

ORIGINAL ARTICLE

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PEAK EXPIRATORY FLOW RATE IN SEDENTARY POPULATION: AN OBSERVATIONAL STUDY

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ABSTRACT:

BACKGROUND- To date there are very few studies evaluating the relationship between sedentary behaviour and pulmonary function in a population who works for more than half a day i.e. 6-8hrs continuously in front of technologies (mainly desk jobs) with no sign of physical activities. Hence the aim of the study was to evaluate the effects of a sedentary lifestyle on peak expiratory flow rate. **METHOD-** The study was conducted on 75 desk job workers, males and females of age group 30-45 years working for 6-8 hours without physical activity. Analysis of their lung function capacity was done by PEFr. **RESULT-** It is seen that there is a significant difference in the predicted and obtained values of PEFr in both genders. The mean predicted value of PEFr in females is 416.04 ± 25.72 and the mean obtained value of PEFr is 284.7 ± 72.84 . In males the mean predicted value of PEFr is 542.6 ± 23.33 and the mean obtained value of PEFr is 396.2 ± 80.6 . It shows that the sedentary lifestyle with physical inactivity affects the PEFr values **CONCLUSION-** Regular exercise in terms of physical activity is essential for every individual with a sedentary lifestyle to overcome health problems and improve their pulmonary functions.

KEY WORDS: PEFr, sedentary lifestyle, desk job workers, physical inactivity, pulmonary functions, aerobic exercise.

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INTRODUCTION

Sedentariness is the practice of living in one place for a long time. [1] According to a survey report conducted in 2008, by the United States National Health Survey, 36% of adults are totally inactive while 59% have never participated in vigorous physical activity lasting more than 10 minutes per week. [2] A person living a sedentary lifestyle is often sitting or lying down engaged in an activity like using mobile phones or computers or television for the rest of the day. A sedentary lifestyle can contribute to ill health and adverse effects. [4] Sedentary lifestyle could be associated with less efficient pulmonary function. It is also due to advancements in modern technologies, lives have become monotonous and busy adapting more of a sedentary lifestyle. [3] Over the last hundred years, there has been a large shift from manual labor jobs (e.g. farming, manufacturing, building) to office jobs which is due to many contributing factors including globalization, outsourcing of jobs and technological advances (especially internet and computers). A sedentary lifestyle is the most modifiable risk factor for cardiovascular diseases. It is also important for a sedentary population to indulge themselves in regular exercise to maintain proper health as it has been shown that physical inactivity and a negative lifestyle in the sedentary population have seriously threatened the health and it deteriorates the human body. [4] The exercise does not have to be strenuous but enough to get up and start moving. Just by exercising 30 minutes a day for five days a week, one can prevent health issues. Sedentary living affects people in such a way that it makes them lazy and prone to fatigue. By being inactive muscle tissues are lost which causes muscle atrophy and makes us lose strength, making a person physically weak and fatigued. Aging process can also be accelerated with no physical activity, decreasing the immunity system and giving rise to various diseases. Inadequate physical activity and low levels of fitness in adults contribute to the development of obesity, hypertension, depression, [5] deep vein thrombosis, heart diseases, Type – 2 diabetes, osteoporosis, cancer, muscle and skin disorders among others with their resultant increase in morbidity and mortality. [6] It is sad to note that many well-meaning citizens of our country and beyond are victims of these

chronic diseases which would have been prevented if they had adopted healthier lifestyles.[7]

Peak expiratory flow rate (PEFR) is a person's maximum speed of expiration. It measures the airflow through bronchi and thus the degree of obstruction in airways. PEFR is the maximum rate of airflow that can be generated during forced expiratory manoeuvre starting from total lung capacity. Total lung capacity refers to the total amount of air in the lungs after taking the deepest breath possible which is about 6,000 ml. The simplicity of the method is its main advantage. It is measured by using a standard Wright Peak Flow meter or mini Wright meter. [8] It is a small handheld device internationally recognized "GOLD STANDARD" in peak flow measurement which measures the speed at which air is exhaled from your lungs, giving you a measurement of how well your airways are working. Peak expiratory flow is typically measured in units of litres per minute. Lung studies give a good estimate of physical endurance and PEFR is one of the most sensitive parameters to assess lung function. [9] The developed society has an increased number of sedentary populations as everything is technology-based which results in people sitting for long hours in one position at one particular place without breaks and gives rise to faulty postural alignment, along with inadequate dietary habits leading to obesity. The truncal fat may compress the thoracic cavity and restrict diaphragmatic movement resulting in reduced vertical diameter of the thoracic cavity. [10] These changes may reduce the compliance of the lungs and thoracic cavity and increase the load on respiratory muscles. This may end up with a reduction in lung volumes and flow rates. [11] These volumes tend to vary depending on the depth of respiration, gender, age and body composition and in various respiratory diseases. To date there are very few studies evaluating the relationship between sedentary behaviour and pulmonary function in a population who works for more than half a day i.e. 6-8hrs continuously in front of technologies (mainly desk jobs) with no sign of physical activities. Sedentary lifestyles could be associated with less efficient pulmonary functions. Hence to create awareness among the population to lower down the risk of cardiovascular diseases with increasing age due to no sign of any aerobic activity, this study is necessary .

METHODOLOGY

The present observational study was conducted in an office workplace including 75 subjects (males and females) of age group 30-45 years working for 6-8 hours a day at one place with no participation at all in any aerobic exercise. The sampling method used is purposive sampling. The sample size was calculated according to openepi.info, version 3 (confidence level 80%). Workers working for at least five years continuously were included. Subjects with a history of any type of disease or acute illness at the time of the study were excluded. Wright Peak Flow Meter was used for recording the peak expiratory flow rate, measuring tape to measure height and weighing machine for the weight. This study was conducted in various offices where people are engaged in desk jobs for 6 to 8 hours a day after obtaining Institutional Ethical Committee Approval. The subjects were explained about the procedure and benefits of this study. Informed consent was obtained from each volunteer. The subjects were selected based on inclusion and exclusion criteria. Only healthy subjects were allowed to participate in this study. Subjects having any Respiratory problems and taking treatment for any disease and those who are doing regular exercise of any type were excluded from the study. A complete history including a past history, family history was taken to exclude any possibility of genetic and acute or chronic diseases and recorded on a Performa. After a detailed explanation regarding the working of the instrument proper demonstration and trial performance, a Mini Wright's Peak Flow Meter was used to record PEFR. The recordings were done in a sitting position. The subjects were instructed to take deep inspiration and asked to blow out forcefully through the mouthpiece. Test maneuver was repeated thrice and the best result was considered for analysis. The instrument was sterilized between uses by each subject using sterilium & cotton wool. [3] [8] [9] [12]

RESULTS

The statistical software used is Graphpad Instat version 3.0 and the results were calculated by unpaired t-test.

Table no 1: Baseline parameters

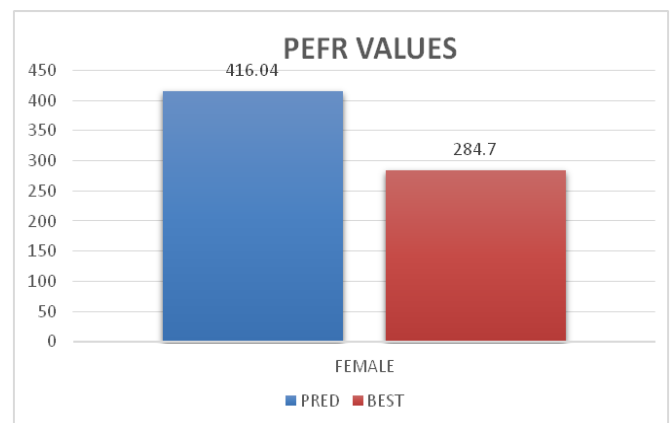
	Number	Age	BMI	Working years
Fe- males	38	39.19±5.67	26.55±4.12	11.1±2.82
Males	37	35.07±4.04	25.04±4.29	14.4±4.76
Total	75			

Baseline parameters of females and males, which shows females and males with a mean age of 39.19±5.67 and 35.07±4.04 respectively both groups having overweight values of BMI (Table 1.)

Table no 2: Values of PEFR in females

	PRED	BEST
FEMALES	416.04±25.72	284.7±72.84

Table 2 shows predicted and best values of PEFR in females. It shows that in females the mean predicted value of PEFR is 416.04±25.72 and mean best value of PEFR is



284.7±72.84

Figure 1: Bar graph showing mean values of PEFR in females

Fig 1 represents that the mean predicted value of PEFR in females is 416.04L/min and the mean best value of PEFR in females is 284.7L/min.

Table no. 3: Values of PEFR in males

	PRED	BEST
MALES	542.6±23.33	396.2±80.6

Table 3 represents the predicted and best values of PEFR in males. It shows that in males mean predicted value of PEFR is 542.6 ± 23.33 and mean best value of PEFR is 396.2 ± 80.6 .

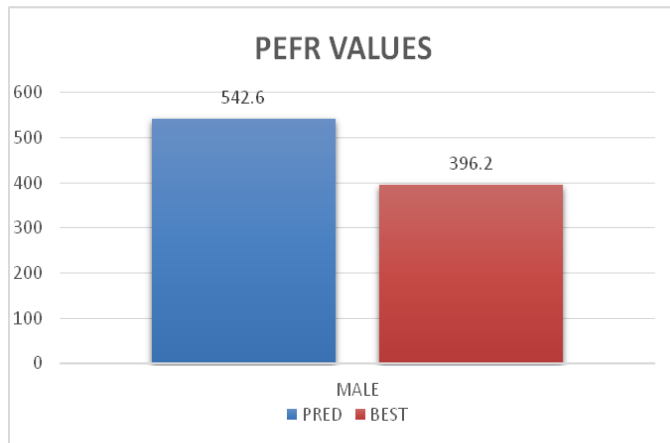


Figure 2: Bar graph showing mean values of PEFR in males

Fig 2 represents that the mean predicted value of PEFR in males is 542.6 L/min and the mean best value of PEFR in males is 396.2 L/min .

Total no. of desk job workers	Mean age	Mean BMI	Mean predicted value	Mean best value	P value
75	37.10 ± 5.26	25.74 ± 4.28	478.52 ± 67.91	339.73 ± 94.03	<0.0001

Table no. 4: Values of PEFR in both the genders

Table 4 represents the mean values of PEFR, age and BMI which shows that the desk jobs workers mean BMI is 25.74 ± 4.28 i.e.; they belong to an overweight class. Also the P value is highly significant.

Table no. 5: Correlation of working years with PEFR

Best PEFR	Working years	P value
339.73 ± 94.03	12.74 ± 4.23	0.2257

Table 5 shows the correlation between the working years with PEFR of males and females whose P value is not significant.

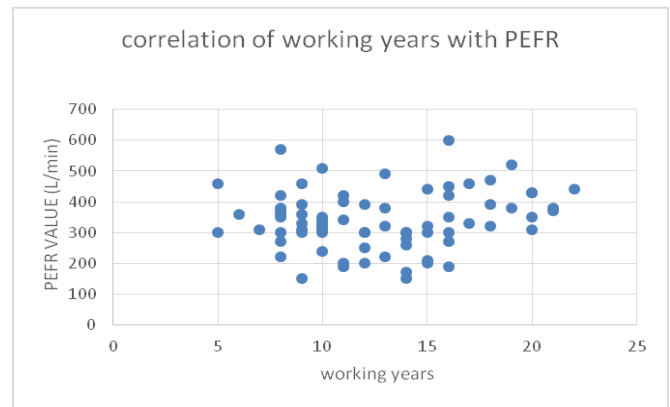


Figure 3: Correlation of working years with PEFR.

This scatter graph shows the correlation of working years with PEFR and it shows statistically non-significant (Fig 3).

DISCUSSION

PEFR is one of the common and simple methods to assess lung function. Peak Flow Rate is an expiratory parameter that measures the caliber of the airways which provides us a valuable tool in the diagnosis of lung functions.^[12]

In this study the population that is chosen are the desk job workers working for more than five years for 6 to 8 hours in one place with no sign of any type of physical activity. This may end up with a reduction in lung volumes and flow rates. ^[11] Several studies have documented that for a healthy body and wellbeing of oneself regular exercise is very important. In some studies it is shown that physical inactivity has a major role in health problems.^[4]

In this context, the present study is conducted to evaluate the effects of a sedentary lifestyle on peak expiratory flow rate in desk job workers. In our study, a total of 75 subjects were taken out of which 38 were females and 37 were males whose mean ages are 39.19 ± 5.67 and 35.07 ± 4.04 respectively. It is seen that there is a significant difference in the predicted and obtained values of PEFR in both genders. The mean predicted value of PEFR in females is 416.04 ± 25.72 and the mean obtained value of PEFR is 284.7 ± 72.84 .

In males the mean predicted value of PEFR is 542.6 ± 23.33 and the mean obtained value of PEFR is 396.2 ± 80.6 . As calculated in this study, the mean BMI of the workers is 25.74 ± 4.28 and it comes in the overweight category so there is a significant difference in the predicted and obtained value of PEFR. Similar to the findings of the present

study, S Suganya and V Philominal^[12] found that there is an influence of body mass index on peak expiratory flow rate. There is a reduction in the vertical diameter of the thoracic cavity due to the deposition of the fat around the thoracic cavity which may compress the diaphragm and restrict its movement. ^[12] Some researches show that there is a reduction in the lung volumes with raised BMI as also described in the article by Stephen W. Littleton^[13] that there is an impact of obesity on respiratory function.

The mean values of predicted and obtained PEFR of both the genders have a significant P value of 0.0001. Number of working years of desk job workers was obtained to see if there were any long-term effects of a sedentary lifestyle on PEFR values which statistically show that there is no significance in the mean value of obtained PEFR with increasing years of working. So, this study reveals that there is no correlation between working years on the pulmonary function due to their sedentary lifestyle. But there is a significant difference between the predicted and obtained values of PEFR in desk job workers with sedentary lifestyle due to physical inactivity, as mentioned in the article by Chaitra B and Vijay Maitri^[14] that there is an effect of Aerobic Exercise Training on Peak Expiratory Flow Rate: a Pragmatic Randomized Controlled Trial.

CONCLUSION

Regular exercise in terms of physical activity is essential for every individual. It should be an important part of people with a sedentary lifestyle to overcome health-related problems which will improve their pulmonary functions.

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