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# A Study of Correlation of Peak Expiratory Flow Rate with Body Mass Index in Healthy School Going Children

**Dr Akkaladevi Sridhar Rao[1], Dr Sumanth Manthri[2]**
[1]Assistant professor department of Anesthesia TRR Institute of medical sciences
[2]faculty department of physiology GMC Nizamabad

***Corresponding Author***
**Dr Akkaladevi Sridhar Rao**
Assistant professor department of Anesthesia TRR Institute of medical sciences

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## ABSTRACT
**Introduction:** Peak expiratory flow rate is the maximum rate at which the air can be expired after deep inspiration and it is an effort dependent parameter. PEFR is measured to detect the cardiorespiratoryefficiency of an individual and it is also affected by BMI of an individual. By taking appropriate measures like physical activity we can reduce the negative effect of BMI on cardiorespiratory function.
**Aims and Objectives:** the present study was done to see the effect of BMI on PEFR and also to compare the PEFR between boys and girls.
**Materials and Methods:** In the present study 300 school going children were selected and their PEFR was measured with the help of mini peak flow meter and their BMI was also calculated.
**Result:** the present study showed that in case of girls PEFR increased with increase in BMI but there wasslight decrease in 19-22.99 categories and in case of boys the PEFR increased with correspondence with BMI but there was decrease in PEFR in 23-26.99 category.
**Conclusion:** from the present study we had found that BMI had a great effect on PEFR. So early physical activity will decrease BMI and thus improve one's cardiorespiratory fitness.
PEFRpeak expiratoryflow rate,BMIbodymassindex.
**Abbreviations** HRheartrate,BMIbodymass index

**Keywords**: Peak expiratory,PEFR,forced, slower rate.

## INTRODUCTION
Peak expiratory flow (PEF) is the maximal flow achieved during a forced expiration following a full inspiration. The peak obtained in this way can be exceeded involuntarily during coughing. The flow reflects the strength of the expiratory muscles, the mechanical properties of the lungs and airways and the inertia, resistance and sensitivity of therecordingequipment.PEFisparticularlysusceptible todynamiccompressionofextrapulmonaryairways because whilst such airways are subject to pleural pressure, their walls are not supported by traction fromlungtissue.(1)Theindexiswidelyusedby health professionals and by patients for detectionand management of variable airflow limitation.There are few variables such as age, gender, and body size which have an impact on the PEFR. During childhood and adolescence the mass of the body increases in parallel with skeletal growth. In adults through into middle age the mass often continues to increase but at a slower rate. Adultswhoput on weight usuallyaccumulate fat. However, in persons who undertake physical training, a gainin weight is due to an increased quantity of muscle and mineralisation of bone. The quantity of fat may then be relatively small.In later life the body mass often stabilises, and then declines. These changes influence the lung function and capacity.(2) Normal tables account for these variables by givingpredicted PFT data for males or females of a certain age and height. Some times as people age increases they begin to increase their body mass by increasing their body fat to lean body mass ratio. If theybecome too obese the abdominal mass preventthe diaphragm from descending as far as it could andthe PFT results will demonstrate smaller measured PFT outcome than expected, i.e. – the observed values are actuallysmaller than the predicted values. For references the standard laid down in the western country are not applicable to the people in tropical country like India having varied ethnic, climatic, cultural, and social-economical conditions. Data available on Indian people in different age groupand sex from various parts of country are limitedand easternmost parts of India are specially lacking. With view to find out

the different parameters the lung function test was carried out among the healthy school going children
.

**MATERIALSANDMETHOD**

In the present study 300 school children were selected. The children having any lungs disease such as asthma, commoncold etcand cardiacdisease wereexcluded from the study. Before starting the work the informed consent was taken. The height and weight were measured and the BMI was calculated. The children were then grouped according to their BMI. ThePEFR was measured with the help ofpeak flow meter. After practical demonstration the subjects wereaskedtoinspireasdeeplyaspossibleandblow as hard and quickly as possible in one short sharp blast in the peak flow meter. The indicator was stop at a figure on the scale and noted this reading. At least three reading were taken and the highest value out of the three was recorded.

**RESULTS**

In the present studythe boys and girls were devided into groups according to their BMI. In the BMI group11-14.99therewas93numbersofgirlsand83 numbers of boys. In the BMI group 15-18.99 there was64 numbers of girls and 34 numbers of boys. There was 11girls and 10boys in the BMI group 19-22.99 and 2 girls and 3 boys in the BMI group 23-26.99.

In case of girls the mean PEFR in the BMI group 11-14.99 was 1.52±0.57L/sec, in 15-18.99 group mean PEFR was 1.79±0.90 , in 19-22.99group itwas 1.83±0.61 and in 23-26.99 group mean PEFR was 1.82±0.2 the correlation coefficient wasand p value was0.001.

**Table1:** showing the distribution of boys and girlsin different BMI groups:

| BMI group | Boys | Girls |
|---|---|---|
| 11-14.99 | 83 | 93 |
| 15-18.99 | 34 | 64 |
| 19-22.99 | 10 | 11 |
| 23-26.99 | 3 | 2 |

**Fig1:distributionofboysaccordingto theirBMI**

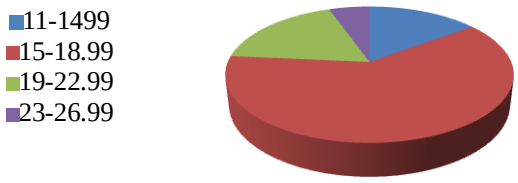
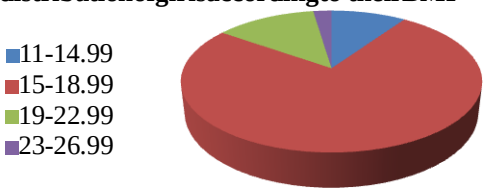



**Fig2:distributionofgirlsaccordingto theirBMI**

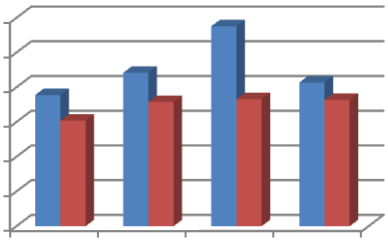



IncaseofboysthemeanPEFRinBMIgroup11-14.99was1.89±0.68,in15-18.99groupmeanPEFRwas2.21±0.80,in19-22.99group2.88±0.74and in 23-26.99 group mean PEFR was 2.07±0.15. The correlation coefficient wasp value was 0.01 When we compare PEFR between boys and girls of same BMI group it was found that mean PEFR was moreincaseofboysthanthegirlsexceptinthe BMIgroup23-26.99whereboyshadlessPEFR than the girls.

**Table 2:** showing the mean PEFR of both boys and girls in different BMI groups.

| BMI group | MeanPEFR | |
|---|---|---|
| | Boys | Girls |
| 11-14.99 | 1.89±0.68 | 1.52±0.57 |
| 15-18.99 | 2.21±0.80 | 1.79±0.90 |
| 19-22.99 | 2.88±0.74 | 1.83±0.61 |
| 23-26.99 | 2.07±0.15 | 1.82±0.20 |

**Fig 3:** bar diagram showing the mean PEFR in both boys and girls in different BMI groups1.5



## DISCUSSION

From the present study we had found that PEFR is more in higher BMI group both in case of boys and girlsexceptintheBMIgroup23-26.99wherePEFR isdecreasedincomparisontotheothergroups.Which may be due to increased BMI that is due to theincreasedaccumulationoffat under the diaphragmwhichhamperfunctionofexpiratorymuscle?WhenthePEFRofboysandgirlsofthe same BMI group were compared it was found that meanPEFR wasmoreincaseofboys in comparisontothegirlswhichmaybeduetothe difference in development of muscle of respiration. Singhetal(1979)measuredPEFRin851healthy SouthIndianmenandwomen.Menhavehigher PEFRthanwomen,theaveragedifferencebeing about140L/min.thePEFRwasfoundtocorrelate best with height in subjects below 30yrs and weight did not show consistent relation with PEFR. There wasahighnegativecorrelationwithAGEinthe subjects over thirty.[3] The study conducted by Sonu Ajmani, Anupama N et al "EFFECT OF ABDOMINAL FAT ON DYNAMICLUNGFUNCTIONTESTS"wherePFT variables of low BMI and overweight BMI groupwascomparedwiththatofnormalBMIgroup, the result showed inverse relation between BMI.[4]the male subjects had mean PEFR of 381±12.81L/min and that of in the female subjects was 272±20.56L/min. The mean PEFR in thecontrol group male was 464±23.92L/min and incase of female the mean PEFR was 328±10.11L/min.Maliiketal(1975)measurePEFR in 414 healthy Indian males and females. It was observed that PEFR values were linearly related to height and PEFR was uniformly lower in women than in male of corresponding age group.[6]S. Natarajan and K. Radha (1978) recorded PEFR I 2060 healthy south Indian men and women. The highest reading for men was obtained in the age group from 21-25 years and women in the agegroup from 17-20years. They found that as the age advances above 35 yrs there was significant decline inthevaluesandheightisoneofthemostimportant factor which determines the PEFR in an individuals.[7]A study done by Dikshit M. B. et al (1991) in 124normal elderly men found that the PEFR regressed atrateof4.47Lpm/yearincreaseinagebutwas positively correlate to the subjects height (cm).[8] Guptaetal(1979)reportedflowratewithother functionparametersinRajasthanisubjects.Their meanvalueofPEFRwere488.55L/mininmenand 393.65L/min in women whish also showed higher PEFR in male than female of same age group.[9]The mean value reported by Kamat et al (1967) in South Indian men and women in the age group of 17-29years was 555L/min and 392L/min respectively.ThesevaluesshowedahigherPEFRin male subjects than the female subjects of the same age group.[10]

## CONCLUSION

So from the present study we can conclude thatBMI had a direct effect on PEFR and increasedBMI due to accumulation of fat may hamper expiratory function. So regular exercise program in school may reduce the fat accumulation and thereby BMI which will lead to good ventilatory functions.Thepresent studyalso showed thatPEFR isalsoaffectedbysex of theindividual. In male due to good muscle development and increased chest circumference the ventilatory functions are more than in case of female.

## REFERENCES


1. Cotes J.E: physiology of exercise and changes resulting from lung disease: lung function physiology, measurements and application in medicine, 6th edition, 134p.
2. Cotes J.E: physiology of exercise and changes resulting from lung disease: lung function physiology, measurements and application in medicine, 6th edition, 338p
3. Singh H.D, Peri S. Peak Flow Rate in South Indian Adult. Ind.J. Physiology Pharmacol 1979;23: 315-20
4. Ajmani S, Sharma A, Kumar N, Sharma V, Ganaraja B, Pai S. Effect of abdominal fat on dynamic lung function tests. International Journal of Biomedical and Advance Research. 2012;3(8):632--636. Cetinkaya E, Cengizlier R, Aslan A, Aycan Z, Yilmaz H, Razi C. Effect of Obesity on Pulmonary Function in Children. Yeni Tip Dergisi. 2007;24:97--99.
5. Galphade S, Dhadse M, Nikam L. Eeefct of body fat percentage on Peak Expiratory Flow Rate (PEFR) in young adults of Indian population. Indian Journal of Applied Basic Medical Sciences. 2014;16(22):51—58
6. Natarajan S. and Radha K. Peak Expiratory FlowRatein Normal South Indians. 1978. Ind. J.Physiol.Phamacol,178-182.

7. DikshitM.B. Jog.N. V. Prasad B.A. K. et al Peak Expiratory Flow Rate in elderly Indian males. Indian J. PhysiologyPharmacol, 1961;1:1365-66
8. Gupta P, Gupta S, and R.L. Ajmera: lung function tests in Rajasthani subjects .Ind. J. Physiol. Pharmacol,23:8-14,979
9. KamatS.R, Thiruvengdam K.V.and Rao T.L (1967) a study of Pulmonary function among Indians in relation to Spirometry for field use. Amer. Rev. Resp.Dis.96,707.