



ASSESSMENT OF FUNCTIONAL CAPACITY AND OXYGEN SATURATION IN PHYSIOTHERAPY STUDENTS USING SIX MINUTE WALK TEST

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Abstract: There is an increased prevalence of overweight and obese undergraduate students which may be due to unhealthy dietary practices, decreased physical activity and sedentary lifestyle. This may further lead to decrease in their functional capacity and affect their overall health. This study was undertaken to identify physiotherapy students having reduced functional capacity and oxygen saturation. Six Minute Walk Test which included the measurements of Peak Expiratory Flow Rate, Oxygen Saturation and Rate of Perceived Exertion was done on a one to one basis. Body Mass Index, Waist Hip Ratio and Six Minute Walk Test of total 211 male and female physiotherapy students were assessed. Data was analyzed using descriptive analysis. Reduced Functional Capacity in students was identified and hence they were encouraged to adopt lifestyle modification with adequate physical activity on a regular basis.

Index Terms - Body Mass Index, Waist Hip Ratio, Functional Capacity, Oxygen Saturation

INTRODUCTION

Studies among the universities in the developing and the developed countries show an increased prevalence of threefold increase in overweight and obese students where stress is an important contributing factor which leads to irregular diet, lack of exercises, addiction etc.; which leads to obesity ^[1], ^[2]. Sedentary behavior and less of physical activity have influence on weight and overall health of students ^[3]. Prevalence of being overweight and obese was seen more in male than female students and that may lead to chronic diseases such as Type 2 Diabetes Mellitus, cardiovascular diseases etc. ^[4]. Body Mass Index Is convenient rule of thumb used to broadly categorize a person as underweight, normal, overweight and obese ^[5]. It was observed that the oxygen saturation is altered in obese individuals, especially with Body Mass Index more than 30 even after mild walking. ^[6] The effect of Body Mass Index less than 18.5 had higher incidence of Cardiovascular Disease than people who had normal Body Mass Index; being underweight was associated with increased risk of Cardiovascular Diseases, as was being overweight and obese ^[7].

Six Minute Walk Test is a self-paced test assessing sub-maximal exercise capacity of an individual which is an indirect assessment of the functional capacity and cardio-respiratory status ^[8]. Distance walked during Six Minute Walk Test is significantly correlated with age, gender and Body Mass Index ^[9]. Six Minute Walk Test is reproducible in overweight, obese subjects; it can be used to evaluate their cardiovascular function. Distance walked by normal individual is found to be significantly higher as compared to obese individuals due to many reasons such as reduced muscle strength and higher fat mass which puts increased load on joints, as well as from skin friction rubbing of obese limbs as compared to normal weight subjects ^[10]. It is seen that the presence of adipose tissue around the rib cage, abdomen and in the visceral cavity loads the chest wall and reduces functional residual capacity and their breath holding capacity. The reduction in Functional Residual Capacity and in expiratory reserve volume is detectable, even at a slight increase in weight ^[3], ^[11]. Increase in Body Mass Index leads to decrease in Six Minute walk test as seen due to increase in work of breathing and decreased respiratory compliance leading to further complications ^[12]. Increased Body Mass Index has a co-relation with Peak Expiratory Flow Rate where the Peak Expiratory Flow Rate of females is greatly reduced as compared to the males of same age ^[13]. Young individuals with Cardio Metabolic Risk clustering had a lower cardio respiratory fitness, as assessed by Six Minute Walk Test, compared to those without Cardio Metabolic Clustering. A poor performance in Six Minute Walk Test may be considered as an additional trait of Cardio Metabolic Clustering in obese youth. The Six Minute Walk Test may represent a valuable, simple, easy and feasible test to estimate the cardiorespiratory fitness in youth who are overweight and obese ^[14].

In healthy subjects, Six Minute Walk Test ranges from 400-700 meters, main predictor variables being gender, age and height [15]. Six Minute Walk Test varies even among healthy individuals [16]. Six Minute Walk Test information is vital to allow physical therapists to design exercises that match the patient's interest and physical abilities and to allow safe and successful participation in these activities [5]. Six Minute Walk Test has also been used to detect changes following interventions to improve exercise tolerance in healthy individuals, to assess fitness level, used as an intervention to improve walking endurance and predictor of objectively measured aerobic fitness in healthy adults [17]. It is well established that the Six Minute Walk Test is widely used to measure the performance in various chronic conditions such as Chronic Obstructive Pulmonary Disease, Diabetes Mellitus, arthritis, frail patients and overweight and obese individuals [9, 18]

Through this survey is carried out to assess the changes seen in the functional capacity and oxygen saturation of the undergraduate physiotherapy students using Six Minute Walk Test.

NEED FOR STUDY

The study is done to assess the changes in the functional capacity and oxygen saturation in the undergraduate physiotherapy students of Tilak Maharashtra Vidyapeeth's Lokmanya Tilak College of Physiotherapy (LTCOP).

The undergraduate students who have academic work, exam stress, prolonged sitting and attending online lectures have sedentary lifestyle with improper diet which can lead to reduction in their functional capacity, oxygen saturation and can alter their Six Minute Walk Distance.

This study will help to identify students who have reduced functional capacity and Oxygen saturation, who are at high health risk to have progression in their symptoms due to deconditioning and decreased activity levels.

Implementing lifestyle modification like changes in diet plan, increase physical activity and counseling can further help these students.

REVIEW OF LITERATURE

- A Study by Hina Vaish, Princi Anchal and Akash Verma on 'Six minute walk distance and six minute walk work in normal weight and obese young adults' reported significant differences in 6MWD between normal weight and obese subjects where the overweight and obese students performed poorly in the test with reduced 6MWD.
- A study by Cheryl m salmoneet al. J ApplPhysiol on Physiology of obesity and effects on lung function reported the presence of adipose tissue around the rib cage and abdomen and in the visceral cavity loads the chest wall and reduces functional residual capacity (FRC). The reduction in FRC and in expiratory reserve volume is detectable, even at a slight increase in weight.
- A study by Augusto dos Santos Bittencourt^{1, 2}, Pedro Arthur Silva Vieira^{1,2}, Maykeane Cristina Catarino Ferreira¹, Lucas Lage Primo¹, Thamyres Nara Deiró¹, Patrick Roberto Avelino^{2,3}, Kênia Kiefer Parreiras de Menezes^{1,2,3}, Susan Martins Lage^{1,3} and Henrique Silveira Costa^{1,2,4*} on The Impact of Overweight on Flexibility and Functional Capacity stated that there is a reduction in the oxygen saturation in the overweight population.
- A study by Paolo Capodaglio et al. DisabilRehabil. On Reference values for the 6-Min Walking Test in obese subjects stated that distance walked during the 6MWT was significantly correlated to age, gender and BMI.
- A study by Alfredo Chetta, Andrea Zaninib, Giovanna Pisic, Marina Aielloa, Panagiota Tzania, Margherita Nerib, Dario Olivieria. on Reference values for the 6-min walk test in healthy subjects 20–50 years old mentioned six minute walk distance in normal individuals

AIM

To study functional capacity and Oxygen saturation using 6MWT in undergraduate physiotherapy students

OBJECTIVES

- To identify undergraduate physiotherapy students who have reduced Six Minute Walk Test.
- To assess functional capacity and Oxygen saturation in undergraduate physiotherapy students.

METHODOLOGY

Study Design : Cross Sectional Survey

Sampling Method : Purposive Sampling Technique

Sample Size : 211 undergraduate physiotherapy students

Study Setup : Tilak Maharashtra Vidyapeeth's Lokmanya Tilak College of Physiotherapy, Kharghar, Navi Mumbai

Inclusion Criteria: 1) Male and Female Undergraduate Physiotherapy Students

2) Age: 18 – 25 years

Exclusion Criteria : 1) Diagnosed Cases Of Diabetes Mellitus, Hypertension, Congestive Heart Disease, Joint Pain, fractures, neurological disorders, etc.

2) Diagnosed cases of COVID-19

Materials : consent form, information sheet, measuring tape, weighing scale, height measuring scale, stop watch, two small cones to mark turn around points during 6MWT, a chair, 6MWT worksheet, digital sphygmomanometer, pulse oximeter, Modified Borg Dyspnea scale, Asia Pacific BMI Scale, Oxygen saturation Scale

Outcome Measures:

- Modified Borg Dyspnea Scale [Reliability – ICC 0.82 (95% CI 0.77, 0.86)]
- Asia Pacific BMI Classification [Validity– sensitivity– 67%, specificity- 54]
- Oxygen saturation scale [Reliability – ICC 0.93]
- PEFR [Reliability – 95%, CI: - 12.37 - 7.48]

PROCEDURE

- Ethical clearance was obtained from the institutional ethics committee of Tilak Maharashtra Vidyapeeth's Lokmanya Tilak College of Physiotherapy, Kharghar.
- The purpose and procedure of the study was explained to the students and informed consent was taken.
- Demographic data including the anthropometric factors such as body mass index and waist hip ratio measurement were taken
- Six Minute Walk Test was performed on the basis of American Thoracic Society guidelines.
- The data collected was statistically analyzed and the results were found.

DATA ANALYSIS AND RESULT

Descriptive statistics was used to summarize the data collected in simple numerical form using MS Excel.

The data collected was statistically analyzed and presented in the form of pie charts and bar diagrams.

Total of 211 responses were collected from physiotherapy students of 1st year, 2nd year, 3rd year, 4th year and interns

Figure 1

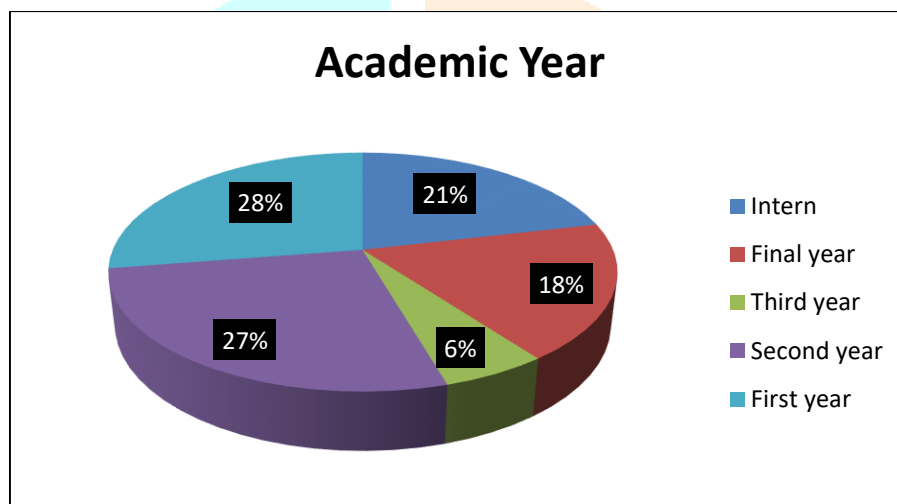


Figure1: Illustrates academic year of students, all the physiotherapy students at Tilak Maharashtra Vidyapeeth Trust's Lokmanya Tilak College of Physiotherapy that have participated in the study where 28% are First year students, 27% are second year students, 6% are third year students, 18% are final year students and 21% are interns.

Figure 2

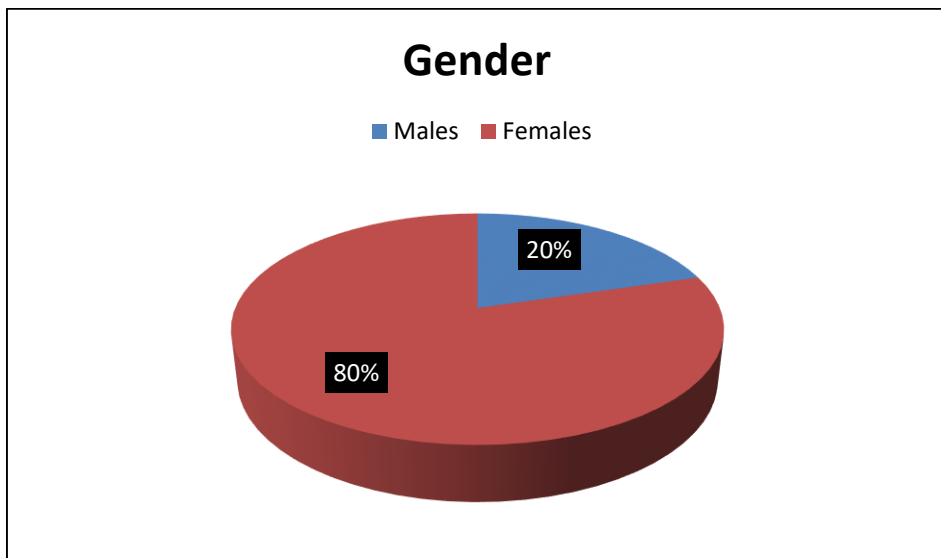


Figure 2: Illustrates that male population is 20% and female population is 80

Figure 3 (a)

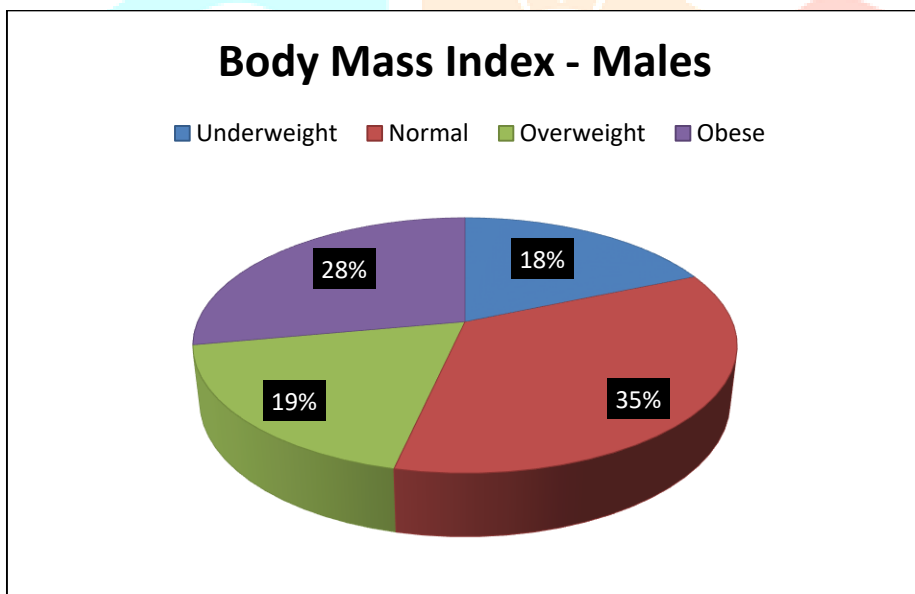


Figure 3(a): Illustrates that 18% males were underweight, 35% were normal, 19% were overweight and 28% were obese.

Figure 3 (b)

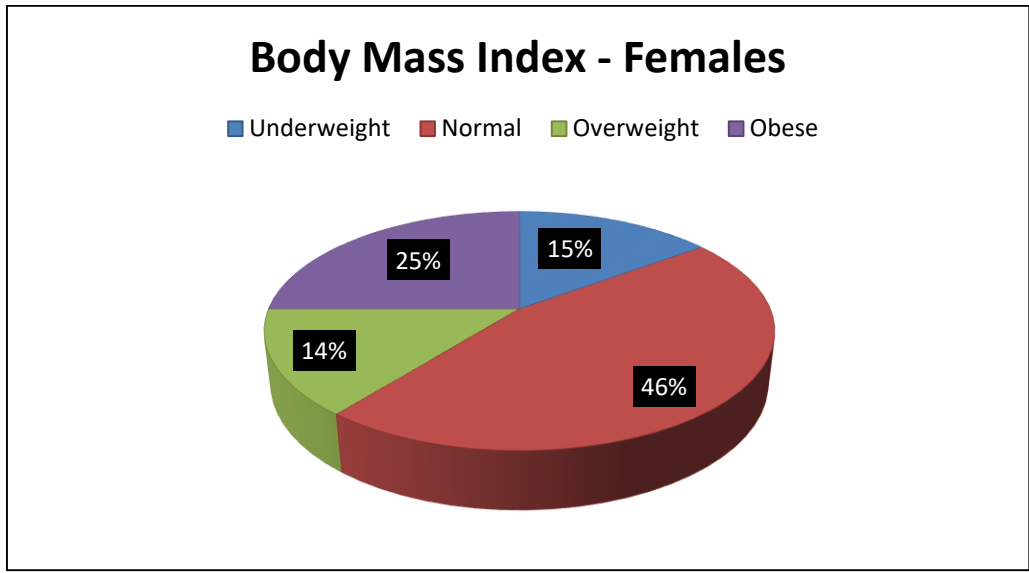


Figure 3(b): Illustrates that 25% males were underweight, 46% were normal, 14% were overweight and 25% were obese.

Figure 4 (a)

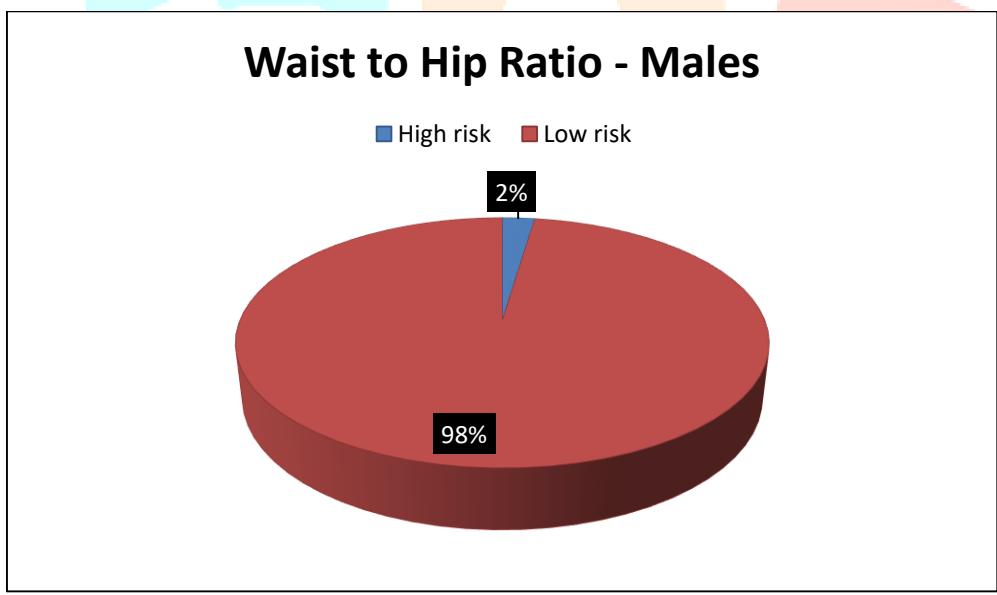


Figure4 (a): Illustrates 2% male participants have a high health risk and 98% of male participants have a low health risk.

Figure 4 (b)

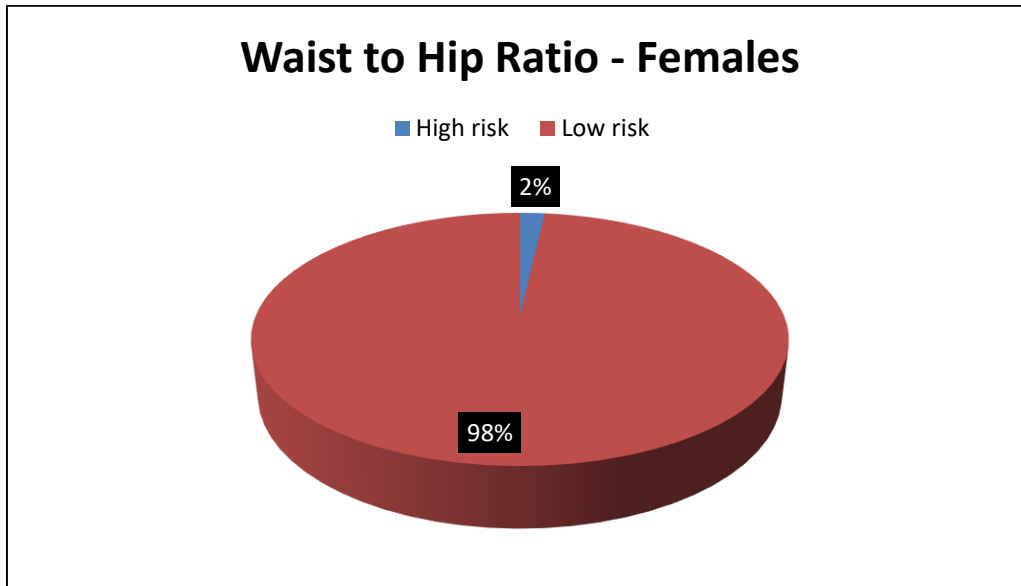


Figure4 (b): Illustrates 2% female participants have a high health risk and 98% of female participants have a low health risk.

Figure 5 (a)

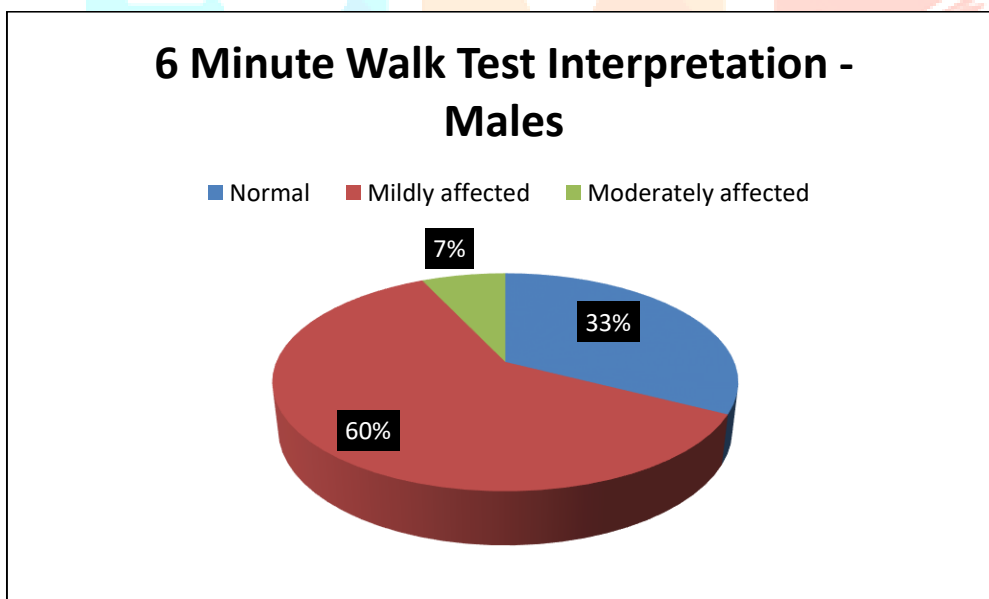


Figure 5(a): Illustrates Six Minute Walk Test interpretation in males where 33% are normal, 60% are mildly affected and 7% are moderately affected.

Figure 5 (b)

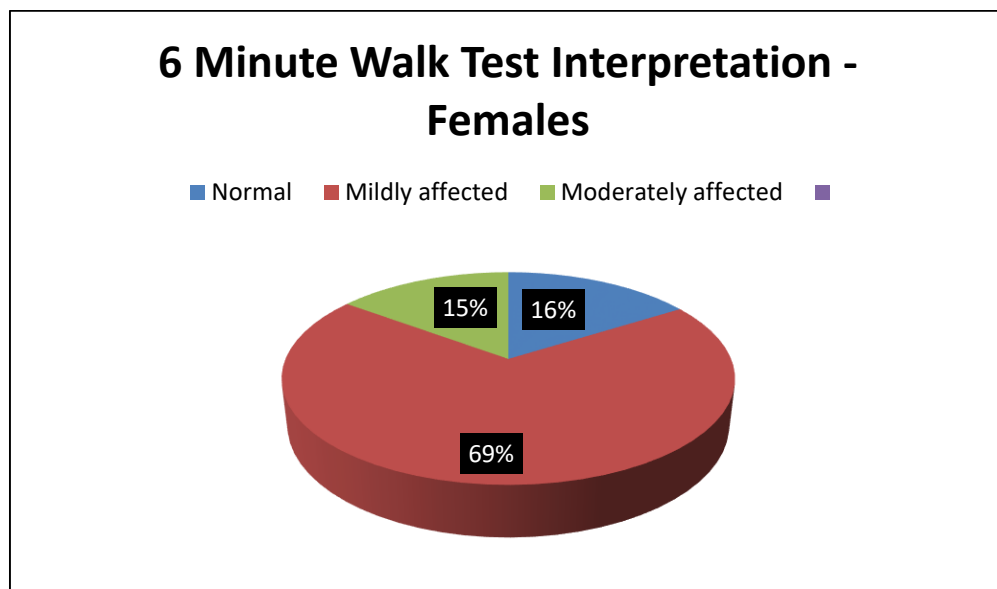


Figure 5(a): Illustrates Six Minute Walk Test interpretation in females where 16% are normal, 69% are mildly affected and 15% are moderately affected.

Figure 6 (a)

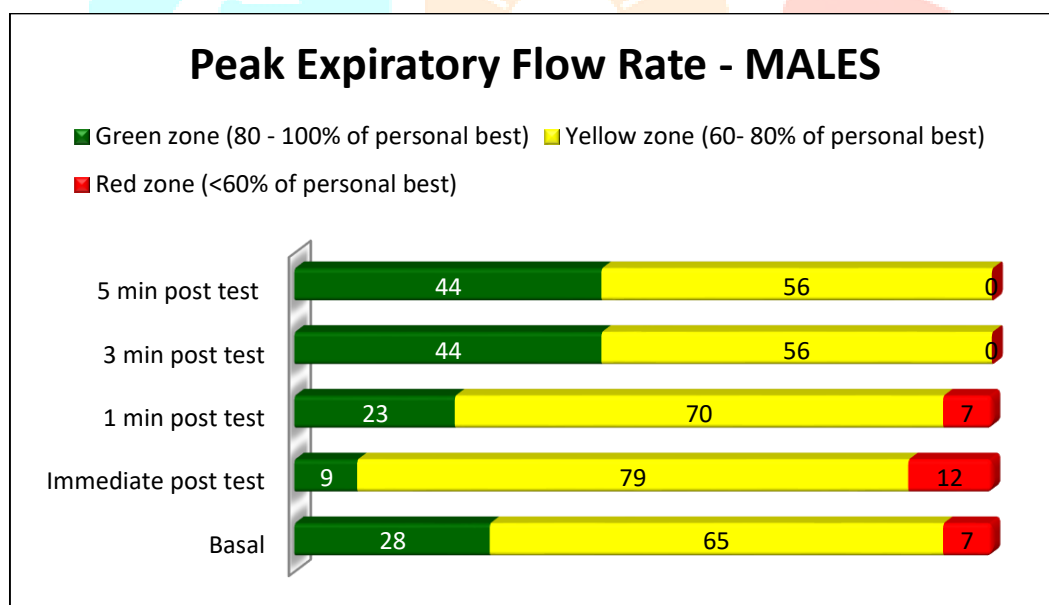


Figure 6 (a): Illustrates PEFR of all male participants where green zone represents PEFR 80 – 100% of personal best, yellow zone represents PEFR 60 - 80% of personal best and red zone represents PEFR <60% of personal best.

In the basal parameters, 28% male participants fall in the green zone, 65% fall in the yellow zone and 7% fall in the red zone. Immediate post-test parameters, 9% male participants fall in the green zone, 79% fall in the yellow zone and 12% fall in the red zone. In the 1 minute post-test parameters, 23% male participants fall in the green zone, 70% fall in the yellow zone and 7% fall in the red zone. In the 3 minute post-test parameters, 44% male participants fall in the green zone and 56% fall in the yellow zone. In the 5 minute post-test parameters, 44% male participants fall in the green zone and 56% fall in the yellow zone.

Figure 6 (b)

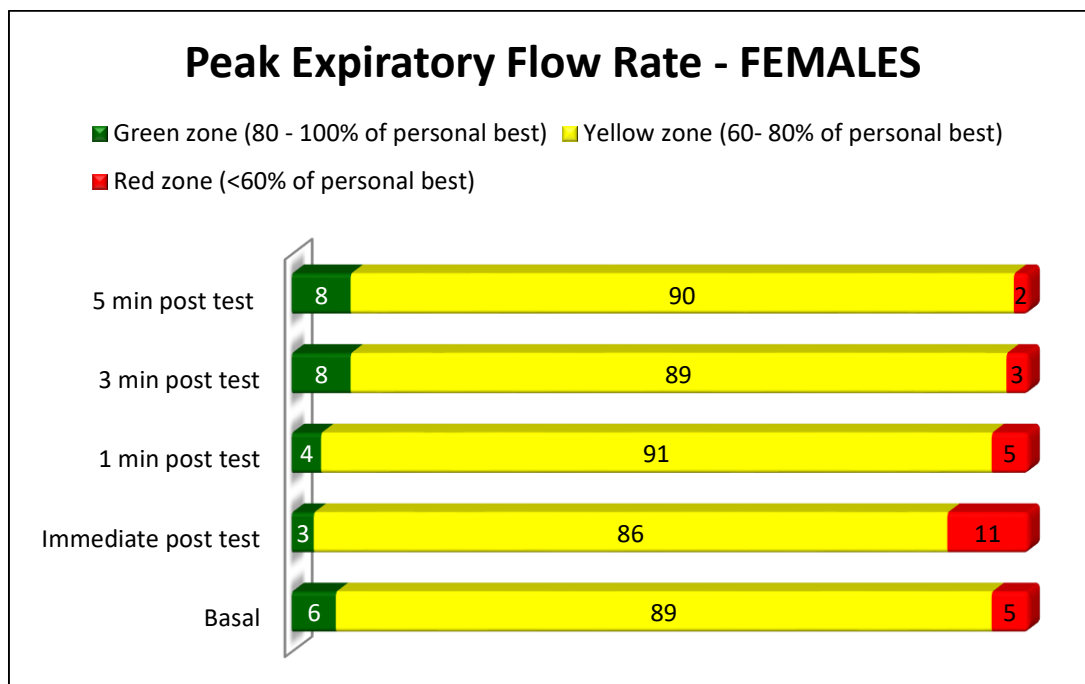


Figure 6 (b): Illustrates PEFR of all female participants where green zone represents PEFR 80 – 100% of personal best, yellow zone represents PEFR 60 - 80% of personal best and red zone represents PEFR <60% of personal best.

In the basal parameters, 6% female participants fall in the green zone, 89% fall in the yellow zone and 5% fall in the red zone. Immediate post-test parameters, 3% female participants fall in the green zone, 86% fall in the yellow zone and 11% fall in the red zone. In the 1 minute post-test parameters, 4% female participants fall in the green zone, 91% fall in the yellow zone and 5% fall in the red zone. In the 3 minute post-test parameters, 8% female participants fall in the green zone and 89% fall in the yellow zone and 3% fall in the red zone. In the 5 minute post-test parameters, 8% female participants fall in the green zone and 90% fall in the yellow zone and 2% fall in the red zone.

The analysis of Six Minute Walk Test in male and female physiotherapy students showed that majority of students are mildly affected which is related to the anthropometric factors mentioned in our study.

DISCUSSION

The study is done to assess the functional capacity and oxygen saturation in undergraduate physiotherapy students using Six Minute Walk Test. The Six Minute Walk Test was performed under the reference of ATS guidelines.

According to the results of the study the Six Minute Walk Test of majority of students was mildly affected and few percent of students were moderately affected which depicts that functional capacity of most of students is moderately reduced.

The anthropometric measures of every student such as height, weight, Body mass index, Waist hip ratio were taken to understand whether these measures have any influence on Six Minute Walk Test. Also the students were asked whether they have a current history of smoking. It was found that the total of overweight and obese students' percentage is more compared to students with normal Body mass index which may be due to decreased physical activity level which lead to altered Six Minute Walk Test ^[19].

It is observed that the Peak Expiratory Flow Rate of females is greatly reduced as compared to the males of same age which may be due to the pattern of fat distribution; also the obese population show decreased functional capacity as compared to the people with normal Body Mass Index ^[12]. It was also found that there was no remarkable change in the oxygen saturation during the test. Previous studies have found that the functional capacity and breath holding test in overweight and obese students has reduced irrespective of their age and gender. ^[3]

The present study analyzed the functional capacity of students in a specific institute with factors influencing the Six Minute Walk Test. Majority of students have reduced functional capacity. Sedentary lifestyle can be one of the reasons that contribute to reduced functional capacity in overweight and obese individuals ^[20]

The study showed various factors affecting the Six Minute Walk Test in Tilak Maharashtra Vidyapeeth Trust's Lokmanya Tilak College of Physiotherapy students.

CLINICAL IMPLICATIONS

Students can be made aware regarding the risk factors such as altered Body Mass Index, smoking, unhealthy lifestyle, etc. can have negative influence on their functional capacity. Healthy lifestyle, proper diet and adequate amount of physical activity can be inculcated in the students.

FUTURE SCOPE OF STUDY

- Further studies can be carried out on different students, age groups and region so that results can be generalized throughout.
- Same study can be continued with different sample so that the reliability of the results obtained can be established.

CONCLUSION

It can be concluded that the functional capacity of physiotherapy students is decreased. Majority of students have mildly affected Six Minute Walk Test. There was no remarkable difference in the students' oxygen saturation pre and post-test.

LIMITATIONS

- All the participants were physiotherapy students from one institute with sample size of 211 students with specific age group having more bias towards female students and do not represent the total student population; therefore results cannot be generalized to other student population.
- Since the study was a survey study, cause and effect relationship cannot be determined and the results therefore somewhat limited.
- Information regarding smoking habit was self-reported and therefore was subject to bias

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