

Assessment of aerobic capacity in normal versus obese housewives

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Abstract:

Aerobic capacity is an important measure as it serves as an index of cardiopulmonary function. Housewives' demographic segment at a greater risk of developing a condition as a result of long-term physical inactivity. The purpose of this study was to assess the body mass index and the aerobic capacity in normal and obese housewives using six minute walk test. 30 participants were selected, BMI was calculated and participants were categorised. The subjects were made to perform six minute walk test. The value of VO_2 max was interpreted by the 6MWT. The data was collected and was statistically analyzed. The more is the BMI lesser is the aerobic capacity and vice versa. This study concluded that there was slight change in the aerobic capacity of obese and overweight housewives as compared to the normal housewives. It was observed that increased BMI had no significant effect on the walking percentage of the participants

Keywords-Aerobic capacity, Body Mass Index, Modified Borg Scale, 6 minute walk test

Introduction:

Physical fitness is a highly helpful health indicator of the functioning of our circulatory, pulmonary, neuroendocrine, and musculoskeletal systems. It is employed to examine the relationship between body composition and illness and death [1] Regular physical activity offers many benefits, particularly for current and future health. The Ministry of Health Malaysia recommends physical activity to reduce the risk of early death, heart disease, metabolic syndrome, cancer, and depression as well as to enhance sleep quality. Regular exercise has a positive impact on cholesterol levels, weight, blood pressure, blood sugar, and blood sugar levels in the body [2]

Yet, many women today maintain sedentary lifestyles that result in physical inactivity, particularly housewives and retirees. Due to their hectic schedules maintaining the home and caring for their children, it has been claimed that housewives are discouraged from engaging in the recommended physical activity. This increases the likelihood that this group of people will get a condition like cardiovascular disease as a result of sustained inactivity. Those who reside in urban regions and have poor incomes are more likely to develop cardiovascular diseases due to their busy schedules and lack of exercise. The risk of developing the illness can be reduced or completely eliminated with moderate physical activity [2]

The greatest quantity of oxygen that a subject can consume per unit of time and body weight is known as the aerobic capacity or VO_2 max. It is a crucial measurement because it characterizes the functional ability of the cardiopulmonary system to carry oxygen to the working muscles and because it is one of the factors that limit endurance performance. WHO defines health as total physical, mental, and social well-being rather than just the absence of disease or disability. People's physical and mental well-being are essential for carrying out their daily duties. BMIs of 18.5-24.9 kg/m^2 are considered normal [3]

Early childhood obesity and overweight are associated with a progressive decline in cardio respiratory efficiency and the development of cardiovascular disease. Just a few years ago, the number of overweight and obese Indians has rapidly increased. Obesity was formerly only a problem in high-income nations, but it is now a widespread problem in low- and middle-income

nations, where its prevalence is steadily rising. More than 1.9 billion persons, aged 18 and older, are overweight, according to recent WHO data. Almost 650 million of these people are fat. 39% of persons 18 years and older who were overweight in 2016 (39% of men and 40% of women). In total, 11% of men and 15% of women in the adult population of the world are obese. According to the World Health Organization (WHO), obesity is a medical disorder in which an individual's body fat levels rise to the point where they have an adverse impact on their health, raising the risk of morbidity and shortening their life span [4]

The BMI [body mass index] is used to determine obesity, and the values are

Overweight $>25.00\text{kg/m}^2$

Class I obese- 30.00kg/m^2

Class II obese- $35.00-39.99\text{kg/m}^2$

Class III obese $>40.00\text{kg/m}^2$ [5,6]

According to the American Thoracic Society's recommendations, a 6-minute walk test was used in this study to evaluate the physical fitness of obese patients. The 6 Minute Walk Test is simple to administer, more tolerated, and more indicative of activities of daily living, according to a review of functional walking tests that was recently published [5,6]

It assesses the overall and combined reactions of all the systems affected by exercise, such as the pulmonary and cardiovascular systems, blood, neuromuscular units, and muscle metabolism. The 6 Minute Walk Distance may more accurately represent the functional activity level for daily physical activities since most activities of daily life are performed at sub maximum levels of effort according to the self-paced 6 Minute Walk Test [7]

Procedure:

The present study was a study conducted on housewives in and around Pune city. The demographic variables used were age, gender, height, weight, which specifically included housewives of age between 30-55 years with BMI of normal, overweight and obese. Data was collected between the year 2022-23

Participants were considered on the basis of the inclusion and exclusion criteria. BMI, 6 min walk test, modified borg's scale were used to obtain data. Sample size was 30 taken in the study. The study design was convenient sampling, and the sampling type was simple random sampling. According to the inclusion criteria Normal and Obese housewives of age 30-55years, BMI $\geq 18.5\text{kg/m}^2$. In the study we excluded Housewives with a medical history of myocardial infarction & unstable angina during previous month. Resting heart rate more than 120bpm, Systolic B.P more than 180 mmHg & Diastolic B.P more than 100 mmHg. The data collected was analyzed by percentage.

Data analysis and result:

Normal	15
Overweight	10
Obese	5

Table 1: BMI wise distribution of participants

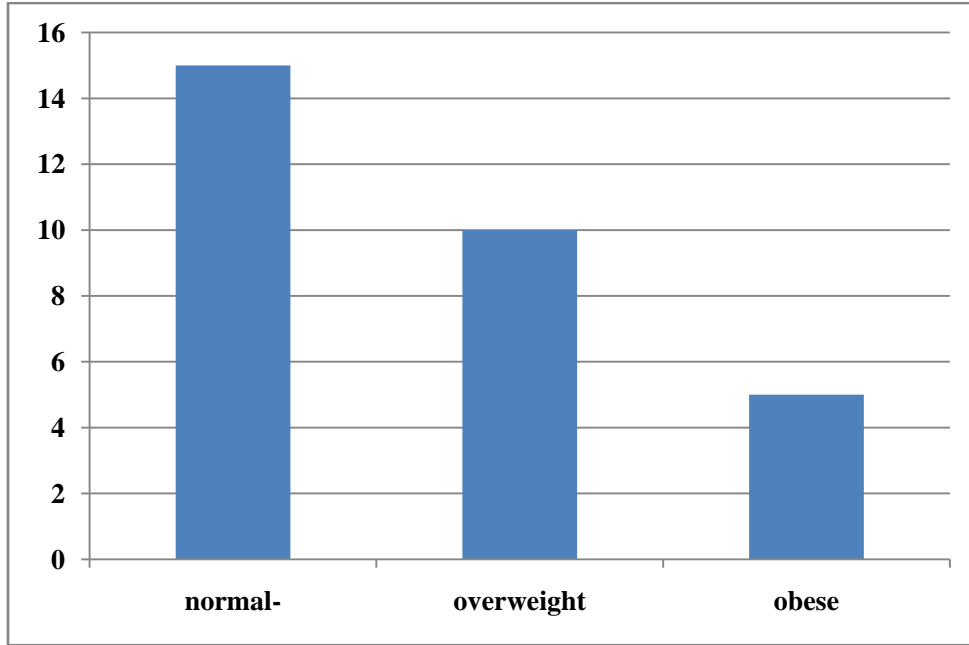


Figure 1: BMI wise distribution of participants

Interpretation

Figure 1 indicates that there were 15 normal housewives, 10 overweight housewives and 5 obese housewives

Age (years)	Normal participants	Obese participants
30-40	13%	23%
40-50	27%	30%
50-55	7%	0

Table 2: Age wise distribution of participants

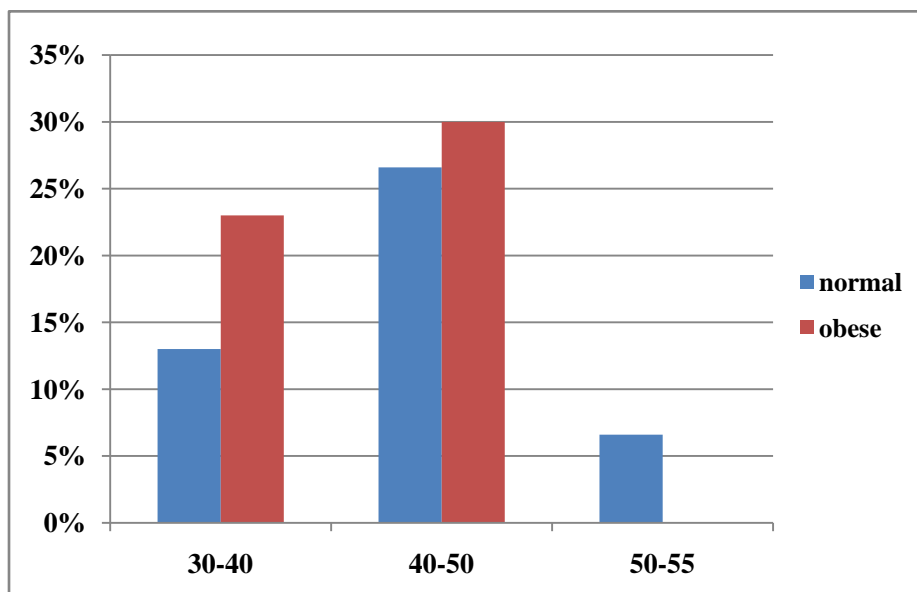


Figure 2: Age wise distribution of participants

Interpretation

Figure 2 shows the age wise distribution of participants, in the age group of 30-40 years there were 13% normal and obese were 23%, in the age group of 40-50 years there were 27% normal and 30% obese, whereas in age group of 50-55 there were only 7% normal participants and no obese participants

Walking Percentage	Normal Participants	Obese Participants
65-75%	0	2
76-85%	3	6
86-95%	7	7
96-105%	4	1

Table 3: Walking Percentage wise distribution of Participants

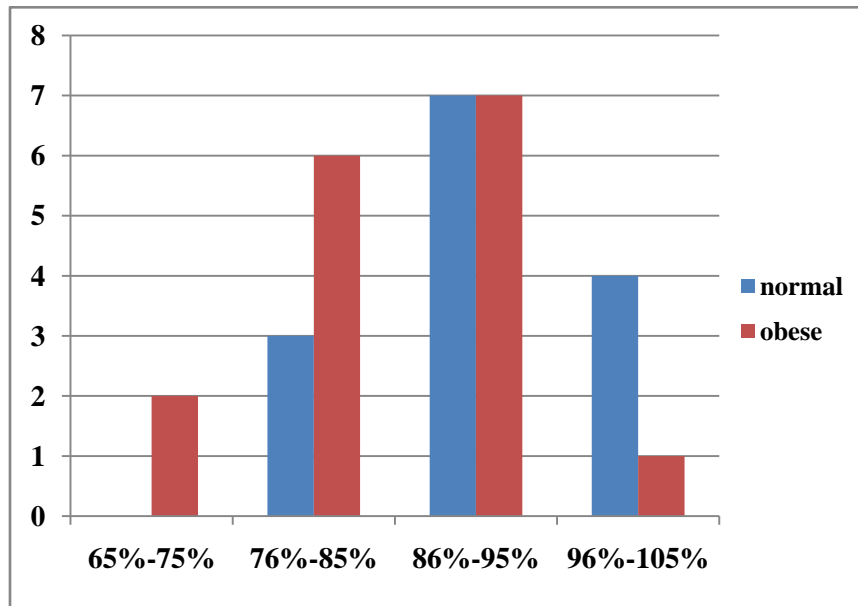


Figure 3: Walking Percentage wise distribution of Participants

Interpretation

Figure 3 interpreted the walking percentage wise distribution of participants where in the walking percentage of 65-75% there were 0 normal and 2 obese participants, between 76-85% there were 3 normal and 6 obese participants, between 86%-95% there were 7 normal and 7 obese participants where as in 96%-105% there were 4 normal and 1 obese participants.

Aerobic capacity	Normal Participants	Obese Participants
24-34%	10%	50%
35-42%	37%	3%

Table 4: Aerobic Capacity wise distribution of Participants

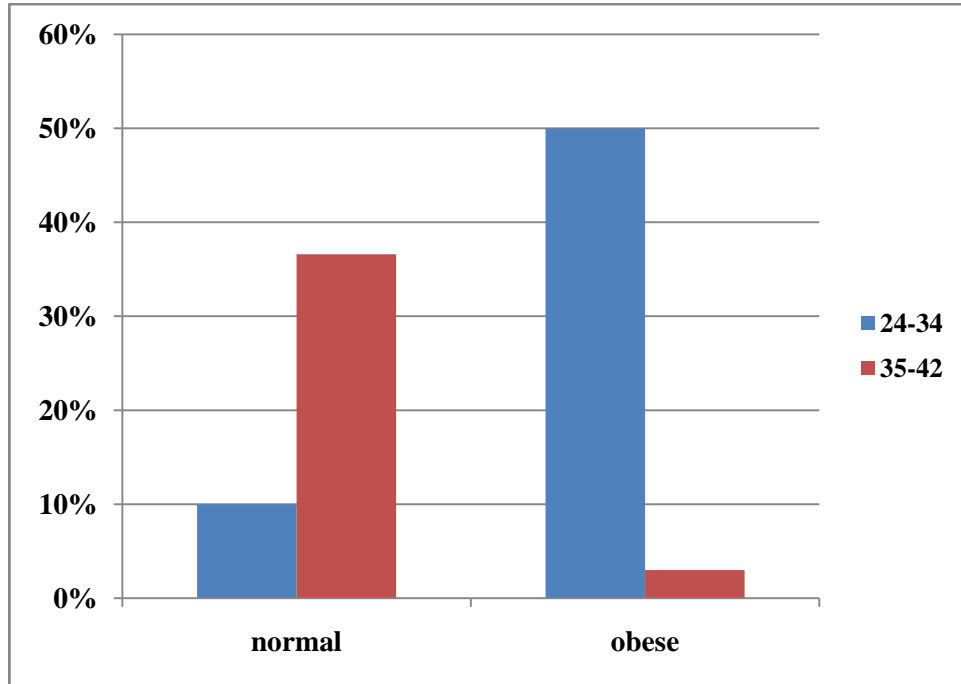


Figure 4: Aerobic Capacity wise distribution of Participants

Interpretation

Figure 4 interpreted the aerobic capacity wise distribution of participants where 10% normal and 50% obese participants had the aerobic capacity between 24%-34% and 37% normal and 3% obese participants had the aerobic capacity between 35%-42%.

Pulse rate	Normal Participants		Obese Participants	
	Count	Percentage	Count	Percentage
68-88	10	33%	8	27%
89-112	5	17%	7	23%

Table5: Pulse rate(Pre) wise distribution of Participants

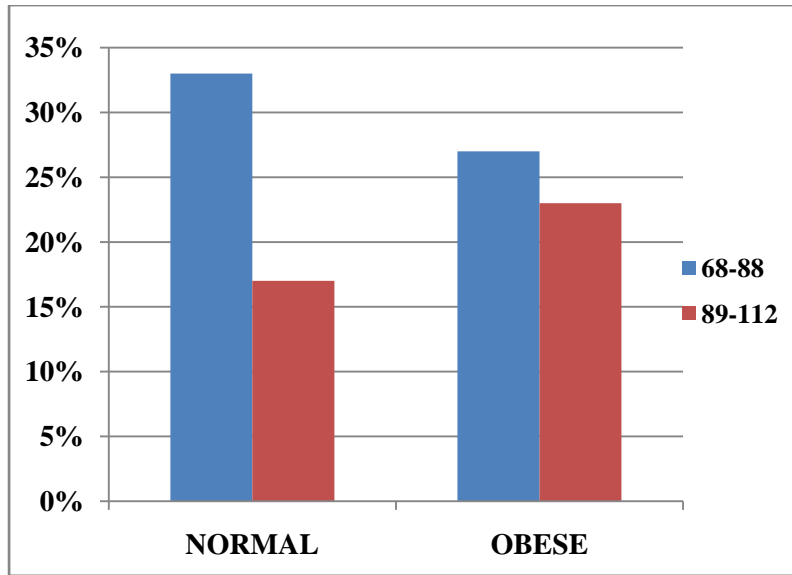


Figure 5: Pulse rate (Pre) wise distribution of Participants

Interpretation

Figure 5 showed the pre test pulse rate wise distribution of participants, we observed that 10 normal participants had the pre pulse rate between 68-88 bpm and 8 obese participants had the pre pulse rate between 68-88 bpm. Whereas 5 normal participants had the pre pulse rate between 89-112 and 7 obese participants had the pre pulse rate between 89 -112 bpm

Pulse rate	Normal Participants		Obese Participants	
68-88	6	20%	4	13%
89-112	8	27%	12	40%

Table 6: Pulse Rate (Post) wise distribution of participants

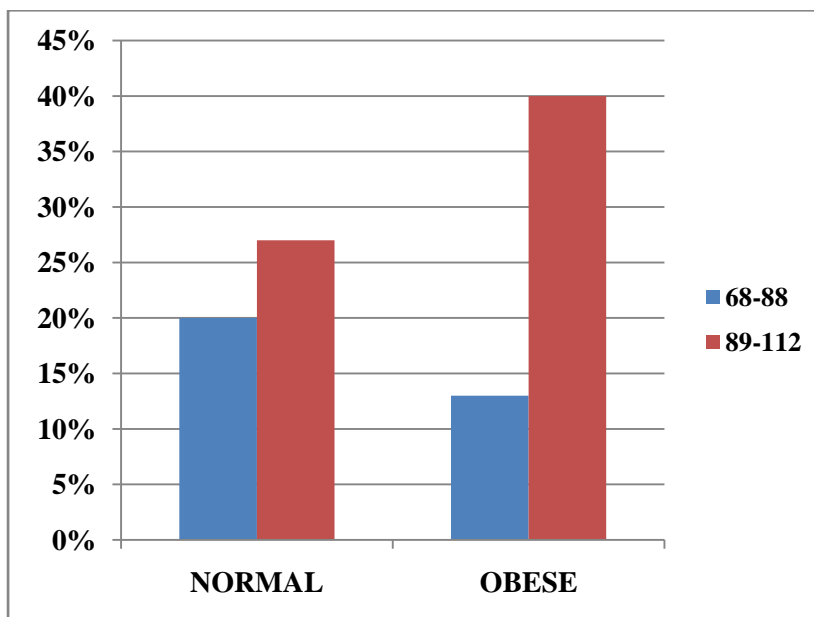


Figure 6: Pulse Rate (Post) wise distribution of participants

Interpretation

Figure 6 showed the post test pulse rate wise distribution of participants, we observed that 6 normal participants had the pre pulse rate between 68-88 bpm and 4 obese participants had the pre pulse rate between 68-88 bpm. Whereas 8 normal participants had the pre pulse rate between 89-112 and 12 obese participants had the pre pulse rate between 89 -112 bpm

Discussion

Physical fitness is a very useful health marker of functional status of our cardiovascular, respiratory, neuro-endocrine, musculoskeletal, and circulatory system. Obesity, as defined by the World Health Organization (WHO), is a medical condition in which excess body fat accumulates to produce negative effects on health which ultimately leads to increased morbidity and reduced life expectancy. The Aerobic capacity or VO₂ max is defined as the maximum amount of O₂ that a subject can use per unit time and body weight. It is an important measure as it serves as an index of cardio-pulmonary function is characterizes the functional capacity of the cardio pulmonary system to transport oxygen to the working muscles; it is one of the limiting factors in endurance performance [7]

The self-paced 6MWT assesses the sub maximal level of functional capacity; because most activities of daily living are performed at sub maximal levels of exertion, the 6MWD may better reflect the functional exercise level for daily physical activities [8]The purpose of this study was to assess and compare the aerobic capacity of normal and obese housewives. This study is consistent with the studies conducted by Moghi Chauhan et.al and Ravi Manavat et.al which studied about the effect of six minute walk test as an effective measure to assess functional capacity and effect of increased body weight on 6 min walk distance in overweight and obese individuals [9]

The present study assessed the aerobic capacity in middle aged housewives between the age group of 30-55yrs, using sub-maximal testing. The study was conducted on normal, overweight and obese housewives.The study applied the 6min walk test protocol proposed by the American Thoracic Society guidelines [10] We used recommended length of corridor of 30m so as to avoid too many turns during the test. The study was conducted on flat surface to avoid restrictions due to terrain.Pre and post test vital readings were taken of every participant. It was made sure that no participant any vigorous activity or exercise prior to the test. Every participant completed the Six-Min Walk Distance successfully, without any restrictions. No participant stopped or paused before 6 min for no reason.

In table 1 & figure 1 it showed the number of participants of normal BMI that were 15, BMI above 25 i.e overweight that were 10 and, those above BMI 30 i.e obese were 5. Figure 2 shows the age wise distribution of participants, in the age group of 30-40 years there were 13% normal and obese were 23%, in the age group of 40-50 there were 27% normal and 30% obese, whereas in age group of 50-55 there were only 7% normal participants and no obese participants. Figure 3 interpreted the walking percentage wise distribution of participants where in the walking percentage of 65-75% there were 0 normal and 2 obese participants, between 76-85% there were 3 normal and 6 obese participants, between 86%-95% there were 7 normal and 7 obese participants where as in 96%-105% there were 4 normal and 1 obese participants. Figure 4 interpreted the aerobic capacity wise distribution of participants where 10% normal and 50% obese participants had the aerobic capacity between 24%-34% and 37% normal and 3% obese participants had the aerobic capacity between 35%-42%.

The aerobic capacity (VO_{2max}) wise distribution of participants which shows that there is a slight change in aerobic capacity in obese housewives as compared to normal housewives. All the participants experienced a very very slight or very slight amount of breathlessness and fatigue immediately post test. There was a nominal amount of changes in the BP and Pulse Rate of the participants' pre and post test.

Conclusion

This study concluded that there was slight change in the aerobic capacity of obese and overweight housewives as compared to the normal housewives. It was observed that increased BMI had no significant effect on the walking percentage of the participants

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