggests regular physical activity and healthy diet could help to improve body weight and fitness. Intervention programs would be required to enhance nutritional education, encourage people to adopt healthy eating behaviour, making healthy food choices and engage in physical activity, thereby reduces risk to chronic diseases and improve their lifestyle. Studies like this are tremendously necessary because it not only enhances physical activity among the students who lack in their modern sophisticated lifestyle but also accelerates an intrinsic motivation for physical activity on medical students because as a future doctor they can encourage and educate community about physical activity.

**FINANCIAL SUPPORT AND SPONSORSHIP:**  
ICMR Short Term Studentship (STS) 2018 project.  
Reference ID: 2018 – 05672

**CONFLICT OF INTEREST:** There are no conflicts of interest.

**REFERENCES:**

1. Banarsidas Bhanot, Park K. Park's textbook of Preventive and social Medicine.2013; 21th ed.:14
2. Haghjoo M, Zar A, Hoseini A. Effect of 8-week Zumba training on overweight women's body composition. Pars J Med Sci 2016; 14(2):21-29.
3. Government of India. NFHS 4. Other proximity Determinants of Fertility Pg176 rchiips.org/NFHS/pdf/India.pdf
4. Kumar S, Priyanka. Effect of Zumba and aerobic exercise training on physical fitness

- variables- a study.Int.J.PESH.2016; 3(5):275-6.
5. Shenbagavalli A, Mary R. Effect of Aerobic Training on Body Mass Index on sedentary obese men. JESP 2008;4(2):125-8.
6. Patel H, Alkhawam H, Madanieh R, Shah N, Kosmas C, Vittorio T. Aerobic vs anaerobic exercise training effects on the cardiovascular system. World J Cardiol 2017;26; 9(2): 134-8.
7. Lehri A, Mokha R. Effectiveness of Aerobic and Strength Training in causing weight loss and favorable Body composition in Females. JESP.2006;2:96-9.
8. Jain PK, Nigudkar MR. Effect of 12 week Zumba Program and healthy diet on Anthropometry, Body Composition and Fitness parameters in working women. J Nutr Health.2016; 5(4):00180.
9. Silva DAS, Petroski EL, Pelegrini A. Effect of aerobic exercise on body composition and lipid profile of overweight adolescent. Rev.Bras.Cienc.Esporte.Floraianopolis.2014; 36(2):295-309.
10. Patterson E: Guidelines for Data Processing and Analysis of the International Physical Activity Questionnaire (IPAQ) – Short and Long Forms. The IPAQ group; 2005
11. Jackson L. The effects of a Zumba fitness dance program on children struggling with obesity. Goucher college. Graduate program in education. April2013
12. Covarrubias-Gomez A. assessment of a Zumba fitness class in hospital workers. Int J Sports Exerc Med 2017; 3(5)
13. Rossmeissl A, Lenk S, Hanssen H et al. ZumBeat: Evaluation of a Zumba dance intervention in postmenopausal overweight women. MDPI 2016; 4(1):5.

**TABLES**

**Table 1: Comparison of Anthropometric measurements within Z group after intervention**

Anthropometric measurements	Mean± SD		Differences In the Mean	P value
	Pre intervention	Post intervention		
Weight in Kgs	65.02±9.33	62.99±9.18	- 2.03	.000
BMI	26.39±3.50	25.29±3.64	- 1.1	.000
WHR	0.86 ± 0.09	0.86 ± 0.09	0	0.29

**Table 2: Comparison of Anthropometric measurements among ZD group after intervention**

Anthropometric measurements	Mean± SD		Differences in the Mean Values	P value
	Pre intervention	Post intervention		
Weight in Kgs	66.43±11.16	61.67±11.03	- 4.76	.000
BMI	27.24±4.06	24.27±4.69	- 2.97	.000
WHR	0.86±0.08	0.85± 0.09	-0.01	0.6

**Table 3: Comparison of Anthropometric measurements between Z and ZD group after intervention**

Anthropometric measurements	Mean± SD		P value
	Z group	ZD group	
Weight in Kgs	62.99±9.18	61.67±11.03	.895
BMI	25.29±3.64	24.27±4.69	.916
WHR	0.86 ± 0.09	0.85 ± 0.09	0.457

**Table 4: Comparison of nutrients among ZD group before and after intervention**

NUTRIENTS	ZD group (Mean± SD)		P value
	Pre intervention	Post intervention	
ENERGY (kcal)	1870±223	1556±113	0.00
Protein (grams)	33.94±10.52	75.5 ±5.7	0.00

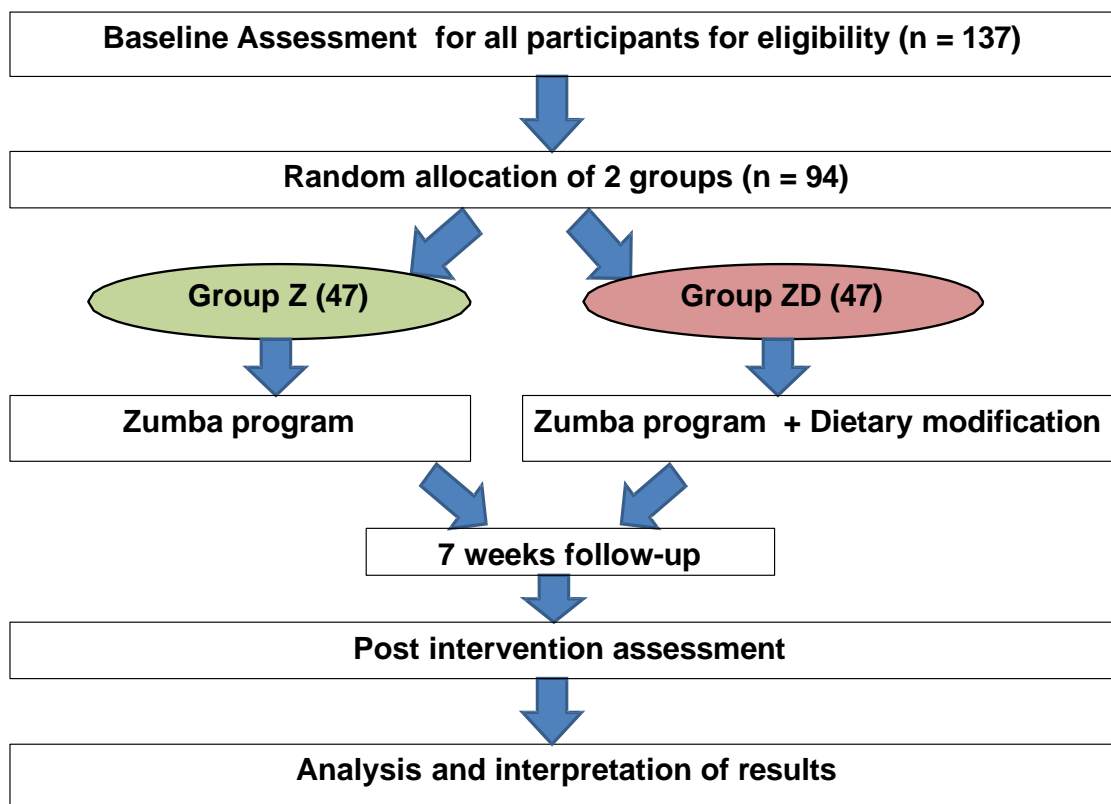


Figure 1: Flowchart showing study design