Original Article

EVALUATION OF PULMONARY FUNCTION TESTS ON NON SMOKING TRAFFIC POLICE MEN AT TIRUPATI, AP, INDIA

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ABSTRACT

The effect of air pollution on traffic police has been evaluated in this investigation by pulmonary function tests (PFT). About 50 non-smokers adult male traffic police (Study group) and 50 non-smokers adult male (control group) were selected from Tirupati, Andhra Pradesh (India) for the study. PFT parameters were compared between both groups by using electronic spirometer. The results shows that there is significant decrease in FVC (P<0.01), FEV1 (P<0.01), FEF-25-75% (P<0.01), FEF75-85% (P<0.02) and PEF (<0.01) in study group compared to the control group. Significant changes of FVC and FEV1, may be due to small airway obstruction and which was confirmed by FEF25-75% and PEF parameters. It can be concluded that the traffic policemen sufferer from tinny air pollutants in traffic areas. So, it is suggested the traffic police personal should use air filter masks during the duty hours in busy traffic areas and should undergo regular health check-up to identify respiratory symptoms.

Key words: Traffic Police Men; Pulmonary Function Test; Electronic Spirometer.

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INTRODUCTION

Air quality crisis in cities is mainly due to emissions from vehicles. 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. Especially traffic policemen are at high risk Automobile exhaust consists of oxides of nitrogen, carbon monoxide, particulate matter, and others, which cause injury to the terminal bronchioles and decrease the pulmonary compliance and vital capacity.[1,2] The ultrafine particles of air pollutant can effect respiratory as well as cardiovascular systems since ultrafine particle can easily enter in blood vessels.[3,4,5,6] Among the motor vehicle-generated air pollutants, diesel exhaust particles account for highly significant percentage of particles emitted in many towns and cities. Acute effects of diesel exhaust exposure include irritation of eyes and nose, change in lung functions, headache, fatigue, and nausea. Chronic exposure is associated with cough, sputum production, and lung function decrements.[7]

Environmental factor are believed to play significant role in the development of allergic respiratory diseases such as asthma and rhinitis in presence of various particles and gases from vehicular emission like carbon dioxide carbon monoxide. Benzene, lead, nitrogen dioxide and black smoke etc. may play a role in the pathogenesis of respiratory diseases. The toxic chemicals and gases released from vehicular emission produce irritation and allergy in the lungs and air passages of individuals who are exposed to them for a long time. Traffic policemen who work in the busy traffic signals areas for years are exposed to the risk of air traffic pollutants. In the long run the pollutants may produce disease like asthma and bronchitis in the exposed individuals with changes in normal lung functions.[8,9] Significant alteration in different parameters of pulmonary functions where observe in some workers due to air pollution.[10] It was observe that the air pollution had affected even the pulmonary functions of healthy adults directly or indirectly in Poland[11]. Pulmonary function tests using a computerized spirometer are assessed all the parameters of respiratory functions and give fair idea about the individual. Therefore, these changes can be observed even before the disease becomes symptomatic by a detailed assessment of pulmonary function tests.

The present study is aimed to assess the pulmonary functional status in traffic policemen of Tirupati, Andhra Pradesh, India who have exposed to long term vehicular pollution and to compare the findings with normal healthy individual.

MATERIALS AND METHODS

Sources of data: The intended study is a case control with the sample size of 100(50 cases and 50 controls). Where in the data was on the basis of inclusive & exclusive criteria collected from the traffic policemen who were working in traffic junctions in Tirupati town, Chitoor, Andhra Pradesh.

Collection of data: Case data was collected using the computerized spirometer in the traffic police station in Tirupati and controllers data collected in the department of physiology, SVIMS, Andhra Pradesh.

Selection Group:

Group I: Subjects working in different traffic junctions, at Tirupati for last 5 years**.**

Group II: Controllers are normal healthy individuals in same area at Tirupati**.**

Inclusive criteria: Healthy, Non-smoking, Traffic policemen within the age group of 20-50 years, working in traffic junctions for 5 years are included for the study.

Healthy, non-smoker control population of same age, sex and BMI selected from general population are included for the study.

Exclusive criteria: Subjects having following complications were excluded from study

- Systemic diseases
- Hypertension
- Diabetes Mellitus
- Tuberculosis
- Asthma
- Smokers and drug addict's
- Inability to perform Pulmonary Function Tests.

Estimation of Parameters:

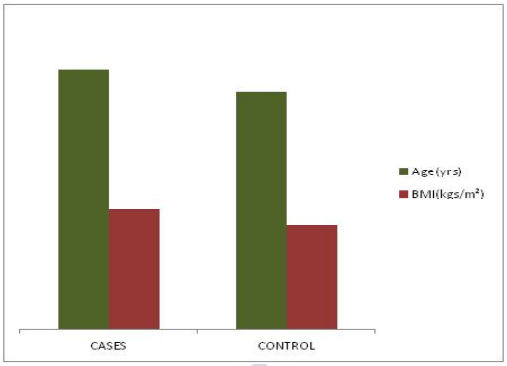
- Pulmonary Function Tests are evaluated by Electronic Spirometer.
- Body Mass Index calculated by Weight in kg/ Height^2 in m.
- Blood Pressures are taken by Auscultatory method with the help of Sphygmomanometer.

Statistical analysis:

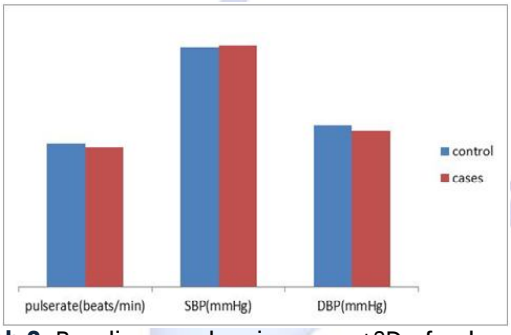
Statistical analysis done by the paired t-test in Microsoft excel.

RESULTS AND TABLES

The present study is designed to observe the effect of heavy traffic air pollution on pulmonary function tests in non-smoker traffic police men for 5 years' experience. Graph 1 indicates age and BMI of the study groups. The age is 20-50 years with mean of 45.6 ± 8.64 in Group-I, 50.0 ± 6.52 in Group-II, ($p<0.03$). The pulse rate (beats/min) was found 75.7 ± 4.83 in Group-I and 74.1 ± 3.48 in Group-II are shown in Fig 2. The systolic blood pressure (mmHg) was found 126.0 ± 10.23 in Group-I, 128.5 ± 6.0 in Group-II and the diastolic blood pressure (mmHg) 85.0±5.38 in group-I, 82.1 ± 4.90 in Group-II are shown in Graph 2.



Graph 1: Bar diagram showing Mean±SD of Age and BMI comparison with both Groups.



Graph 2: Bar diagram showing mean±SD of pulse rate, SBP and DBP comparison with both Groups.

The spirometer values are recorded (at 9am) among both groups after 12 hours exposure. The predicted value of FEV1 3.38 ± 0.20 in Group-I, 2.92±0.23 Group-II, (p<0.01) and the observed values of FEV1 3.31 ± 0.28 in Group-I, 1.96 ± 0.42 in Group-II, (P<0.001) are shown in Table1. FVC predicted values 4.38±040 in Group-I, 3.41 ± 0.42 in Group-II (P<0.01) and the FVC observed values 4.38±0.40 in Group-I, 3.42 ± 0.42 in Group-II (P<0.01) are also shown in Table1.

Parameters		Group-I		Group-II		GI-GII
		Mean	SD	Mean	SD	P Value
FEV1	Predicted	3.38	0.2	2.92	0.23	0.001
	Observed	3.31	0.28	1.96	0.42	0.001
FVC	Predicted	4.38	0.4	3.41	0.42	0.001
	Observed	3.95	0.3	2.36	0.44	0.001
FEV1/FVC	Predicted	77.2	1.65	63.79	10.49	0.001
	Observed	76.27	3	59.67	9	0.001

Table1: Mean, SD and P Value of FEV1, FVC and FEV1/FVC comparison with both Groups.

Parameters		Goup-1		Group-II		GI-GII
		Mean	SD	Mean	SD	P Value
FEF 25-75%	Predicted	4.26	0.66	2.79	0.15	0.001
	Observed	3.72	0.46	2.47	0.36	0.01
FEF 75-85%	Predicted	1.06	0.13	0.69	0.09	0.02
	Observed	1.03	0.03	0.76	0.05	0.001
PEF	Predicted	5.26	0.85	2.86	0.69	0.001
	Observed	4.99	0.4	2.1	0.38	0.03

Table 2: Mean, SD and P values of FEF25-75%, FEF75-85% and PEF comparisons with both Groups.

FEV1/FVC values among both groups are also observed in this investigation (Table1). The predicted and observed values of FEF25-75%, FEF75-85% and PEF among both groups are statistically analyse and shown in Table2.

FEF 25-75% observed values 3.72 ± 0.46 Group-I, 2.47 ± 0.36 Group-II, (P<0.01) the values are significant between Group-I and Group-II. The FEF 75-85% observed values 1.03 ± 0.03 Group-I, 0.76 ± 0.05. Group-II, (P<0.02) and PEF observed value 4.99 ± 0.040 Group–I, 2.1 ± 0.38 Group-II are also significant (P<0.03) in different level.

DISCUSSION

The computerized spirometer was used in this study which is also used in most of the hospitals and research laboratory to assess the pulmonary functions of the lung. The additional parameter like BMI, pulse rate, SBP and DBP were also investigate in this study by normal physiological procedure which indicates that cardiovascular parameters are not affected significantly by air pollution but respiratory parameters are significantly affected. We observed that FVC and FEV1 values reduced in traffic policemen as compared to control group. This shows some degree of restriction is present in the respiratory tract of traffic police man. The changes might be in the tissue of the lungs due to chronic irritation by pollutants. FEV_1 was the fraction of the vital capacity expired during the first second of a forced expiration. It indicates the capacity of expiratory muscles. FEV_1 was less in non-smoker traffic policemen indicating that there was some obstruction during the expiration. Pravati Pal et al[12] also observed that FVC values (3.92±0.13 in Group-I and 3.56 ± 0.11 in Group-II) are significantly (P<0.05) reduces in the case group due to irritation in respiratory tract and weakness of respiratory muscles. FEV_1/FVC indicates the condition of the bronchial musculature. In our study FEV1/FVC was statistically significant in traffic police men. It indicates that they are suffering from both obstructive and restrictive type of disorder in lungs. Wongsuraji et al [13] states that the traffic policemen had a significantly higher prevalence of abnormal air flow (FEV1 < 80% predicted) than the control group (21.1% vs. 12.4%, P < 0.04).

The mean values of FEV1 of the traffic policemen were significantly lower than the control group (3.29 ± 0.5 L vs. 3.43 ± 0.5 L, (P<0.01). The condition of airways and flow of air through the airways are studied by the observation of FEF25-75%, FEF75-85% and PEF during their performance. Reduced FEF25-75% in traffic police men shows smaller airway obstruction and reduced values of FEF75-85% and PEF indicate that disturbance of air flow through the respiratory tracts. The other studies at Jaipur, India by (Singh et al[14]) also shows that highly significant (P <0.001) changes between control and subject groups in their investigation.

CONCLUSION & RECOMMENDATIONS

To the finding of our study shows that the adverse health impacts of automobile pollution can be significant. The observed results shows decrease lung functions in traffic policemen when compared with control groups. The Spirometric values indicate decreased FVC, FEV_1, values in traffic policemen. This may be due to small airway obstruction which can be confirmed by FEF25-75% and PEF. It was suggested that the traffic police personnel should use air filter masks during the duty hours in busy traffic area and should undergo regular health check-up to identify respiratory symptoms. If any symptom is present, they should undergo suitable management procedures.

Awareness must be created in the public regarding the harmful effect of traffic air pollution and advice should be given to switch-off the engine in traffic queue.

Following recommendations should be given to traffic policemen:

· Imparting health education and conducting regular medical check-up for protection of traffic policemen working at heavy traffic junctions.
· Compulsory use of protective equipment (e.g. nose air filter masks) by traffic policemen working at heavy traffic junction.
· Intensive promotion of electrical vehicles by Government agencies.
· Purified fuels are used (petrol, diesel) and better to use gas in bikes and cars.
· Promotion of "Car-pool" concept that is use of single vehicle by 3-4 people who work in same office.

Conflicts of Interest: None

REFERENCES

1. Ingle ST, Pachpande BGH, Wagh ND, Patel VS, Attarde SB. Exposure to vehicular pollution and respiratory impairment of traffic policemen in Jalgaon city, India. Ind health 2005; 43:656-662.
2. Nicolai T, Carr D, Weiland SK, Duhma H, Ehrestein OV, Wagner C, Mutlus EV. Urban traffic and pollutant exposure related to respiratory outcomes and atopy in a large sample of children. Eur Respir J 2003; 21: 956-963.
3. Frampton MW. Systemic and cardiovascular effects of airway injury and inflammation: Ultrafine particle exposure in humans. Environ Health Prospect 2001; 109:529-532.
4. Fung KY, Luginaah I, Gorey KM, Webster G. Air pollution and daily hospital admissions for cardiovascular diseases in Windsor, Ontario. Can J Public Health 2005; 96:29-33.
5. Pope CA III, Burnett RT, Thurston GD, Thun MJ, Calle EE, Krewski D, Godleski JJ. Cardiovascular mortality and long-term exposure to particulate air pollution: epidemiological evidence of general pathophysiological pathways of disease. Circulation 2004; 109:71-77.
6. Routledge HC, Manney S, Harrison RM, Ayres JG,Townend JN. Effect of inhaled sulphur dioxide and carbon particles on heart rate variability and markers of inflammation and coagulation in human subjects. Heart 2006; 92:220-227.
7. Sydbom A, Blomberg A, Parnia A, Stenfors N, Sandstrom T, Dahlen SE. Health effects of diesel exhaust emissions. Eur Respir J 2001; 17: 733-746, 2001.
8. Proietti L, Mastruzzo C, Palermof1, Yancher C, Lisitano N, Crimi N. Prevalence of respiratory symptoms, reduction in lung function and allergic Sensitization in a group of treaffic police officers exposed to urban pollution. Med Lav 2005; 96:24-32.
9. Zhang YX, Wei QY, Wang J, Qiao TH, Bai HB, Cai LN. Automobile tyre colloidal particle induced allergic damage of respiratory system in traffic policemen and its allergenicity. (Article in Chinese) Zhonghua Lao Dong Wei Sheng Zhi Ye Bing Za Zhi. 2007 Jun;25(6):346-9.
10. Gupta P, Makhijani SD, Meenakshi C. Pulmonary function tests on rubber factory workers exposed to polynuclear aromatic hydrocarbons. Indian Journal of Physiology 1988; 52: 71–5.
11. Lubinski W, Toczyska I. Chcialowski A, Pluso T, Influence of air pollution on pulmonary function in healthy young men from different regions of Poland. Ann Agric. Enveron Med 2005; 12:1-4.
12. Pal P., John Robert A., Dutta T.K.. Pal G.K. pulmonary function tests in traffic police personal in Pondicherry. Indian J physiology and pharmacology 2010; 54(4): 329-326.
13. Wongsurakiat P, Maranetra KN, Nana A, Naruman C, Aksorint M, Chalermsanyakorn T, Respiratory symptoms and pulmonary function of traffic policemen in thorunburi. J, Med Asssocthai 1999; 82:435-443.
14. Singh V, Sharma BB, Yadav R, Meena P. Respiretory morbidity attributed to auto exhaust pollution in traffic policemen of jaipur, India. Asthma 2009; 46:118-21.

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