Original Research Article

A comparative study of peak expiratory flow rate among healthy working women and housewives of Ahmedabad

Hiran Pandya[1*], Neeta Vyas[2], Megha Sheth[3]

[1]P.G. Student, [2]Principal, [3]Lecturer
SBB College of Physiotherapy, VS Hospital Campus, Ahmedabad, Gujarat, India
[*]Corresponding author email: **hiran.pandya01@gmail.com**

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Abstract

Background: The growth of population, industry, number of vehicles and improper implementation of stringent emission standard makes the problem of air pollution worse. Automobile exhaust consists of particulate matter and gases which cause injury to the terminal bronchioles and decrease in the pulmonary compliance and vital capacity and PEFR.
Aim: The present study aimed at assessing the Peak expiratory flow rate (PEFR) in healthy working women in the Ahmedabad compared to healthy housewives of same age to see the effect of short duration daily exposure of traffic air pollutants on PEFR.
Materials and methods: An observational study was conducted in the community of Ahmedabad with 30 females between the ages of 30-40 years, divided into 2 groups. Group 1 comprised of 15 healthy housewives and Group 2 comprised of 15 healthy working women. Peak expiratory flow rate (PEFR) using a Wrights peak flow meter was measured in liter per minute. Three such readings were taken in standing posture. The highest of the three values obtained was treated as the peak expiratory flow rate.
Results: The mean PEFR of the housewives and working women was 304±60.80litres/min and 285.33±45.01 litres/min respectively**.** There was no statistically significant difference between the two groups of the study (p=0.208, z= -1.259).
Conclusion: There is no difference between the Peak Expiratory Flow Rate between healthy housewives and working women in Ahmedabad.

Key words

Peak expiratory flow rate, Air pollution, Wrights peak flow meter, Women.

Introduction

The growth of population, industry, number of vehicles and improper implementation of stringent emission standard makes the problem of air pollution worse [1]. Owing to the expanding economic base, Indian cities are growing rapidly. This has led to an increase in the ownership and use of motor vehicles with a subsequent rise in the levels of air pollution. Exposure to air pollutants is known to be harmful to health, in general, and to the lungs [2].

Among the motor vehicle-generated air pollutants, diesel exhaust particles account for a highly significant percentage of the particles emitted in many towns and cities. Acute effects of diesel exhaust exposure include irritation of eyes and nose, lung function changes, headache, fatigue, and nausea. Chronic exposure is associated with cough, sputum production, and lung function decrements [3].

Peak expiratory flow rate (PEFR) is the maximum rate of air flow achieved during a forced expiration after maximal inspiration [4]. PEFR is particularly useful for early detection of airways obstruction, also useful for individuals with asthma and monitors the effects of environment and occupational exposure [4].

Studies show that gender affects lung function with male subjects having a higher PEFR as compared to females [5]. This could be explained by the morphological differences in the lung structure between genders. It has been suggested that men have larger lung volumes, larger diameter airways, and larger diffusion surfaces compared to women [5]. The average PEFR of healthy young Indian males and females are around 500 and 350 liters/minute respectively [6]. PEFR increases as age increases and peaks at the age of 31-35 years in females [7].

As the times are changing, more and more women are venturing out of their house to earn and contribute to their household which increases their exposure to pollution. Similar studies have been done in different cities [7] in the country but none in Ahmedabad, so there is a need to find the difference in the PEFR in working women and housewives in the city of Ahmedabad.

The main aim of the study was to assess the Peak expiratory flow rate (PEFR) in healthy working women in the Ahmedabad compared to healthy housewives of same age.

Materials and methods

An observational study was conducted in the community of Ahmedabad, which included 30 women between the age group of 30 to 40 years of age. Convenience sampling was used. The women were housewives or working women who have worked for at least 10 years, traveling by either two-wheeler or used public transportation for commuting.

All subjects selected for the study had no history of smoking or cardiopulmonary disease. They had no skeletal deformity and the women were not pregnant. Specifically the subjects denied any history of exertional dysponea, frequent or persistent cough and expectoration of sputum, wheeze, or other serious respiratory complaints. They were also free from any other significant illness.

The subjects were divided into two groups. Group 1 consisted of housewives and Group 2 consisted of working women. Informed consent of the participants was taken. Prior to measuring the PEFR; clear instructions were given regarding the technique of the test. Participants were demonstrated how to perform the procedure. A trial was giving once which was not counted to acquaint the participant with the procedure.

Peak expiratory flow rate (PEFR) was measured using a Wrights peak flow meter in liters per minute. Three such readings were taken in standing posture. The highest of the three values obtained was treated as the peak expiratory flow rate [8].

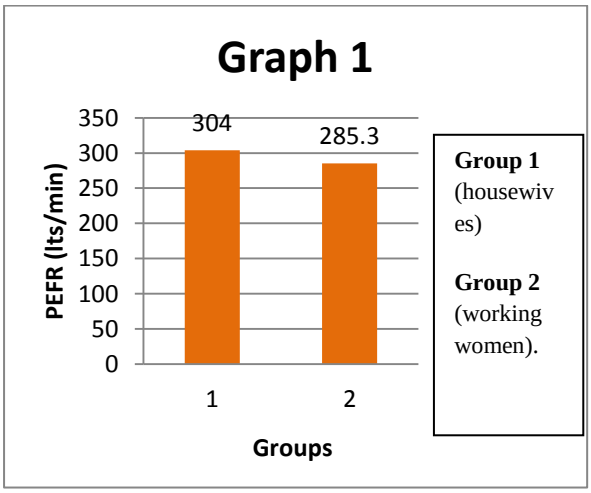
Statistical Analysis

Statistical analysis was done using SPSS version 16. To compare the difference in the data of the two groups Mann-Whitney U test was done. Level of significance was kept to 5%.

Results

The mean age of all the subjects was 35.8±3.5 years. The mean PEFR of the housewives was found to be 304±60.80 liters/min and that of working women was 285.33±45.01 liters/min. The mean PEFR values of group 1 (housewives) and group 2 (working women) was as per **Graph - 1**.

Graph - 1: Mean PEFR of Group 1 (housewives) and Group 2 (working women).



The difference between the mean PEFR of the two groups of the study was found using Mann-Whitney U test which was statistically insignificant (p=0.208, Z=-1.259). The difference between the mean PEFR values of the two groups was as per **Table – 1**.

Discussion

The results show that the PEFR of working women is 285.3 liters/min and that of housewives is 304 liters/min between the ages of 30-40 years. There was no significant difference found between the two. The average value of PEFR for Indian women is 350 liters/minute [6]. The present study showed that PEFR was reduced for both the groups as compared to the average value.

Table - 1: Difference between mean PEFR of Group 1 (housewives) and Group 2 (working women).

Groups	PEFR (LTS/MIN)	z value	p value
Group 1	304±60.80	-1.259	0.208
Group 2	285.33±45.01		

Wongtra Kool says air pollution not only can worsen lung function in people with breathing problem but also can decrease lung function in those with healthy lungs, over long term causing coughing, wheezing, irritation and puts stress on the cardiovascular system [9]. Sharat Gupta, et al. in 2011 concluded that the adverse health impacts of automobile pollution can be significant, probably due to the prolonged exposure to vehicular pollution in traffic police [10].

The present study has similar findings to Neera G, et al. (2014) who concluded that the air pollution of Jhansi city may affect PEFR of housewives as well as working women [7]. They also stated that PEFR in healthy working women in age group I (20-25), II (26-30), III (31-35), V (41-45) and VI (46-50) as compared with house wives was statistically insignificant ($p>0.05$). However the difference in PEFR in group IV (36-40) was statistically significant ($p < 0.05$). The present study does not find any statistically significant difference between the PEFR in the working women and housewives between 30 to 40 years of age. Their study also found that the duration of occupation has no effect on PEFR of

the subjects. The present study has considered the duration of job only in the inclusion criteria.

Hui Jean Yap, et al. in 2012 found that gender, level of education and state of exposure to noxious particles have an effect on the PEFR. In their study, most of the participants who were exposed to noxious particles were uneducated or having lower levels of education and were employed as elementary workers [11]. There was a close association of occupation and education. People who receive higher education are more likely to have a better working environment [11]. A large number of studies have shown that long-term exposure to particulates and vehicular exhausts is associated with adverse effects on health [12-16].

Females can be adviced to wear a mask while travelling to reduce the exposure to pollution; regular health checkups can also be recommended. Certain Yoga exercises such as Pranayama which includes anulom-vilom, Bhastrika pranayama etc. has been found to be helpful in improving lung capacities [17-18].

Conclusion

There is no difference between the Peak Expiratory Flow Rate between healthy housewives and working women in Ahmedabad. However a decrease in PEFR of healthy working women and housewives alike as compared to normal values is observed.

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