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A cross-sectional survey study on breath holding capacity in undergraduate physiotherapy students

Sumedh Mohan Komurlekar[1], Sabina Salim Kazi Hakim[2], Shweta Satish Devare Phadke[3], Pranati Tilak[4]
[1] Intern, TMV's Lokmanya Tilak College of Physiotherapy, Kharghar, Navi Mumbai, Maharashtra, India
[2] Assistant Professor, TMV's Lokmanya Tilak College of Physiotherapy, Kharghar, Navi Mumbai, Maharashtra, India
[3] Professor and Principal, TMV's Lokmanya Tilak College of Physiotherapy, Kharghar, Navi Mumbai, Maharashtra, India
[4] Director, Tilak Maharashtra Vidyapeeth, Kharghar Campus, Pune, Maharashtra, India

Abstract
Students nowadays have online studies due to Covid 19 pandemic which leads to, less of physical activities and sedentary behavior that impacts their overall health. Functional capacity of students has decreased due to increase weight, less activity level and smoking as seen in various studies. This study was undertaken to assess and identify physiotherapy students having reduce breath holding capacity. One to one survey was conducted that included Body Mass Index, Wait-Hip Ratio and Breath holding test of total 198 physiotherapy students using convenience sampling. The breath holding capacity of all physiotherapy students was studied. Data was analyzed using descriptive analysis. Reduced breath holding capacity in students was identified and they were encouraged for life style modification and physical activity regularly for improving their functional capacity.

Keywords: smoking, body mass index, waist hip ratio, functional capacity, breath holding capacity

Introduction

It has been seen by various studies that increased weight, decreased activity levels, smoking etc causes altered breath holding capacity, students now a days having more online studies and decreased activities can be prone to reduced functional capacity which affects the breath holding test.

Students with sedentary behaviour and less of physical activity have influence on weight and overall health. Higher physical activity levels are associated with lower health risk. There is evidence that excessive participation in sedentary behaviour such as watching television, computer use and siting for work/study purposes is associated with high risk of obesity, independent of diet and physical activity behaviour.(1) During COVID 19 pandemic there was increase in sitting time more in students attending online lectures, completing assignments etc. from home has increased sedentary behaviour.

Major epidemic of overweight and obese patients suffering with respiratory symptoms is noticed recently.(2) Increase in weight has overall impact on lung function and causes substantial changes in mechanics of lung and chest wall. The changes can lead to symptoms such as dyspnea, wheeze and airway resistance. Excess adiposity can increase production of inflammatory cytokines and immune cells which may also lead to respiratory diseases [3].

Obesity is a major problem in adult population. several studies reported a reduction in lung volumes and capacity in overweight and obese individual when compared with non-obese individual [4]. Changes in respiratory physiology is due to fat accumulation with impairments of various lung parameters. Different pattern of body fat distribution also affects negatively over functioning of respiratory system [5]. Low physical activity is associate with obesity and low lung function. Obese individuals have decreased functional capacity and increased dyspnea which affects their physical activity levels [6].

Studies suggest that comorbid factors like smoking and obesity are leading cause of deaths. The tobacco smoke contains potentially noxious substances and are carcinogens [7]. Smoking causes inflammatory changes in airways, lung function and also lowers body weight .the individuals continue to smoke rather than quit in order to lower weight. Weight concerns amongst adolescents increase the likelihood of initiating smoking [8]. There is evidence of low body mass index in smokers due to nicotine effect on adipose tissue which increases body expenditure. There is a behavioural alternative to eating in smokers as it decreases the food intake [9].

The respiration can be voluntary inhibited but overridden by voluntary control. The point at which breathing can no longer be inhibited is known as the breaking point as there is rise in arterial PCO2 and fall in PO2. This breaking point is the duration measured in breath holding of an individual [10].

It is seen that 45-55 sec is the normal breath holding time in adult individuals [11]. This may be reduced in overweight and obese individuals due to their sedentary lifestyle. Studies over breath holding time in normal and healthy individual can also be used for measuring central ventilatory response [12].
The current study is to check the effect of change in body mass index by assessing breath holding test in undergraduate physiotherapy students. To assess that undergraduate physiotherapy students who have academic anxiety, exam stress, prolong sitting , attending online lectures have reduce active lifestyle which has lead to increase in weight that has effect on functional capacity [13]. This study will help to assess the functional capacity of students who are at high health risk and can have progression in their symptoms. implementing lifestyle modification like change in diet plan, encouraging physical activity and counselling has shown reduction in weight and improving functional capacity in students.

Need of study
The study is done to assess the breath holding capacity in undergraduate physiotherapy students by using breath holding test. The study is done to identify students with reduced breath holding capacity and to understand influence of anthropometric measures on breath holding capacity.

Aim
To study breath holding capacity in undergraduate physiotherapy students of TMV's Lokmanya Tilak College of Physiotherapy, Kharghar, Navi Mumbai.

Objective
1. To identify students who have reduce breath holding capacity.
2. To assess functional capacity in undergraduate physiotherapy students using breath holding test.

2. Methods and materials
Inclusion criteria
1st, 2nd, 3rd, 4th year and interns
18-25 years age group
Both males and females

Exclusion criteria
Diseases and deformities involving the cardiovascular and respiratory system.

Outcome Measures
Asia Pacific scale: Validity: sensitivity- 67% specificity- 54%
Waist Hip ratio: High test-retest reliability (ICC - 0.87) Sabrasez Breath Holding test: High test reliability (ICC - 0.93)

Procedure
1. Ethical clearance was obtained from the institutional ethics committee of TMV's Lokmanya Tilak College of Physiotherapy, Kharghar.
2. The purpose and procedure of the study was explained to the students and informed consent was taken.
3. Demographic data including the anthropometric factors such as body mass index and waist hip ratio measurement were taken.
4. Breath holding capacity of students was assessed using Sabrasez breath holding test.
5. The data collected was statistically analysed and the result were found.

Data analysis results
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 donut charts.
Total of 198 responses were collected from physiotherapy students of 1st yr, 2nd yr, 3rd yr, 4thyr and interns

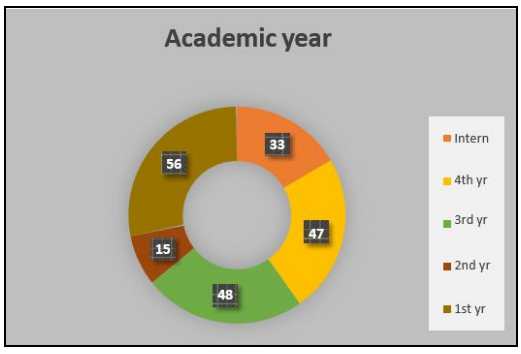


Chart 1: Illustrates academic year of students, all the physiotherapy students at Tilak Maharashtra Vidyapeeth's Lokmanya Tilak College of Physiotherapy have participated in the study.

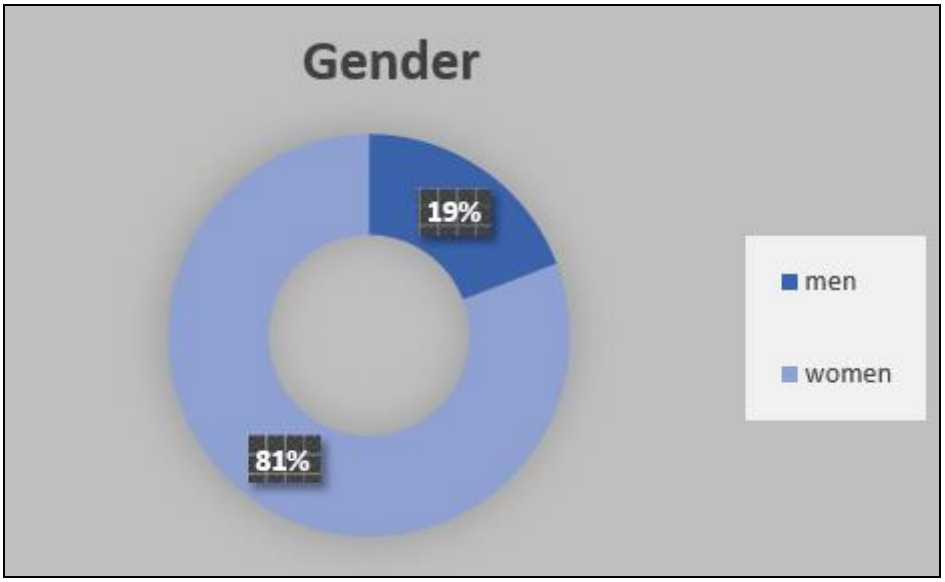


Chart 2: It shows that men participants were less compared to women participants.

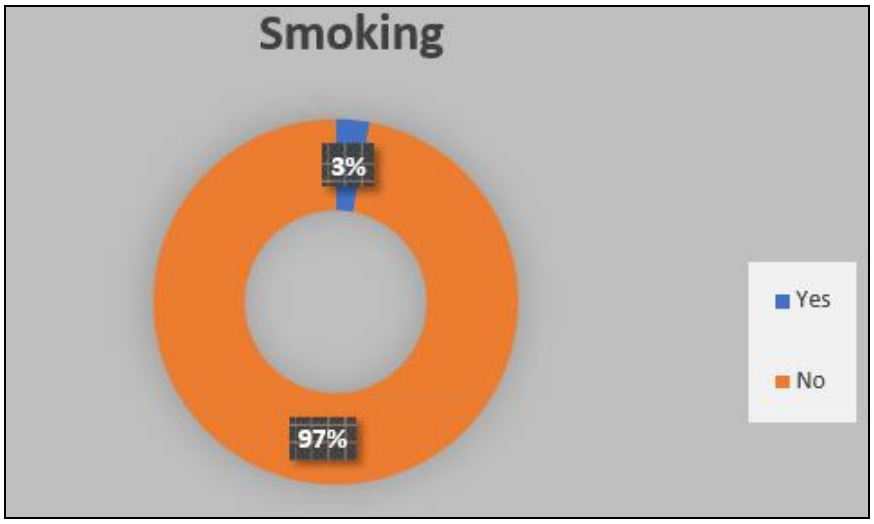


Chart 3: Shows that there are only a few students who smoke.

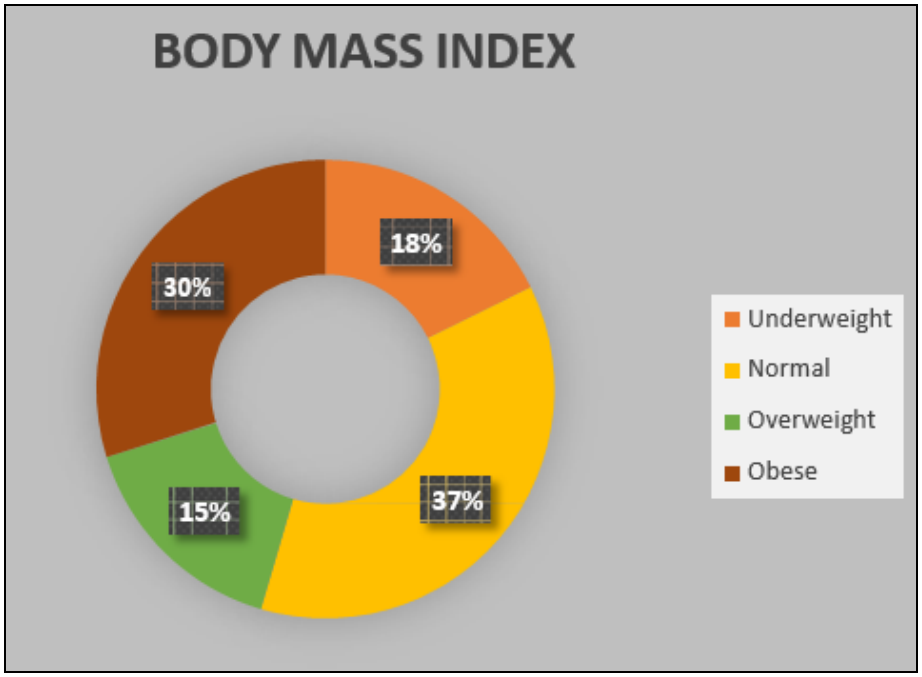
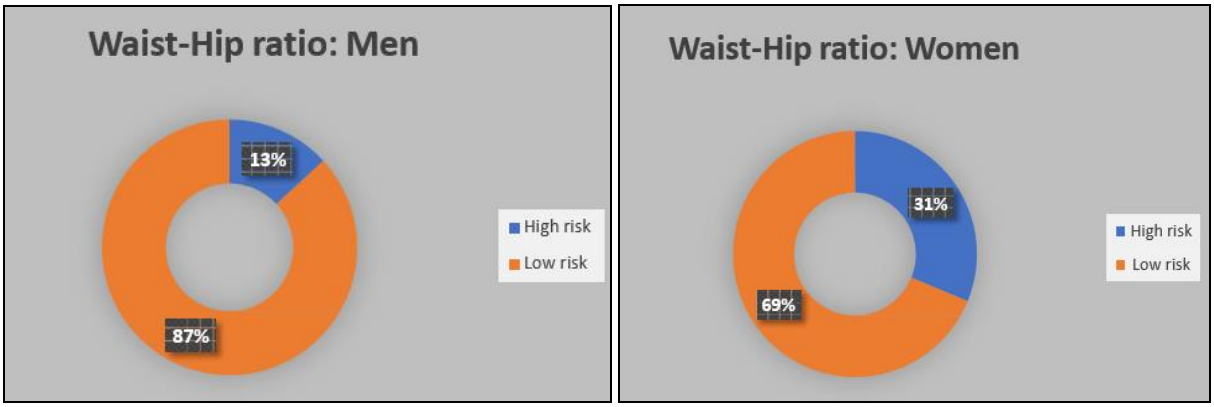


Chart 4: It depicts that 18% were underweight, 37% were normal, 15% were overweight and 30% were obese

It showed that majority of students were overweight and obese due to online studies which lead to decreased physical work.



(a) (b)

Chart 5: (a) In men 13% participants have high health risk and 87% having low health risk. (b) In women 31% have high health risk and 69% having low health risk.

It shows that, the risk of having health issues were moderate in men as well as women.

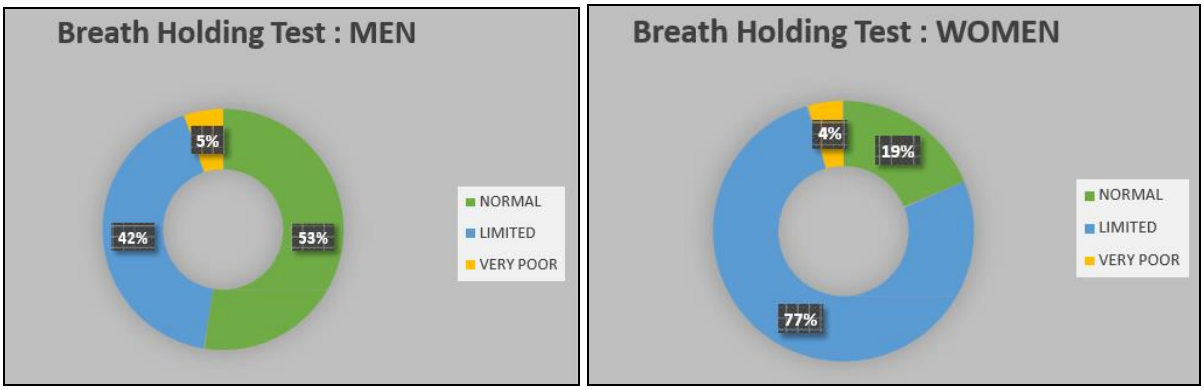


Chart 6: (a) In men it is seen that 53% have normal, 42% have limited and 5% have very poor breath holding capacity. (b) In women it is seen that 19% have normal , 77% have limited and 4% have very poor breath holding capacity.

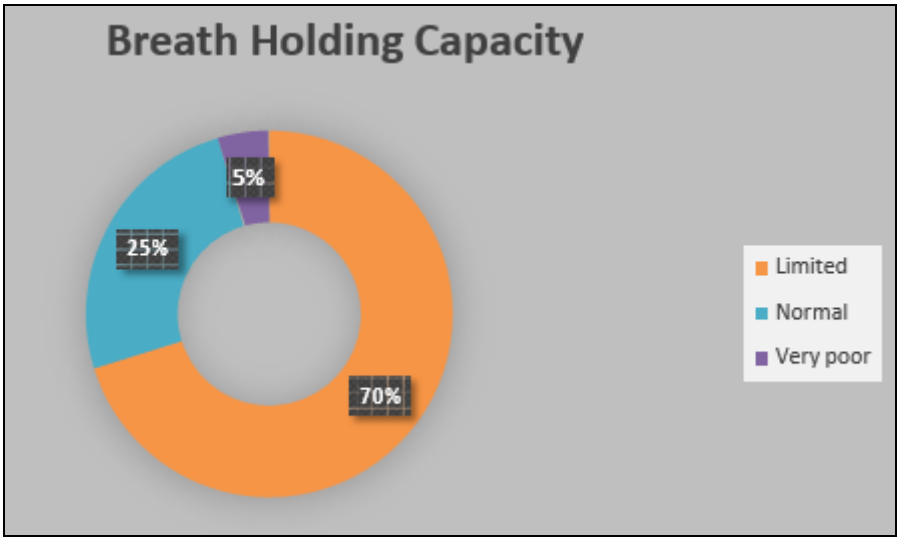


Chart 7: It is seen that among all the students, 70% students have limited breath holding capacity, 25% students have normal breath holding capacity and 5% have very poor breath holding capacity.

The analysis of breath holding test in men and women showed that majority of student have reduced breath holding capacity which is related to the anthropometric factors mentioned in our study.

Interprtation of result

198 students participated in the study. The age of the participants was between 18 and 25. Out of 198 participants, 159(81%) were female and 39(19%) were male. among all the students , 70% students have limited breath holding capacity, 25% students have normal breath holding capacity and 5% have very poor breath holding capacity. The analysis of breath holding test in men and women showed that majority of student have reduced breath holding capacity This cross-sectional study demonstrated that a remarkable number of physiotherapy students had decreased breath holding capacity.

Discussion

The study is done to assess the functional capacity in undergraduate physiotherapy students using breath holding test . The breath holding test used here is Sabrasez breath holding test, in which the student is in sitting position and asked to take a full but not too deep breath and hold as long as possible simultaneously therapist holding stop watch recorded the time. According to the results of the study the breath holding time of majority of students were limited and few percent of students had very poor breath holding time which depicts that functional capacity of most of students is moderately reduced.

The anthropometric measures of every students such as height, weight , Body mass index , Waist hip ratio were taken to understand whether these measures have any influence on breath holding holding time. Also the students were asked whether they have history of currently 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 decrease physical activity level which lead to reduce breath holding capacity. Also some students were engaged in smoking which may have lead to decrease in lung capacity.

Previous studies have shown effect of being overweight and obese on the functional capacity of an individual. Studies have also found that the breath holding capacities in overweight and obese student have reduced irrespective of their age and gender.

The present study analysed the breath holding capacity of students in a specific institute with factors influencing the breath holding time. Majority of students have reduced functional capacity which is observed to be related to the anthropometric factors. Also the effect deconditioning during covid 19 pandemic may have reduce breath holding capacity. The factor of smoking was taken into consideration which may cause reduction in breath holding time. Students in overweight and obese category having reduced breath holding capacity can be one of reason due to their sedentary lifestyle.

The study showed various factors affecting the functional capacity using the breath holding test in TMV's Lokmanya Tilak College of Physiotherapy students.

Using the above information awareness can be created among students regarding the risk factors or how factors such as increased Body mass index, smoking have negative influence on their functional capacity and further students can be encourage to engage themselves into healthy lifestyle like proper diet and increase in physical activity.

Conclusion

It can be concluded that the breath holding capacity of physiotherapy students has decreased.

Majority of students have moderately decreased breath holding capacity.

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