

Analysis of Physical Parameters in Pre-Obese Women- An Observational Study

Manali B Badave¹, G Varadharajulu²

¹Faculty of Physiotherapy, Krishna Institute of Medical Sciences Deemed to be University, Karad, Maharashtra, India, ²Dean of Krishna college of Physiotherapy, Department of Neurosciences, Krishna Institute of Medical Sciences deemed to be university, Karad, Maharashtra, India

Abstract

Objective: To analyze the physical parameters in pre-obese women.

Methods: A total of 100 pre-obese women between the age group 40-59 years were randomly selected, to analyze physical parameters in them. Pre-obese was categorized according to the BMI classification (BMI- 25-29.99). Outcome measures used for assessment included physical fitness tests such as curl ups for abdominal endurance, push ups for upper body endurance, squat test for lower body endurance. For assessing upper body muscular strength free weight flat bench press was selected and to assess lower body muscle strength leg press test was selected. Sit and reach test was performed to assess flexibility. Then we observed the physical parameters scores in pre-obese women with the normal ranges.

Result: 27% of the women showed poor muscle flexibility, 45% women showed poor results for abdominal endurance, 33% showed poor results for upper body endurance, 3% women gave poor results for lower limb endurance. 17% women showed poor results for upper body muscle strength and 3% women showed poor results for lower body muscle strength.

Conclusion: On the basis of the results of this study, it can be concluded that, the lower body muscular strength and lower limb endurance was found to be normal but flexibility, upper limb muscle strength and upper limb muscle endurance was found to be poor among these pre-obese women.

Key words: physical parameters, physical fitness, pre-obese.

Introduction

With the recent development incidence of obesity is increasing dramatically among general population.¹ The prevalence of obesity has been increasing worldwide which is 39% in adults with ratio indicating that women are more likely to be obese than men.² Prevalence of obesity is 38% for males and 40% for female respectively also, prevalence for obese and pre-obese found out to be 29.7% in India.^{2,3} It is found out that 12.7% of women are pre-obese in India.⁴

It is necessary to quantify obesity; the method used to quantify obesity may include Body Mass Index (BMI). It can be calculated by dividing an individual's weight measured in kg by their height in meters squared (kg/m^2)⁵ This index is independent of age and gender.⁵

According to the classification of BMI individuals who have score ranges between 18.50-24.99 are rated as normal, >25 are overweight, 25- 29.99 are pre-obese and above 30 considered as obese.²

A variety of factors such as poor diet, genetic predisposition, physical inactivity, advancing technology, sedentary life, physiological and behavioral factors which are implicated as contributing factors to obesity.⁶ Body mass index (BMI) has been shown to be an important predictor of risk of non communicable diseases.³ There are various negative effects of obesity on health which are hypertension, type 2 diabetes mellitus, stroke, dyslipidemia, osteoarthritis, cancer, cardiovascular diseases, respiratory system problems and on mental health.⁷

Physical fitness is defined as “the ability to carry out daily tasks with vigor and alertness, without undue fatigue and with ample energy to enjoy leisure-time pursuits and to meet unforeseen emergencies.” There are few components which can measure physical fitness are endurance, muscle strength, flexibility, agility, speed, balance.⁸

Muscular endurance is defined as “a health related component of physical fitness that relates to the external force that a muscle can exert” Muscular endurance is also known as local endurance. It is the ability of a muscle to contract repeatedly against a load, generate and sustain tension, and resist fatigue over an extended period of time. The important components of muscular endurance test are low- intensity, muscle contractions, a large number of repetitions, and a prolonged time period. So, muscular endurance can be assessed by partial curl-up test, push up test, sit ups, etc.¹⁶ Cardiopulmonary endurance is also known as total body endurance. It is associated with repetitive, dynamic motor activities such as walking, cycling or upper extremity ergometry, which involve use of the large muscle of the body. Different types of test like 6-minute walk test, 12-minute walk test, treadmill test, etc. is used to find out the functional status of respiratory, cardiovascular, and skeletal muscle systems.¹⁶

Muscle strength is “a health related component of physical fitness that relates to the amount of external force that a muscle can exert.” Muscular strength can be assessed either statically or dynamically. Static strength can be assessed by variety of devices including cable tensiometers and handgrip dynamometer. The 1-repetition maximum (1-RM) has been the standard for dynamic strength assessment which includes different methods like bench press, leg press, etc.¹⁷ Flexibility is “a health related component of physical fitness that relates to the range of motion available at a joint.”¹⁸

A cross sectional study was done on obesity, physical fitness and activity levels in Cree children, they concluded that there was a high prevalence was found of overweight in population, with low physical activity and fitness level.¹⁴ Another study was done on physical fitness and physical activity in obese and non-obese youth they concluded that obese subjects had poorer performances in various tasks e.g sit up, bent arm,

shuttle run, endurance shuttle run as compared to non-obese subjects and they had higher sport index than their obese counterparts.¹⁵

Physical activity is defined as any bodily movement produced by skeletal muscles that require energy expenditure. Exercise is a subcategory of physical activity which is structured, repetitive and purposeful.¹⁰ If the person is weak, dull, and sick and he is not able to do his work efficiently and quickly. A well balanced exercise program can improve general health, endurance and also enhances emotional well being. Any healthy person may become physically unfit if he is not doing exercise regularly.¹⁰

There are certain physiological changes occurred in body in response physical activity. Physiological changes triggered by exercises includes increased requirement for oxygen and substrate in skeletal muscle are increased, as are the removal of metabolites and carbon dioxide. Along with this certain chemical, mechanical and thermal stimuli which alters the metabolic, cardiovascular and ventilator function in order to meet this increased demands.¹¹

There are various pharmacological and non-pharmacological therapies used for treatment of obesity to stay physically fit but pharmacological treatments may leads to adverse effect on body. Regular exercises maintain the physical fitness, reduce stress and enhance the mental health. Regular physical activity increases the amount of oxygen delivered to the brain, which increases capacity to do work and allows oxygen flow to the brain enables one to cognitively functions.¹³

The purpose of the study is to observe the physical parameters in pre-obese women. Moreover no study till date hence, it is necessary to study physical fitness parameters among pre-obese women.

Materials and Methodology

Study design: Observational study, sample size- 100, Place of study- Krishna hospital and medical research centre, karad, sampling method- simple random sampling, study duration- 3 months

Participants:

Inclusion criteria: 100 subjects including women

of age group 40-59years and pre- obese women with BMI score between 25-29.99 were taken in the study.

Exclusion criteria: Women with psychological ailments, undergone surgery in past or pain in past 3 months, any physical injury, subjects with history of smoking, heart and lung diseases were excluded from the study.

Outcome measures: Outcome measures were recorded after the physical fitness tests were done.

1-Body Mass Index

2- Partial curl ups (abdominal endurance)

3- Maximal push ups (upper body muscle endurance)

4- Squat test (lower body muscle endurance)

5- Free weight flat bench press(upper body strength)

6-C:\Users\rksharma\Downloads\Leg press.docx Leg press (lower body strength)

7-Sit and Reach Test (Flexibility)

Procedure: Subjects fulfilling the inclusion and exclusion criteria were included. Informed consent form was taken from each of the subjects prior to the physical fitness tests. The motive and procedure of the study was thoroughly explained to the subjects. Instructions were given to subjects about the physical fitness tests.

Their BMI were taken in order to categories them under pre-obese. To check physical parameters physical fitness tests were done which may include curl ups for abdominal endurance, push ups for upper body endurance, squat test to check lower body endurance. To check upper body muscle strength free weight flat bench press was taken and to check lower body muscle strength leg press test was taken. Sit and reach test was done for flexibility. Then we observed the physical parameters scores in pre-obese women with the normal ranges. Then data was collected and analyzed. And after that statistical analysis was done.

Results

1. Flexibility-

i) Sit and reach test

Table no.1: Interpretation: This table shows that statistically 27% pre-obese women showed poor results for muscle flexibility in sit and reach test.

Age	Findings	Frequency	Percentage
40-59	Excellent	2	2%
	Very good	10	10%
	Good	15	15%
	Fair	27	27%

2. Endurance-

i) Curl ups (Abdominal endurance)

Table no.2: Interpretations: This table shows that statistically 45% pre-obese women showed poor results for abdominal endurance in curl ups test.

Age	Findings	Frequency	Percentage
40-49	Very good	10	10%
	Good	45	45%
	Fair	45	45%

ii) Pushups (Upper limb endurance)

Table no.3: Interpretation: This table shows that statistically 33% pre-obese women showed poor results for upper limb endurance in pushups test.

Age	Findings	Frequency	Percentage
40-59	Very good	24	24%
	Good	43	43%
	Fair	33	33%

iii) Squat test (Lower limb endurance)

Table no.4 : Interpretation: This table shows statistically 3% pre-obese women showed poor results for lower limb muscle endurance in squat test.

Age	Findings	Frequency	Percentage
40-59	Excellent	1	1%
	Good	25	25%
	Above average	23	23%
	Average	21	21%
	Below average	27	27%
	poor	3	3%

4. Muscle strength

i) Flat bench press (Upper limb muscle strength)

Age	Findings	Frequency	Percentage
40-49	Excellent	5	5%
	Good	11	11%
	Average	46	46%
	Fair	21	21%
	Poor	17	17%

Table no.5 :Interpretation: This table shows that statistically 17% pre-obese women showed poor result for upper limb muscle strength in flat bench press test.

ii) Leg press (Lower limb muscle strength)

Table no.6: Interpretation: This table shows statistically 3% pre-obese women showed poor results for lower limb muscle strength in leg press test.

Age	Findings	Frequency	Percentage
40-49	Excellent	4	4%
	Good	37	37%
	Average	45	45%
	Fair	13	13%
	Poor	3	3%

Discussion

With the recent development incidence of obesity is increasing dramatically among general population.¹ It is found out that worldwide prevalence of obesity is 39% in adults with ratio indicating that women are more likely to be obese than men.² It has been reported that prevalence of preobese women is 12.7% in India. A variety of factors such as poor diet, genetic predisposition, physical inactivity, advancing in technology, sedentary life, physiological and behavioral factors which are the contributing factors for obesity.⁶

In the current study, 100 women between age group 40-59 years fulfilling the inclusion criteria were included. From which 54 subjects were between the age group of 40-50 and 46 subjects were between the age group of 50-59 years respectively. Women who are categorized under pre-obese according to the B.M.I classification (BMI- 25-29.99) were included in the studies.

The aim of our study was to analyze the physical parameters in pre-obese women such as muscle flexibility, abdominal and muscular endurance and muscle strength. Flexibility is a health related component of physical fitness that relates to the range of motion

available at a joint.¹⁸ Sit and reach test was used to check the flexibility in pre-obese women. Statistically the present study showed that, there were 27% of women showing poor results, 15% were good, 10% were very good and 2% gave excellent results.

Muscular endurance is defined as a health related component of physical fitness that relates to the external force that muscles can exert.¹⁶ curl ups test was used to check the abdominal endurance, the present study noted that 45% women showing poor results, 45% were good and 10% were very good. Push ups test was used to check the upper limb endurance, the result was found in which 33% showed poor results, 43% were good and 24% gave very good results. To check the lower limb endurance squat test was used and statistically the present study showed that, there were 3% women gave poor results, 27% were below average, 21% were average, 23% were above average, 25% were good and 1% gave excellent results.

Muscle strength is a health related component of physical fitness that relates to the amount of external force that a muscle can exert.¹⁷ Flat bench press test was used to check the upper limb strength; statistically the present study showed that 17% women showed poor results, 21% were fair, 46% were average, 11% were good and 5% women gave excellent result. Leg press was used to check the lower limb muscle strength in which the present study showed 3% women were poor, 13% were fair, 43% were average, 37% good and 4% were gave excellent results.

A study was done on physical fitness and physical activity in obese and non-obese youth. Physical fitness was assessed by the European physical fitness test battery and activity was assessed by modified version of Beacke questionnaire. They concluded that obese subjects had poorer performances in various tasks e.g sit up, bent arm, shuttle run, as compared to non- obese subjects and they had higher sport index than their obese counterparts.¹⁵

A study was done by Carmina N.G, Marshall D, Willows N on obesity, adiposity, physical fitness and activity levels in creechildren. objectives of the study were to describe the levels of obesity, adiposity, physical activity and fitness in cree children. The study concluded that there was a high prevalence of overweight in this

population with low physical activity and fitness levels.¹⁴

A study was done on effect of 2 year physical education program on physical activity and fitness in elementary school students. In which they evaluated health related physical education program for fourth and fifth grade students designed to increase physical activity during physical education classes. Result was found that physical education curriculum provides more physical activity during physical education classes.¹⁹

At the end in our study, we concluded that lower limb strength and lower limb endurance was found normal but flexibility, upper limb muscle strength and upper limb muscle endurance was poor among pre-obese women between the age of 40-59 years.

Conclusion

On the basis of this study, it was concluded that lower limb strength and lower limb endurance was found to be normal but flexibility, upper limb muscle strength and upper limb muscle endurance was poor among pre-obese women between the age of 40-59 years.

Authors Contribution:

Manali B. Badave: conducted literature review for this manuscript, developed introduction section of the manuscript together with the discussion of the study findings, collected data and analyzed the data. Dr.GVardharajulu: Provided a description of the background information and participated in preparation of manuscript.

Ethical Clearance: Ethical clearance was taken from institutional ethics committee of Krishna Institute of Medical Sciences deemed to be university, Karad.

Source of Funding: This study is funded by Krishna Institute of Medical Sciences Deemed to be University, Karad.

Conflict of Interest: The authors declare that there are no conflict of interest concerning the content of the present study.

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