ISSN: 0975-8585

Research Journal of Pharmaceutical, Biological and Chemical Sciences

A Study of Effect of Air Pollution on Peak Expiratory Flow Rate in motor cycle riders with and without Breathing Masks.

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ABSTRACT

Peak expiratory flow rate (PEFR) is a reliable indicator of the lung function. PEFR depends on the force of contraction of expiratory muscles, elastic recoil of lungs and resistance of the bronchial tree. Reduction in PEFR values may indicate the risk of obstructive airway disease in the bike riders in metropolitan cities as the have to travel a long distance in motor cycle for years together and are exposed to air pollutants every day. To evaluate and compare PEFR in the motor cycle riders with and without breathing mask. The study group comprised of 100 healthy bike riders aged about 25 – 50 years. The study subjects were divided into two groups, group 1 comprised of 50 men who were not using breathing masks while riding and group 2 comprised of 50 men who were using breathing masks while riding. The wrights peak flow meter was used the dial range is 0-1000 lpm. Each participant blow 5 times into the flow meter and three maximum readings were recorded. Each study subject was encouraged to make a maximal effort and was closely watched to ensure that an air tight seal between lips and mouth piece is maintained. The Data analysis was performed using one way ANOVA to find the significance of study parameter between the two groups. The p value less than 0.05 or less was considered statistically significant. There was a significant reduction in the actual PEFR values in both the study groups when compared to predicted values ($p < 0.001$**). Secondly there was no statistically significant change in the actual PEFR values between the two study groups ($p \rangle 0.001$). If similar study is undertaken in larger population, we might get statistically significant increase in the PEFR values between the two groups. With this we conclude that the clean air act should be established which should identify all pollutants that may reasonably be anticipated to endanger the public health and to issue air quality criteria documents for such pollutants that reflect “the latest scientific knowledge useful to indicate the kind and extent of all identifiable effects on public health and welfare which may be expected from the presence of such pollutants in the ambient air”.

Keywords: PEFR, bike riders, breathing mask, air pollutants

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ISSN: 0975-8585

INTRODUCTION

Air pollution is a major environment related health threat and a risk factor for both acute & chronic respiratory disease. Epidemiological studies have demonstrated an association between air pollution as it occurs in various places around the world and lung function [1].

In urban areas vehicular pollution is predominant and significantly contributes to air quality problems. Road traffic produce volatile organic compounds, suspended particulate matter (SPM), oxides of sulphur (SOx), oxides of nitrogen (NOx), and carbon monoxide (CO), which makes adverse health effects on the exposed population. The particles emitted from the vehicular exhaust of more than 10-micron size are held in upper respiratory tract and particles less than 10-micron size (PM10) accumulates in the lung and produces respiratory abnormalities. The effects of air pollution include breathing and respiratory problems, aggravation of existing disease and alterations in the body defense systems against foreign materials, damage to lung tissue, carcinogenesis and premature death [2, 3].

Traffic related sources of air pollution are drawing increasing concerns from interested exposure assessors, epidemiologists, as well as toxicologists. Bike riders who travel in the busy traffic areas for years together are exposed to the risk of air traffic pollution. In the long run, the pollutants may produce diseases like asthma and bronchitis in the exposed individuals with changes in normal lung functions [4]. The wrights peak flow meter is accurate, rugged a portable equipment and thus can be used in field studies to measure Peak expiratory flow rate (PEFR) [5]. Therefore the present work was undertaken to evaluate and compare PEFR in the traffic police men with and without breathing mask.

METHODS AND MATERIALS

The study group comprised of 100 healthy men aged about 25 – 50 years. The study subjects were divided into two groups, group 1 comprised of 50 men who were not using breathing masks and group 2 comprised of 50 traffic police men who were using breathing masks while riding bike.

The present study was conducted in Chennai, Ashok nagar. Ethical clearance for the study protocol was obtained from institutional ethical committee.. Subject's clinical history and details were taken according to the standard proforma. Informed written consent was taken from all subjects in the study. Subjects with history of smoking, recurrent or persistant expectoration, wheezing, episode of bronchitis, asthma, any serious respiratory disease and those on regular medications affecting cardiovascular and respiratory system were excluded from the study.

Experimental design

Each person was weighed with normal light clothing and height measured without shoes and body mass index was calculated. The experimental protocol was fully explained to the participants to allay apprehension and method of blowing into the instrument was demonstrated. The wrights peak flow meter was used the dial range is 0-1000lpm. Each subject then held the instrument and had several trials blows, until it was clear that he was using the meter properly and comfortably. Each was encouraged to make a maximal effort and was closely watched to ensure that an air tight seal between lips and mouth piece is maintained. Each participant blow 5 times into the flow meter and three maximum readings were recorded [6].

Statistical analysis

The data profile of subjects including name, age, height, weight, body mass index, with their mean and standard deviation are shown in table 1. The results were given in mean± standard deviation. Data analysis was performed using one way ANOVA to find the significance of study parameter between the two groups. The p value less than 0.05 or less was considered statistically significant.

RESULTS

This comparative study consisted of 50 bike riders who were not using breathing masks and 50 bike riders who were using breathing masks in the age group of 25 – 50 years [Table 1]. The PEFR values were

determined and compared between two groups. There was a significant reduction in the actual PEFR values in both the study groups when compared to predicted values ($p < 0.001$**). Secondly there was no statistically significant change in the actual PEFR values between the two study groups ($p \rangle 0.001$) [Table 2].

Table 1: Profile of the study group

Variable	Group 1: Bike riders Without breathing mask	Group 2: Bike riders With breathing mask
Age (yrs)	36±6.6	34±3.7
Height (cms)	162.9±5.80	161.2±6.50
Weight(kg)	60±13.0	63.8±10.10
BMI(kg/m2)	22.2±4.00	24.5±3.60

Table 2: Comparision of the PEFR between BIKE RIDERS with and without breathing mask

PEFR	n	nMean±SD PEFR Actual (l/min)	Mean±SD PEFR Predicted (l/min)	P value
Bike riders Without breathing mask	50	427±102	497±48	<0.001**
Bike riders With breathing mask	50	50 436±160	494±35	<0.001**

**-- Highly significant

DISCUSSION

This study was done to evaluate and compare PEFR in the men riding motor cycle with and without breathing mask. PEFR was evaluated in 100 men, 50 of them used breathing mask while riding and remaining 50 did not used the breathing mask while riding motor cycle. The two groups were similar in terms of age, sex and BMI.

PEFR is a reliable indicator of the lung function. It depends on the force of contraction of expiratory muscles, elastic recoil of lungs and resistance of the bronchial tree and thus testing the function of all these. Reduction in PEFR values may indicate the risk of obstructive airway disease in the occupational group who are exposed to air pollutants everyday [7]. In the present study there was a significant reduction in the actual PEFR values in both the study groups when compared to predicted values ($p < 0.001$**). This shows that the motor cycle riders are probably at high risk of developing obstructive pulmonary disease. Secondly there was no statistically significant change in the actual PEFR values between the two study groups ($p \rangle 0.001$) [Table 2] irrespective of whether they use breathing mask or not. This tells us that usage of Protective gears such as masks did not had any beneficial effect on PEFR values which is a marker of lung function. The probable reasons for not getting significant change between the two groups may be due to the following reasons:

Subjects don't use their masks regularly. Even if they wear continuously masks will prevent only the suspended particles but not the poisonous gases such as CO, SO2, and Oxides of nitrates. If similar study is undertaken in larger population, we might get statistically significant increase in the PEFR values between the two groups.

CONCLUSION

With this we conclude that the clean air act should be established which should identify all pollutants that may reasonably be anticipated to endanger the public health and to issue air quality criteria documents for such pollutants that reflect "the latest scientific knowledge useful to indicate the kind and extent of all identifiable effects on public health and welfare which may be expected from the presence of such pollutants in the ambient air".

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