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RESPIRATORY HEALTH STATUS OF TRAFFIC POLICEMEN IN PUDUCHERRY, SOUTH INDIA

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ABSTRACT

Aim: To assess respiratory health status of traffic policemen using spirometry.**Materials and methods:** A cross sectional study was conducted among traffic policemen in Puducherry, a town in south India. Information on duration of exposure, respiratory symptoms and usage protective equipment were obtained. Spirometry was done to assess lung function. Observed values of Pulmonary Function Test (PFT) parameters like Forced Vital Capacity (FVC), Forced expiratory volume in one second (FEV1), Peak Expiratory Flow Rate (PEFR) and Mid Maximal Expiratory Flow (MMEF) were compared with predicted values (expected values). **Results:** A total of 94 traffic policemen were included in the study. Mean duration of working in traffic department was 4.5 years (SD \pm 4.2). More than half (52.1%) of policemen reported 'cough' in past three months. Rhinitis (common cold) was reported by 40%. All observed PFT parameters (FVC, FEV1, PEFR and MMEF) were less than their respective predicted (expected) values. **Conclusion:** Respiratory function of traffic policemen showed reduction compared to their expected values emphasizing the need for preventive measures.**Keywords:** Pulmonary function test, traffic policemen, respiratory function, respiratory illness

INTRODUCTION

Exposure to air pollutants is known to be harmful to health, in general, and to the lungs in particular. In this respect, traffic police personnel, due to the nature of their job, are at a particular risk, since they are continuously exposed to emissions from vehicles. These personnel have to undergo physical strain in an environment polluted by fumes, exhaust of vehicles, use of blowing horns, blow of dust in the air by a speeding vehicle, etc. Prolonged exposure to dust can cause bronchial problems. [1-5] The presence of various particles and gases from vehicular emission like carbon dioxide, carbon monoxide, sulphur, benzene, lead, nitrogen dioxide, nitric

oxide and black smoke etc. play a role in the pathogenesis of respiratory diseases. Acute effects include irritation of the eyes and nose, lung function changes, headache, fatigue and nausea. Chronic exposure is associated with cough, sputum production and reduction in lung function. [6,7] In the long run, the pollutants produce diseases like asthma, COPD and malignancy in the exposed individuals apart from significant changes in lung functions.

Pulmonary function tests using a computerized spirometer assess respiratory functions and give a fair idea about the respiratory health status of an individual. These changes can be observed even before the disease becomes symptomatic. Hence,

this study aimed at evaluating the respiratory health status of traffic policemen using spirometry and also to document the prevalence of respiratory symptoms among traffic policemen.

MATERIALS AND METHODS

A cross sectional study was carried out among traffic policemen in Puducherry, a Union territory in southern part of India. This study was carried out as part of annual screening camp organized in the Department of Pulmonary medicine at a tertiary care centre on occasion of World COPD day for traffic policemen. Traffic policemen were screened in three batches. Information on age, gender, years in service, history of smoking and alcohol consumption, usage of protective mask were obtained during the camp. History of respiratory symptoms and family history of allergy and asthma were also recorded.

Lung function was assessed by using spirometry, a quite accurate method for assessing the pulmonary function especially the ventilatory functions of the lung. The lung function was assessed using 'Ferraris KoKo Spirometer' (Ferraris Respiratory Inc., Louisville, Colorado) using standard protocols. Parameters like FVC, FEV1, PEFR and MMEF were measured and post bronchodilator testing was done as per the need of the case. The actual values (observed values) were compared with predetermined Predicted values of the subjects.

The testing was performed in the sitting, relaxed position after adequate motivation and encouragement. Satisfactory demonstrations were carried out about the equipment and the procedure. The subjects were asked to perform the 'FVC maneuver' (maximal expiration followed by maximal inspiration) and best of three efforts was taken into account. Chest physicians examined all the study participants to exclude gross pulmonary diseases or anatomical deformity of chest or spine and interpreted the

spirometry. The study was reviewed and approved by Institute Ethics Committee.

Statistical analysis

Data were entered in Microsoft excel spreadsheet and analysis was done in SPSS version 17.0. Observed values of PFT parameters like FVC, FEV1, PEFR and MMEF were compared with predicted values (expected values) standardized for age, height and weight. 't' test was used to compare the difference of means between observed and predicted values.

RESULTS

A total of 94 traffic policemen were included in the study. The study participants (N=94) constituted about 90% of all traffic policemen working in the study area. All were males and 86% were married (Table 1). Mean duration of working in traffic department was 4.5 years (SD \pm 4.2). Forty two percent were working for more than three years. Only 7% of traffic policemen were following some protective measure (mask or handkerchief over face to cover nose and mouth). Twenty percent reported family history of allergy and asthma reported by 12%. More than half (52.1%) of policemen reported 'cough' in past three months. Rhinitis (common cold) was reported by 40%.

Pulmonary function tests help to evaluate the respiratory status of individuals and helps in diagnosing and managing respiratory problems. Only 81 participants were able to complete the spirometer procedure with good effort. Remaining participants' spirometry results showed poor effort and were excluded from analysis. Table 2 shows the pulmonary function tests of the traffic policemen. All observed PFT parameters were less than their respective predicted (expected) values. Observed FVC (3.7 L) in traffic policemen were less than expected FVC (4.0 L) and this difference was statistically significant ($P < 0.001$). Forced Vital Capacity (FVC) is the maximum amount of air that can be exhaled after a maximal inspiratory effort. The

mean observed FVC in traffic policemen was 92% of the expected value. Peak Expiratory Flow Rate (PEFR) was considered as a better test for assessing expiratory effort. There was statistically significant difference ($P=0.03$) between observed PEFR (8.1 L/s) and expected PEFR (8.5 L/s). FEV1 is the volume of air exhaled in one second during a forced vital capacity effort. The observed FEV1 (2.9 L) was less than expected FEV1 values (3.3 L) and this difference was statistically significant ($P < 0.001$). Mean observed FEV1 value of participants was 88% of expected FEV1 values. MMEF (Mid Maximal Expiratory Flow) values also showed significant difference ($P < 0.001$).

Considerable emphasis is placed on respiratory function testing in the assessment of work-related respiratory illness. These tests rarely provide a single clinical diagnosis and must always be interpreted within the full clinical context. Based on history, clinical examination and PFT parameters, chest physicians diagnosed obstructive and restrictive lung diseases in the traffic policemen. About 28% of the participants were diagnosed to have some obstructive disease, majority 21% having diagnosed with 'small airway disease'.

DISCUSSION

Pulmonary function tests showed a reduction in respiratory function of traffic policemen. All the four parameters (FVC, FEV1, PEFR and MMEF) were reduced in traffic policemen. The significant difference between observed and expected PFT values points towards the reduction in lung function in this occupational group. This fact is strengthened by high prevalence (28%) of obstructive disease in this population. Similar observations have been observed in studies in India and other countries as well.^[8-16] In some of the studies mentioned above, the pulmonary functions of the traffic policemen were compared with a control group. The increase in prevalence of respiratory symptoms in traffic policemen or

individuals who were exposed to air pollutants like taxi drivers, auto-rickshaw drivers have been reported in some studies.^[17] Reduction in PEFR values may indicate the risk of obstructive airway disease in this occupational group who are exposed to air pollutants every day. The fact that majority of the policemen did not use any protective mask increases this risk. Though 60% of the traffic policemen were exposed for less than three years duration, the high level of obstructive respiratory disease in traffic policemen might indicate higher density of air pollutants.

Assessment of respiratory status by spirometry along with clinical history and examination by chest physicians adds strength to the study. Adding a control group would have been better to interpret the findings and it is a limitation of this study. Detailed information on air pollutants of the study area would have helped to understand the issue better.

Pre-placement examination like in other industries would help the individuals to choose right job and reduce the risk of getting ill. Periodic examination of traffic policemen will help in identifying the health problems. Emphasis has to put on preventive aspects rather than on diagnosis and management of respiratory diseases. Hence protective mask wearing and reduction timing of work shifts will help in reducing the exposure to air pollutants.

CONCLUSION

Respiratory function of traffic policemen showed reduction compared to their expected values. Measures have to be taken in preventing and managing respiratory diseases in this occupational group. Pre-placement and periodic medical examination will be helpful in identifying at risk personnel and appropriate management can be instituted at early stage of disease itself.

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Table-1. Socio-demographic characteristics and history of respiratory symptoms among traffic policemen (N=94)

Variables	Values
Age (mean ± SD)	38.6 ± 9.6 years
Marital status	
Married	81 (86.2)
Unmarried	13 (13.8)
Education	
Higher secondary	53 (56.4)
Graduate	31 (33.0)
Post-graduate	10 (10.6)
Height (mean ± SD)	1.7 ± 0.04 metres
Weight (mean ± SD)	75.5 ± 10.3 kg
No. of years in service (Traffic department)	
≤3years	55 (58.5)
>3 years	39 (41.5)
Using a protective mask/any other protection	7 (7.4)
Family history	
Allergy	19 (20.2)
Asthma	12 (12.8)
Current smoker	19 (20.2)
Alcohol intake	30 (31.9)
Respiratory symptoms	
Cough	49 (52.1)
Rhinitis/dermatitis	38 (40.3)

Table2 Observed and predicted PFT parameters of traffic policemen (N=81)

Parameter	Observed values	Expected values	P value
FVC (L)	3.7 ± 0.09	4.0 ± 0.05	<0.001
FEV1 (L)	2.9 ± 0.06	3.3 ± 0.04	<0.001
PEFR (L/s)	8.1 ± 0.20	8.5 ± 0.14	0.03
MMEF (L/s)	4.1 ± 0.10	4.2 ± 0.06	<0.001

Observed and expected values were expressed as mean ± standard error. FVC- Forced Vital Capacity, FEV1- Forced Expiratory Volume in one second, PEFR- Peak Expiratory Flow Rate, MMEF- Maximal Mid Expiratory Flow.