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Physiology

A STUDY OF CORRELATION BETWEEN PEAK EXPIRATORY FLOW RATE WITH HEIGHT AND WEIGHT IN HEALTHY YOUNG ADULTS

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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. The PEFR is also dependent on body parameters such as height, weight and chest circumference.

AIMS AND OBJECTIVES: The present study was done to find out the relation between height and weight with PEFR in healthy young adults.

MATERIALS AND METHOD: The present study was conducted on 200 healthy young adults of 18- 21 years of age in around the Assam Medical College, Dibrugarh comprised of 120 healthy young males and 80 healthy young females they were again subdivided into different groups according to their height and weight. PEFR was measure with mini wright peak flow meter.

RESULTS: In the present study it was found that mean PEFR has a positive correlation with height of the individuals both in case of male and female. It was also seen that as weight is increased the mean value of PEFR is also increased in females but in males the mean PEFR is slightly decreased again in the same weight group mean PEFR is more in males than in females.

CONCLUSION: the present study showed that body parameters greatly affect the PEFR in healthy young adults and increase weight due to excess fat may produce a negative effect on PEFR.

KEYWORDS : PEFR peak expiratory flow rate

INTRODUCTION

Peak expiratory flow (PEFR) 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 the recording equipment. PEF is particularly susceptible to dynamic compression of extra pulmonary airways because whilst such airways are subject to pleural pressure, their walls are not supported by traction from lung tissue.[1] The index is widely used by health professionals and by patients for detection and management of variable airflow limitation. There are few variables such as age, gender, and body size which have an impact on the PEFR. Stature (standing height) can be represented as the sum of leg length and sitting height. As a result, stature and sitting height are correlated. Both are also correlated with all the primary indices of lung function. The correlations are higher for stature than for sitting height probably because the inclusion of leg length leads to a better representation of body size. In adults through into middle age the mass often continues to increase but at a slower rate. Adults who put on weight usually accumulate fat. However, in persons who undertake physical training, a gain in weight is due to an increased quantity of muscle and mineralisation of bone.[2] The quantity of fat may then be relatively small. In most men, and to a lesser extent in women, a change in fat is the largest single cause for a change in lung function. . A small man will have a smaller PFT results than a man of the same age that is much larger. Normal tables account for these variables by giving predicted 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 they become too obese the abdominal mass prevent the diaphragm from descending as far as it could and the PFT results will demonstrate smaller measured PFT outcome than expected, i.e. – the observed values are actually smaller than the predicted values. The present study was done to see the effect of one's anthropometric measurement (e.g. height & weight) on PEFR.

MATERIALS AND METHODS:

The study was conducted on 200 healthy young medical students of both sexes in age group of 18-21 years out of this 120 were male and 80 were female. History was taken from each subject and each subject was clinically examined to exclude apparent cardio-vascular and respiratory disease. In the present the male and the female population were devided into different groups according to their height and weight. The male subjects were subdivided according to their height into group1 (height <165cm), group2 (height 165-169cm), group 3 (height>170cm) and female group was subdivided into group1 (height<155cm), group2 (height 155-159cm), group3 (height>160cm). Again according to weight both male and female subjects were subdivide into group1 (weight 40-50kg), group2 (weight 51-60kg), group3 (weight>61kg).The tests were performed at various times of the day, but most were done between 10am to 12noon.` Peak expiratory flow rate was measured by using a Mini Wright Peak Flow Meter. After practical demonstration the subjects were asked to inspire as deeply as possible and blow 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.

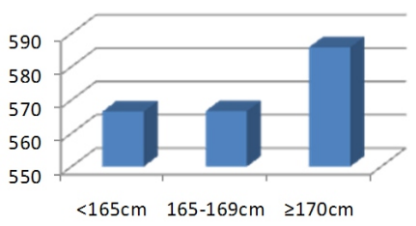
RESULTS:

In the present study the cases were divided into the following height (cm) groups in males : <165cm; 165-169cm; 170cm and above. In the height group <165cm there were 38 cases. In the height group 165-169cm there were 39 cases and in 170cm and above group there were 43cases.

Fig1:division of male subjects according to their height

In the <165cm height group the mean PEFR was 566.57L/min, in the height group 165-169cm the mean PEFR is 566.67L/min and in the height group 170cm and above the mean PEFR is 585.81L/min. Though the mean value difference of PEFR was not very significant in different height group but it is seen that increase height will cause increase in PEFR values.

height (cm) and PEFR (L/min) in males.



In the present study the female cases were divided into following height groups : <155cm; 155-159cm, 160cm and above. There were 40 subjects having height <155cm, 22 female 155-159cm, and 18 female subjects had height of 160cm and above. Female subjects of <155cm height had mean PEFR of 412.75 L/min, in the subjects having height 155-159cm had mean PEFR 423.63L/min and the female subjects having height of 160cm and above had mean PEFR 451.16L/min. so in the present study it was found that in the female subjects PEFR increases with increase in height. In the present study the PEFR values in relation to height in case of males and could not be compared because of different height group on both males and females.

Fig3: division of female subjects according to their height

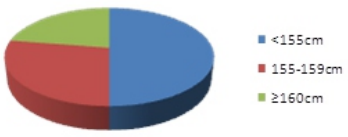
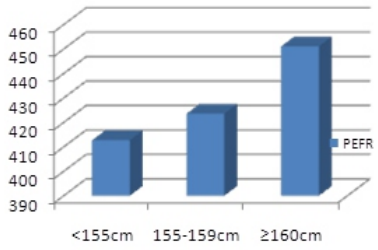
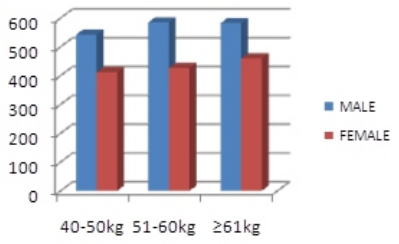


Fig4: bar diagram showing the relationship between height(cm) and PEFR (L/min) in females



In the present study the cases were divided in the following weight (kg) groups both in male and female: 40-50kg, 51-60kg, and 61kg and above. In the group of 40-50kg the mean PEFR in male subjects was 542.58L/min and in female subjects was 412.05L/min. In the 51-60kg group the mean PEFR in male subjects was 585.28L/min and in female subjects was 426.55L/min. the mean PEFR in the group 61kg and above the male had 582.78L/min and female had 460L/min. So from the present study it was seen that as weight was increased the mean value of PEFR is also increase in females but in males the mean value of PEFR was slightly decreased in the weight group of 60kg and above than the weight group of 51-60kg, but at the same weight group the men value of PEFR was more in males than in females.



DISCUSSION:

In the present study we had found that with increase in height there was increase in PEFR both in case of male and in case of female but increase of male it was not statistically significant. It was also found that with increase in weight there was increase in PEFR in case of female but in case of male the mean PEFR was decreased in higher weight group. When the PEFR was compared between male and female of the same age group it was found that the mean PEFR was more in male than in case of female.

Study done by Anthonisen et al (1963)(3) and Baldwin et al (1948)(4) found a positive correlation between height and PEFR which is similar with the present study.

The peak expiratory flow rate has received general acceptance as a useful test of ventilatory capacity. Since the apparatus is small and portable and does not requires electric power to operate, it is specially suited for use not only at bedside of the patients but in epidemiological survey. Though spirometric indices in Indian subjects have been well reported, data on PEFR are very few.

Singh et al (1979) measured PEFR in 851 healthy South Indian men and women. Men have higher PEFR than women, the average difference being about 140L/min. the PEFR was found to correlate best with height in subjects below 30yrs and weight did not show consistent relation with PEFR. There was a high negative correlation with AGE in the subjects over thirty[5].

Maliik et al (1975) measure PEFR 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 age group from 17-20years. They found that as the age advances above 35 yrs there was significant decline in the values and height is one of the most important factor which determines the PEFR in an individual's[7].

A study done by Dikshit M. B. et al (1991) in 124 normal elderly men found that the PEFR regressed at rate of 4.47Lpm/year increase in age but was positively correlate to the subjects height (cm) .[8]

Gupta et al (1979) reported flow rate with other function parameters in Rajasthani subjects. Their mean value of PEFR were 488.55L/min in men and 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. These values showed a higher PEFR in male subjects than the female subjects of the same age group. [10]

CONCLUSION:

The present study it had been found that PEFR increases with increase in height in but male and female. In case of female as weight increases there was also increase in PEFR but the same is not true for the male PEFR is less in the male subjects who had more weight than the others. The mean PEFR is more in male than in case of female subjects. So from the present study we can conclude that height and weight had a great influence on PEFR so increase physical activity in earlier part of life will enhance the development of muscle and body structure, and thus improves ones expiratory flow rates and respiratory function

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