ORIGINAL ARTICLE

VIMSJPT

EFFECTS OF OBESITY ON PEFR VALUE

[1]Rudalee Husale, [2]Dr. Abhijit Diwate(PhD) ,[3]Dr. Arijit Das

1. Intern, 2. Professor & HOD, 3. Asso. Professor, Department of Musculoskeletal Sciences, DVVPF,COPT,Ahmednagar

ABSTRACT

Background: Obesity has become one of the major health issues in India. The English word "Obesity"is derived from the Latin word "obesus" meaning fat or plump. Obese patients have decreased exercise capacity and increased dyspnoea, which influences the quality of life.Peak expiratory flow rate (PEFR) is the largest expiratory flow rate achieved with a maximally forced effort from a position of maximal inspiration. **Materials & Methodology:** Study Design: observational study design, Subjects were selected based on inclusion and exclusion criteria with purposive sampling technique. Subject with Obesity, (BMI ≥25and less than ≤29 overweight) were taken. A total of 30 subjects were included in the study. **Procedure:** After obtaining clearance from the ethical committee.The BMI was calculated using Queteletformula/index – BMI = Weight in kilograms / Height in m2. Assessment of Peak Expiratory Flow Rate (PEFR) was measured by using advanced computerized spirometer according to standard procedure. **Statistical Analysis:** The results were ana-lyzed by using the Spearman Rank correlation test, where the Statistical not significance was set at $p>0.05$. **Result:**The study shows no correlation between the body mass index and PEFR in obese students using the Spearman Rank correlation test, p-value obtained was 0.1766, which is statistically not significant. **Conclusion:**To determine the correlation between PEFR Value in obese Students.Thereby concluding that no effect of PEFR value in obese students. It also showed no Correlation between the body mass index and PEFR in obese students.

Keywords: PEFR, Obesity

Received 6th Dec 2019, Accepted 19th Dec 2019, Published 26h Dec 2019

CORRESPONDING AUTHOR

Miss Rudalee Husale

DVVPF'S College of Physiotherapy,

Ahmednagar. 414111

E-mail: – husalerudalee13@gmail.com

Phone No: +91 9766566036

INTRODUCTION

Obesity is a chronic medical disease [1]. According to WHO, overweight or obesity are defined as" abnormal or excessive fat accumulation that may impair health"[2]. The World Health Organization has described obesity as one of today's most neglected public health problems, affecting every region of the globe[3,].The WHO defines obesity as BMI higher than or equal to 30kg/m2.[4] The normal range of BMI is 18.5-24.9 kg/m2. The BMI was calculated using the Quetelet formula/index – BMI = Weight in kilograms / Height in m^2.[5]The national average of overweight adolescents in India is currently 19.9%, i.e., 1 in every 3 of them [6] Obesity is a significant risk factor for various non-communicable diseses such, cardio-pulmonarydiseases (mainly heart disease and stroke), which were the leading cause of death in 2012; type 2 diabetes [non-insulin dependent diabetes] [7].

Besides this, obese people are at increased risk of respiratory symptoms, such as breathlessness, particularly during exercise, even if they have no obvious respiratory illness [8]. The major respiratory complications of obesity include increased demand for ventilation, elevated work of breathing, respiratory muscle inefficiency and Reduced respiratory compliance [9].

This reduction in respiratory and chest wall compliance causes an increase in respiratory resistance [10]. To maintain the respiratory homeostasis, non-elastic work may have been performed by respiratory muscle and chest wall to overcome the air flow limitation and airway resistance. The airflow limitation and airway resistance are reportedly increased in patients with obesity [11]. Also, the obese men had reduced flow rates at 50% and 75% of exhaled vital capacity (VC); this shows expiratory muscle insufficiency in obese individuals [12]. This will result in a reduced peak expiratory flow rate (PEFR).Obese people are highly susceptible to Asthma, COPD, Pneumonia condition, resulting from impaired lung defence mechanism [13]

PEFR value can be measured by Wright's mini-Peak flow meter, which is a small, portable, convenient and inexpensive device.Peak expiratory flow rate (PEFR) is the largest expiratory flow rate achieved with a maximally forced effort from a position of maximal inspiration (American Thoracic Society, 1995). The peak flow meter is a useful instrument for monitoring PEFR in children and adults. It can be used to measure Peak Expiratory Flow Rate (PEFR) value and is an easy tool to assess lung function in field studies. PEFR values vary with various factors like age, sex, body surface area, obesity posture, physical activity and also the environment. The primary factors that affect PEFR are the strength of the expiratory muscles generating the force of contraction, the elastic recoil pressure of the lungs and the airway size.[14] The Peak expiratory flow rate for obese children is significantly lower than non-obese children even before physical exercise.

Peak expiratory flow (PEFR) helps to assess the airflow limitation through the airways and thus, help to determine the degree of obstruction in obese student and also to measure the lung functions.

As there are several research articles available regarding the effect of obesity on PEFR value in the adult population, but there is less evidence found regarding the effect of obesity on PEFR value in obese medical students. Hence this observational study aimed to find out the correlation between obesity and PEFR value.

MATERIALS AND METHODOLOGY

The study design was Observational. The study was conducted at Dr. VithalraoVikhePatil Memorial Hospital Ahmednagar. The total duration of the study was 6 Months. The sampling method used was purposive sampling. Total no. of sample size 30. Those patients satisfying the inclusion criteria with the age group of 18-25 years and BMI ≥25and less than ≤34.9 (Obese) were included for the study.

Exclusion criteria- Subjects who have longstanding pulmonary ailments, such as bronchial asthma from childhood. Acute respiratory infections within seven days of the studyRecurrent cough or Chest infection.

Ethical clearance was obtained from the Institute Ethical Committee, and informed consent was obtained from all the subjects after explaining the procedure thoroughly and giving the assurance that they could withdraw from the study whenever they wanted.

The weight of each participant, while wearing minimal clothing, was measured using electronic scales (Hanson, CHINA) to the accuracy nearest 0.1 kg. The standing height was measured using a wall-mounted stadiometer to the accuracy nearest 0.1 cm, while the participants' occiput, back, and bare heel were touching the stadiometer. The BMI was calculated using Quetelet formula/index – BMI = Weight in kilograms / Height in m2

Assessment of Peak Expiratory Flow Rate (PEFR): PEFR can be measured by Wright's mini-Peak flow meter, which is a small, portable, convenient and inexpensive device.Peak expiratory flow rate (PEFR) is the largest expiratory flow rate achieved with a maximally forced effort from a position of maximal inspiration (American Thoracic Society, 1995).The forced expiratory manoeuvre was demonstrated to all the participants.

1.Set the cursor to zero. Do not touch the cursor when breathing out.

2. Sit on a chair with back support and hold the peak flow meter horizontally in front of the mouth.

3.Take a deep breath in and close the lips firmly around the mouthpiece, making sure there is no air leak around the lips. And put the nose clip to prevent air leak.

4. Breath out as hard and as fast as possible.

5. Note the number indicated by the cursor.

6. Return cursor to zero and repeat this sequence twice more, thus obtaining three readings.

The highest or best reading of all three measurements is the peak flow at that time. The highest reading should be recorded in the patient's daily data collection form.

STATISTICAL ANALYSIS

Statistical analysis was performed using the SPSS software, version 16.0 (SPSS, Inc., Chicago, IL). Data were expressed as mean ± standard deviation (SD). The results were analyzed by using the Spearman Rank correlation test. Statistical not significance was set at P<0.1766.

RESULT

Table No.1 Baseline Characteristics

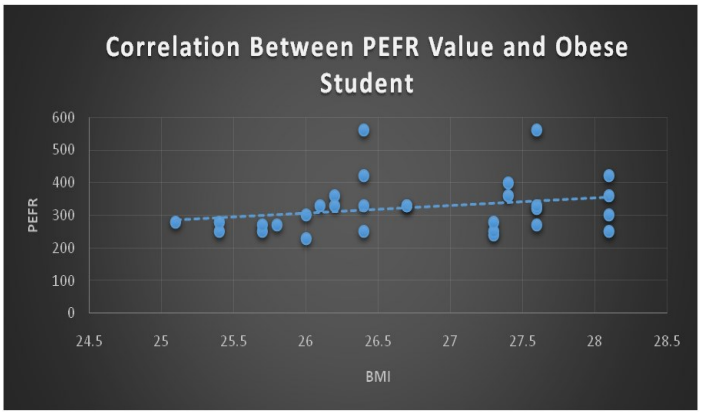
Characteristics	Mean ± SD
Age	21.1 ± 2.2
Male	16
Female	14
Weight	69.9 ±6.9
Height	154.4 ± 9.2
BMI	26.7 ± 0.91
PEFR	323.6± 82.7

Table no.2 Correlation Between PEFR Value and BMI

Outcome measurements	Mean ±SD	P value	R value
BMI	26.7 ± 0.91	0.1766	0.3283
PEFR	323.6± 82.7		

Correlation between the body mass index and PEFR in obese students using the Spearman Rank correlation test, the p-value obtained was 0.1766, which is statistically not significant.

Graph 1: Correlation Between PEFR Value and BMI



Graph no. 1 shows that there is no statistically significant difference between BMI and PEFR values in obese students.

DISCUSSION

The present research study is an observational study conducted on obese medical students. This study was aimed to find out the effect of obesity on PEFR value in obese students. All individuals were evaluated using body mass index [As per WHO guidelines], and PEFR values were obtained by using the peak expiratory flow meter.

The present study shows that there is no statistically significant between PEFR values in obese students.Spearman Rank correlation test-value obtained was 0.1766; therefore, the results found were not statistically significant.

Chaudhariprajakta et al (2016). stated in their studythere are many possible pathophyiogical mechanisms involved in the development and maintenance of obesity. In particular, apetite-related hormones act on the hypothalamus, a region of the brain central to the regulation of food intake and other adipose-derived hormones, adiponectin (a protein that is secreted by adipose tissue) levels decrease with increasing body mass index (BMI) and is thus lower in obese individuals.

Dr. NirupamaMoran (2016) studied the effect of BMI on PEFR in young adults. He stated in their study the obesity compress the thoracic cavity and restricted the diaphragmatic movement resulting in reduced vertical diameter of the thoracic cavity. These changes may reduce the compliance of the lungs and the thoracic cavity and increase the load on the respiratory muscles. This may end up with a reduction in lung volumes and flow rates, especially PEFR.

One of the similar research carried out by Lazarus,and Collins et al. found that there is no correlation between WHR and PEFR [12,13].Here, WHR was used as a measurement criterion to evaluate obesity instead of BMI. In contrast to these findings, YogeshSaxenaet al. (2010), and Chen et al.reported a significant negative correlation between WHR and Peak expiratory flow rates [PEFR][14]. The reason for this difference in results may be attributed to the group of the selected subjects. In the present study, we included the young adults in their post-adolescent age with mild grade 1obesity, whereas the other two studies included the older population and severe obesity.

Another research carried out by SaraswathiIlango et al. (2013), studied the Correlation of Obesity Indices with Peak Expiratory Flow Rate in Males and Females. Where their result showed thatthe PEFR was significantly lower in obese males ($p < 0.003$) but not in obese females ($p < 0.2$) when compared to their non-obese counterparts. And in males, PEFR was negatively correlated with BMI ($p < 0.002$, $r=0.470$) but not with WHR. In females, there was no correlation of PEFR with either BMI or WHR.

This may be because of the gender difference in fat distribution - males having a central distribution which may reduce compliance and PEFR whereas females having a peripheral distribution which may not affect the compliance and PEFR.[15]

In the present study, BMI and their peak expiratory flow rate (PEFR) values were being measured in obese students. PEFR measurement is very popular in primary care and is commonly applied as a quick screening method for assessing lung function in the clinic or at the bedside. It is an expiratory parameter that measures the calibre of the airways. It is a valuable tool in lung function studies for diagnosis, treatment and in epidemiological and occupational studies for identifying the presence of airflow limitation, assessing its severity and variation. PEFR is dependent upon several variables including airway resistance maximal voluntary muscular effort and the possible compressive effect of the manoeuvre on thoracic airways. Considering the value simplicity of the test, we decide to measure PEFR in the students to assess their lung functions.

Therefore, this study concluded there is no effect of PEFR value in obese students.

CONCLUSION

From the present study, we found that there is no correlation between the body mass index and PEFR in obese students. Therefore, the study concludes that there is no effect of obesity on PEFR value.

REFERENCES

1. Babu NP, Mini K. The correlation of fat mass and fat-free mass with peak expiratory flow rate in medical students of government medical college. THRISSUR. Journal of evolution of medical and dental sciences-jemds. 2017 Apr 24;6(33):2730-4.
2. Taksande A, Jain M, Vilhekar K, Chaturvedi P. Peak expiratory flow rate of rural school children from Wardha district, Maharashtra in India. World Journal of Pediatrics. 2008 Aug 1;4(3):211.
3. Saxena D, Kumar P. Prediction of peak expiratory flow rate from arm span in healthy children aged 8 to 12 years. International Journal of Biomedical Research. 2015;6(9):626.
4. Bora G, Sudhir GK, Swamy KN. Impact of exercise training on peak expiratory flow rate about body mass index- An Indian perspective. Indian Journal of Clinical Anatomy and Physiology. 2017;4 (1):34-9.
5. Das D. A Study of Correlation of Peak Expiratory Flow Rate with Body Mass Index in Healthy School Going Children. Journal of medical science and clinical research. 2017;5(8).
6. Goswami B, Roy AS, Dalui R, Bandyopadhyay A. Peak expiratory flow rate–a consistent marker of respiratory illness associated with childhood obesity. American Journal of Sports Science and Medicine. 2014 Feb 2;2(1):21-6.
7. Mishra J, Mishra S, Satpathy S, Manjareeka M, Nayak PK, Mohanty P. Variations in PEFR among males and females concerning anthropometric parameters. IOSR Journal of Dental and Medical Sciences (IOS JDMS). 2013;5:47-50.
8. Pramanik P, Kelley D, Ganguli I. Peak Expiratory Flow Rate in Respect to Anthropometric Parameters of Adolescent Boys and Girls from West Bengal, India. IOSR Journal of Dental and Medical Sciences. 2014;13(4):58-62.
9. Saraswathi I, Christy A, Saravanan A, Dr Prema S. Correlation of Obesity Indices with Peak Expiratory Flow Rate in Males and Females. IOSR Journal of Pharmacy. 2014.
10. Lazarus R, Sparrow D, Weiss ST. Effects of obesity and fat distribution on ventilatory function: the normative ageing study. Chest. 1997 Apr 1;111 (4):891-8.

11. Collins LC, Huberty PD, Walker JF, Fletcher EC, Peiris AN. The effect of body fat distribution on pulmonary function tests. Chest. 1995May1;107 (5):1298-302.
12. YogeshSaxena B. RashiUpmanyu. Adiposity: Determinant of Peak Expiratory Flow Rate in young Indian Adults Male. The Indian Journal of Chest Diseases & Allied Sciences. 2011;53.
13. Moran N. Study the effect of body mass index [BMI] on peak expiratory flow rate [PEFR] in 20-30 years age group. IOSR JDMS. 2015 Jul;14(7):86
14. Brand PL, Roorda RJ. The usefulness of monitoring lung function in asthma. Archives of disease in childhood. 2003 Nov 1;88(11):1021-5.
15. Jain P, Kavuru MS, Emerman CL, Ahmad M. Utility of peak expiratory flow monitoring. Chest. 1998 Sep 1;114(3):861-76.
16. Mohammadzadeh I, Gharagozlou M, Fatemi SA. Normal values of peak expiratory flow rate in children from the town of Babol, Iran. Iranian Journal of Allergy, Asthma and Immunology. 2006:195-8.
17. Vijayan VK, Kuppurao VK, Venkatesan P, Sankaran K, Prabhakar R. Pulmonary function in healthy young adult Indians in Madras. Thorax. 1990 Aug 1;45(8):611-5.

How to cite this article: Rudalee Husale, Dr. Abhijit Diwate, Arijit Das. **Effects of obesity on PEFR value.** VIMS J Physical Th. Dec 2019;1(2): 111-116.