ORIGINAL ARTICLE

Study of Pulmonary Function Tests of Traffic Policemen In Jammu Region

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Abstract

The present study was carried out to assess the lung functions of traffic policemen in Jammu region. A cross sectional study was carried out among 100 traffic policemen and compared with healthy persons with the subgroup comparison among rural and urban areas. Lung function like FVC, FEV1 , FEV3,PEFR & MVV on computerized spirometry. The results revealed that all lung functions were lower than the healthy controls and differences were statistically marked in FVC,FEV1, ,PEFR. Intergroup comparison between rural and urban revealed that police personnel's posted in rural areas had better lung function than urban counterpart which varied among each other statistically significantly .(FVC -0.04,FEV1-0.0003,FEV3-0.0001,MVV-0.003,PEFR-0.03). The traffic policemen exposed to air pollution have lower lung function than the healthy persons and those posted at rural areas have better lung function

Key Words

PFTs,Traffic Policemen , Occupational Hazards

Introduction

Occupational hazards on health owing to environmental pollution have recently received some attention in public health management and occupational medicine but the mitigation measures for those exposed leaves a lot to be desired. Urbanization & industrialization coupled with the ever increasing use of automobiles are major source of environmental pollution. Airborne dust constitutes most significant source of ultrafine particles in urban environment. (1) Automobile exhaust is a major hazard for traffic policemen, autorickshaw drivers, roadside vendors etc. Contaminants in automobile exhaust are oxides of nitrogen, carbon monoxide, hydrocarbons, respirable particles, lead and sulfur dioxide (2) which results in a health problem.

Studies have indicated that air- borne pollutants cause changes in the pulmonary function tests (PFT) due to injury to airways and parenchyma in those exposed because lungs are the major site of contact between body and environment. (3,4) The effects of air pollution include chronic cough, wheezing, breathlessness, decreased body defense mechanism against foreign material damage to lung tissue and carcinogenesis. (5,6)

Number of studies have shown that ventilatory lung values are related to age, sex, anthropometric parameters, ethnic origin, smoking habit, occupational exposure, environmental conditions and methods used (7-10).

Numerous studies have recorded deterioration in the lung function tests among the road side workers. However most of the studies originate from the west and few studies are available from Indian setup.

Moreover, there is limited published data regarding PFT (Pulmonary function Test) abnormalities in traffic policemen who are exposed to air pollution during duty hours. It was in this context that the present study was carried out in urban and rural areas of

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Jammu region to assess lung functions of traffic policemen and compared them with the normal healthy individuals.

Material and Methods

Current cross - sectional study was carried out among 100 traffic policeman and among them 56 of the study subjects were working in urban areas of Jammu city while rest of the 44 were on duty in rural areas adjoining Jammu city. A group of 33 healthy males from similar age group serving in Govt. Medical College, Jammu as nursing orderlies, pharmacists and other technical staff in similar age group (25-45 years) but not exposed to traffic pollution were taken as controls.

Each subject was provided a questionnaire in which he recorded demographic data, health status and consent to participate in the study.

Inclusion Criterion

- Who gave proper consent
- Non-smoker subjects(Traffic Policemen) with no previous history of any respiratory illness prior to their posting

Exclusion Criterion - Presence of any acute or chronic respiratory disorders, systemic illness indirectly affecting respiratory system, in present occupation < 2 years, smokers, age <25 and >45 years.

PFT's of those subjects were performed with the help of MEDSPIROR, a computerized Spiro meter that automatically records all lung function tests and their percentage values. The subjects were familiarized with the instrument. All PFT's were done in sitting position and subjects were encouraged to perform upto optimum levels. A nose clip was applied during the entire maneuver. Three reading were taken at the same time and best out of them was considered for analysis and FVC, FEV1, FEV3, PEFR and MVV values were obtained.

Statistical Analysis

The data obtained was analysed using SPSS 10.0 version as mean and SD and statistical difference was tested using unpaired student's 't' test.

Results

Table- 1 Comparison of mean values of age, height and weight of study subjects and control which shows mean values of age in years, height in cms and weight in kg's in both the study group as well as control group.

Table -2 Relationship of mean values of hemodynamic parameters between subjects and controls which depicts various parameters like pulse, respiratory rate , systolic BP, diastolic BP in the study subjects and control group. The difference in mean respiratory rate between the two groups was found to be statistically significant [$p < 0.001$].

Table 3- Relationship of Haemodynamic parameters between urban and rural study population which shows distribution of haemodynamic parameters of urban vs. rural study subjects. The difference in the mean respiratory rate between the two groups was statistically significant [$p < 0.001$].

Table 4- Pulmonary Function parameters in study subjects vs control group which shows various parameters of PFT's in study subjects and controls. The difference between the two groups was highly significant ($p<0.001$) for FVC, MVV and PEFR while FEV1 was found to be significantly lower in study subjects.

Table 5- Urban and Rural PFT's in the study population shows PFT's in urban vs. rural study subjects. Highly significant association ($p<0.001$) was found for FVC1, FEV3 and MVV while FEV1 and PEFR were significantly lower in urban study subjects when compared to their rural counterparts.

Discussion

PFT's are non- invasive diagnostic tests that provide measurable feedback about the function of lungs. An assessment of lung volumes, capacities and flow rates provide specific information for clinical diagnosis and research purposes. Study of PFT's in workers in different occupations define safe conditions and in assessing the effects of exposure to known hazards.

There has been an exponential increase in automobiles in the last couple of decades with resulting in increase in air pollution levels in and around Jammu city. The present study examined respiratory health of traffic policemen who constitute a high risk group in terms of health and occupation, as they are exposed to diesel exhaust, organic and inorganic substances present in petrol, particulate matter, photoionizable dust. The various lung function parameters recorded were compared with controls and

Table. 1 Demographical Profile of Study Population

Parameters	Study Subjects	Control Group
Age(years)	34.4 ± 5.40	32.2 ± 6.40
Height(cms)	166.6 ± 3.30	170.4 ± 4.15
Weight(kg)	64.8 ± 9.60	68.6 ±8.40

Table. 3 Comparison of CVS & Respiratory Rate

Parameters	Urban (Mean ± SD) N=56	Rural (Mean ± SD) N=44	p value
Pulse (beats /min)	73.14 ± 2.88	72.36 ± 4.79	0.34
Respiratory rate	17.68 ± 2.81	15.81 ± 1.24	0.001
SBP(mmHg)	124.18 ± 66.05	124.95 ± 5.48	0.50
DBP(mmHg)	80.07 ± 6.77	80.72 ± 5.34	0.59

between traffic personnel posted in urban and rural areas. Except for FEV3/FVC all other PFT's were found to be on the lower side in the study subjects. However there was not much difference in FEV3/ FVC in both the groups. Similar results were reported in numerous studies. Gamble *et al* (10) studied the chronic effects of diesel exhaust on respiratory system in 283 diesel bus garage workers. Results showed reduction in all pulmonary function parameters except FEF. Chawla and Lavania (11) in their study in petrol station workers reported decline in FVC and FEV1 but FEF 25-75% was the most affected pulmonary function parameter. Similar Findings have been reported by various other authors. (12-17)

However there are other studies contrary to the results of current study. Attfield *et al* (18) have observed no significant differences in FVC among mine workers in either smokers or non smokers. Kesava Chandrani *et al* (19) in their study in petrol pump workers also reported that regression co efficient of age were not found to be signify cant for all PFT except PEFR.

In the current study PFT's in traffic policemen working in the urban areas were found to be significantly on the lower side as compared to those working in rural areas. The most obvious reason being the lower traffic density and more of green plantation in the rural areas. Our results

Table. 2 Comparison of CVS & Respiratory Rate

Parameters	Subjects (Mean ± SD) N=100	Controls (Mean ± SD) N=33	p value
Pulse (beats /min)	72.8 ± 3.83	73.82 ± 4.13	0.31
Respiratory rate	16.86 ± 2.43	15.79 ± 0.96	0.001
SBP(mmHg)	124.52 ± 5.79	127.94 ± 3.98	0.51
DBP(mmHg)	80.36 ± 6.16	83.94 ± 3.89	0.59

Table. 4 Comparison of Respiratory Parameters

Parameters	Subjects (Mean ± SD) N=100	Controls (Mean ± SD) N=33	p value
FVC	2.52 ± 0.68	3.12 ± 0.30	0.0007
FEV1	2.20 ± 0.81	2.86 ± 0.21	0.05
FEV3	3.20 ± 0.43	3.26 ± 0.41	0.49
FEV1/FVC (%)	88.97 ± 20.74	92.24 ± 4.43	0.21
FEV3/FVC (%)	100.21 ± 0.32	100. 14 ± 0.16	0.96
MVV (L/min)	90.09 ± 32.98	117.38 ± 26.96	0.000
PEFR (L/min)	6.44 ± 1.84	8.55 ± 1.80	0.0001

Table. 5 Comparison of Respiratory Parameters

Parameters	Urban (Mean ± SD) N=56	Rural (Mean ± SD) N=44	p value
FVC, (L)	2.32 ± 0.87	2.77 ± 0.32	0.04
FEV, (L)	2.07 ± 0.87	2.38 ± 0.68	0.0003
FEV3 (L)	1.93 ± 0.877	2.85 ± 0.622	0.0001
FEV1/FVC (%)	88.67 ± 24.17	91.90 ± 15.09	0.19
FEV3/FVC(%)	100.20 ± 0.38	100.21 ± 0.23	0.95
MVV (L/min)	80.64 ± 32.12	91.93 ± 34.11	0.003
PEFR(L/sec)	5.84 ± 1.81	6.63 ± 1.88	0.03

are well supported by Souza MB *et al* (20). The authors in their histopathological study concluded that long term exposure to air pollution may contribute to the pathogenesis of airway disease and that levels of air pollution have adverse effects on respiratory tract. Rajkumar (21) has reported higher morbidity in autorickshaw drivers due to exposure to air pollution in his study conducted in Delhi. Periodic checkups and transfer to other sections of the department are some of the remedial measures.

Awareness on health aspects of pollution and use of protective equipment in the form of mask can also improve situations. The traffic policemen studied might be small in number with respect to total population engaged in this profession but the trend of the results are representative of that population. The limitation of the

current study can be inclusion of convenient sample of traffic policemen and this can be attributed to limited time of data collection on workday for all the respondents who work day after day without any break.

Consulion

PFT's of traffic policemen who are occupationally exposed to vehicular emissions and other dust have significantly reduced PFTs in comparison to healthy controls and amongst the personnel's those working in rural areas have less deterioration in PFTs than their urban counterparts.

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