Int. J Med. Pharm. Res.
E-ISSN: 2958-3683 | **P-ISSN**: 2958-3675
Available on: https://ijmpr.in/

International Journal of
Medical and Pharmaceutical Research

ORGINAL ARTICLE OPEN ACCESS

A Study Regarding the Influence of Gender and Parameters Like Weight, Height, Body Mass Index on Peak Expiratory Flow Rate in Young Healthy Population in Southern Assam

Dr Aparajita Chakraborty[1], Dr Jyotismita Deka[2]

[1] Assistant Professor, Department of Physiology, Silchar Medical College, Assam, India
[2] Professor and HOD, Department of Physiology. Silchar Medical College, Assam, India

OPEN ACCESS

*Corresponding Author:

Dr Aparajita Chakraborty
Assistant Professor,
Department of Physiology,
Silchar Medical College,
Assam, India

Received: 20-06-2025
Accepted: 05-07-2025
Available Online: 02-08-2025

A B S T R A C T

Background: Pulmonary function tests are done to access the changes in the respiratory system and its functions. PEFR is the maximal flow which is achieved during the expiration, which is delivered with maximal force. PEFR is considered as the simplest index of pulmonary function. Such study has not been conducted earlier in this region. Similar other prior studies gave varied results regarding influence of BMI and height, weight on PEFR readings.
Objective: to study the variation of PEFR with respect to the anthropometric parameters among males and females subjects of age group of 18-35 years.
Materials and Methods: this was a cross sectional study, conducted at Silchar Medical College, Department of Physiology, Assam, India. The ethical committee clearance was taken from Institutional Ethical Committee. The subjects with no cardio respiratory disease, non smokers or medicine users that can influence cardio respiratory function were added in the study. PEFR was measured with the subject seated comfortably during the same time of the day for all subjects. Instrument used was Schiller's Spirovit SP -1 spirometer. Height was recorded using stadiometer and weight was recorded using weighing machine
Results: Out of total subjects, 52% were males, 48% were females. PEFR was highly significant in males. For height 145-155 cm, PEFR is highly significant in males, for height 160-165 cm, PEFR is significantly high in males. Also PEFR is significantly higher in overweight males.
Conclusion: PEFR is higher in males than females subjects, in all age groups. The effect of height, age, weight, BMI on PEFR have all been discussed.

Keywords: PEFR, BMI, males, females.

INTRODUCTION

Major function of the respiratory system is gaseous exchange in between atmosphere and blood. The main process involved in the process are ventilation (movement of air in and out of lungs), distribution of ventilated gases into various lobes, segment lobules and diffusion of gases between the alveoli and plasma. Inspiration is an active process. Quiet expiration is passive.

PEFR is considered as the simplest index of pulmonary function. PEFR is defined by European Respiratory Society as the maximal flow which is achieved during the expiration, which is delivered with maximal force, starting from the level of maximal lung inflation, following the maximal inspiration which was expressed in liters/min. (1,2). The average PEFR of healthy Indian males and females are found to be around 500 and 350 litres/min respectively.(3)

Pulmonary function tests are done to access the changes in the respiratory system and its function. The tests are carried out by spirometer. Spirometers are noninvasive diagnostic instruments for screening and basic testing of lung function.

Peak expiratory flow (PEF) is the method used most commonly to monitor lung function it is an easy process. But PEFR is a measure of the large airway caliber.

The PEFR reaches a peak at about 18 -20 years, maintains its level up to 30 years in males and 34 years in females, then declines with age. 4

According to Asian classification, BMI of below 18 kg /m2 is underweight and 18 – 23.4 kg /m2 is considered normal. BMI of 23.5-27.4 kg /m2 is overweight and 27.5 kg/m2 is obese. 5

Several prior studies gave varied results regarding influence of BMI and height, weight on PEFR readings.

So, keeping in view all the above points and also that the reports on such comparative studies from this part of the country are not available, the present study is hereafter conducted to observe PEFR and its variation with respect to gender and anthropometric parameters among subjects of age group 18 to 35 years. Such study has not been done previously in our region.

AIM

The aim of the present study was to study the variation of PEFR with respect to anthropometric parameters among the male and female subjects of age group 18 to 35 years.

MATERIALS AND METHODS

75 healthy males and females were selected after obtaining informed consent which includes 39 Males and 36 females students from Silchar medical college and hospital, Assam. The study was conducted in the department of Physiology, SMCH, after obtaining ethical clearance from Institutional Ethical Committee.

Inclusion criteria :

1. No cardiac or respiratory disease.
2.non smokers
3.no intake of drugs altering cardiopulmonary efficiency.

Excusion criteria :-

1. Smokers
2.athletes

All the subjects were advised to have light breakfast in the morning. They were made to relax mentally and physically for about 15 minutes in comfortable clothing. Standard height (Ht) was recorded in centimeters using stadiometer. Weight (wt) was recorded in kilograms using weighing machine. BMI (body mass index) was derived by Quetlet's index from body weight in kilogram divided by square root of height in meters. BMI= body weight in kgs/ height in metre ^{2}.

PEFR was measured via Schiller's Spirovit SP 1 spirometer, with the subject comfortably seated in a time period 9 am to 11am to avoid diurnal variations. Instructions and method of carrying out the tests was demonstrated to all subjects individually.The subjects were asked to inspire deeply, and then blow into the instrument's mouthpiece with nostrils closed. Three readings were taken and the highest was considered.[6]

STATISTICAL ANALYSIS

The data was analyzed in Excel sheet (Microsoft Excel 2007) and are expressed in $Mean \pm SD$. Independent t-test was used to compare the PEFR, vital capacity, height and weight between male and female subjects.

RESULTS

The present study included 75 healthy medical students in the age group 17 to 24 years. 39 males and 36 females were enrolled in the study. The age of males and females were 21.6805 ± 4.5152 and 20.7820 ± 2.6576 and the BMI of males and females were
22.3263 ± 4.2473 and 21.9520 ± 3.4510 were respectively.

Table 1.

Parameter	Gender		p-value	Significance
	Male	Female		
Age	21.6805 ± 4.5152	20.7820 ± 2.6576	0.2926	NS
Height	166.9028 ± 6.2824	157.7564 ± 5.3186	0.0001	HS
Weight	60.8472 ± 9.6893	54.6410 ± 10.1371	0.0084	HS
BMI	22.3263 ± 4.2473	21.9520 ± 3.4510	0.6754	NS
PEFR	6.9605 ± 2.1306	5.1261 ± 1.8027	0.0001	HS

(HS- Highly Significant, S-Significant, NS-Not Significant)

In the table above, the p-values for Height, Weight and PEFR are highly significant in males whereas those for Age and BMI are not significant.

Table 2: PEFR in Males and Females with different Heights

Height (cms)	Number of PEFR				P-value	Significance
	Female	Male	Female	Male		
145-150	2	1	6.14+0.66	4.2+0	0.001	HS
150-155	7	1	5.06+1.98	5.19	0.001	HS
155-160	15	2	5.35+1.79	6.86+1.13	0.272739	NS
160-165	11	7	4.85+2.20	7.38+2.08	0.027509	S
165-170	2	11	4.795+.65	6.94+1.96	0.165162	NS
170-175	2	11	4.45+.77	7.06+2.64	0.206731	NS
175-180	0	3	0	7.22+2.30	-	

(HS- Highly Significant, S-Significant, NS-Not Significant)

The table above indicates that PEFR values for the height groups 145-150 cm and 150-155 cm are highly significant, whereas for the height groups 155-160, 165-170, and 170-175, they are not significant and in group 160-165cm group, it is significant.

Table 3: PEFR in Males and Females with different Weights

Weight	Females		Males			Significance
	Numbers	PEFR	Numbers	PEFR	p- values	
30-35	1	6.61 ± 0	0	0	-	
35-40	1	2.57 ± 0	0	0	-	

40-45	3	$6.21 \pm .85$	2	6.12 ± 2.72	0.956246	NS
45-50	9	4.90 ± 1.91	2	$5.7 \pm .72$	0.498878	NS
50-55	6	6.31 ± 2.54	4	7.1 ± 1.74	0.594569	NS
55-60	7	4.39 ± 1.69	8	6.25 ± 2.55	0.126126	NS
60-65	3	3.64 ± 0.645	6	8.12 ± 2.34	0.016285	NS
65-70	6	5.71 ± 1.96	8	6.48 ± 1.34	0.465933	NS
70-75	3	4.72 ± 1.10	4	7.37 ± 2.64	0.125791	NS
75-80	0	0	0	0	-	-
80-85	0	0	2	0	-	-

(HS- Highly Significant, S-Significant, NS-Not Significant)

The p values in the table above suggests that none of the groups' PEFR values for weights are significant i.e. all are non-significant.

Table 4: Comparison of PEFR between male and Female with BMI among young healthy subjects

BMI	PEFR Female	PEFR Male	p value	Significance
Underweight	5.23 ± 1.53	6.81 ± 1.77	0.115	NS
Normal	5.04 ± 2.06	6.59 ± 2.64	-	-
Overweight	5.29 ± 2.15	8.32 ± 2.09	0.024	S
Obese	0	10 ± 0	-	-

(HS- Highly Significant, S-Significant, NS-Not Significant)

The p-values from the comparison of PEFR between male and female subjects with BMI among young healthy individuals indicate that the BMI for underweight males and females is not significant, whereas for overweight male students, it is significant.

RESULTS

Out of total subjects, 52%were males and 48% were females. PEFR was found to be highly significant in males in entire height and weight range (table 1). Height and weight was significantly high in males, but age and BMI shows non significant changes between males and females. All the participants were of age group 18-35years. It is 21.6$\pm$4.5 and 20.6$\pm$2.6 respectively of males and females.(table 1)

The PEFR values of males and females are tabulated in different groups according to their heights and weights, as per height, in table 2, as per weight in table 3.
In table 2, here the PEFR for height 145 to 150cm and 150 to 155 cm are highly significant in males and for height 160 to 165 cm, it is significant.

In table 3, PEFR doesn't show any significant values for males and females in all weight ranges.
In Table 4, PEFR in BMI showing overweight range is significantly higher in males.

DISCUSSION

Multiple factors like height, weight, BMI, influence PEFR in normal subjects. Pulmonary function tests can be done to assess the different physiological and pathological conditions of an individual. [7]. In this study, PEFR shows to be higher in tall males. PEFR for height 145 to 150cm and 150 to 155 cm are highly significant in males and for height 160 to 165 cm , it is significant. This shows increased height ad muscular power results in

high PEFR. PEFR in BMI showing overweight range is significantly higher in males. Fat deposition and decreased muscle mass as in females can cause low PEFR[6.]

Similar results were found in study by James Tinju, where males have higher PEFR than females. Males of same height have increased lung size and increased muscularity. Females have less musle mass and more fat. PEFR was also found to be higher in obese males. [5]Sex hormones can also play a role in PEFR differences in males and females. Md Saroar in his study also found similar effect of height in increased PEFR. Taller subjects have greater chest volume. Airway passages and muscle effort also increase with increased height.[9]

The limitations of the present study is smaller sample size and non inclusion of parameters like mid arm circumference, mid thigh circumference which would yield finer results. Ours is cross sectional study, a longitudinal study will be more helpful.

CONCLUSION

PEFR was found to be highly significant in males in entire height and weight range. PEFR in BMI showing overweight range is significantly higher in males. The effect of age, height, weight, BMI on PEFR have all been discussed in this study.

REFERENCES

1. Pedersen, O.F (1997). The Peak Flow Working Group: physiological determinants of peak + expiratory flow. The European Respiratory journal. supplement,24,11S-16S.
2. Quanjer P, Lebowitz M.D, Gregg I, Miller M M R and Pederson O.F (1997) Peak Expiratory flow: conclusions and recommendations of a Working party of the European Respiratory Society. European respiratory Society. European Respiratory journal,10(24),2s- 8 s.
3. Ebomoyi MI, Iyawe VI. Variations of peak expiratory flow rate with anthopometric determinants in a population with healthy adult nigerians. Nijerian J Physiol,Sci 2005;20:85-89.
4. K Tinju james . Influence of gender and anthopometric parameters on peak expiratory flow rate and vital capacity among medical students of a teaching institution. international journal of contemporary medical research,2020,2,7:B9-B12
5. Babu Ranjith K, Mohit Magle, Dileep Kolekar. A comparative study of peak expiratory flow rate and BMI in male and female medical students. International journal of health sciences and research, vol5,issue 8, Aug 2015.
6. Holger J, Schunemann Joan Dorn,Brydon JB,Grant,Warren winkelsteinjr, Maurizio trevisian. Pulmonary function is the long term predictor of mortality in the general population .:29 year sfollow up of the buffalo health study. Chest 2000,118;656-64
7. Card JW, Zeldin DC.Hormonal influences on lung function response on lung function response to environmental agents .proc Am Thoracicsoc 2009:6:588-95.
8. Md. Saroar Hussain, Sarwat Jahan Zubrya,Md. Zakir Hussain et al.Variation in the PEFR with various factors with respect to age , body mass index, B.P, H.R among males and females patients. Haya – the Saudi Journal of life science .7(8) 240-243.2022