ASSES THE IMPACT OF EFFECTS OF VEHICULAR EXHAUST IN LUNG'S FUNCTIONS OF TRAFFIC POLICE OFFICERS WORKING AT BATTICALOA TOWN

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ABSTRACT: Environment is polluted by vehicular exhaust due to increased number of automobiles working on petrol and diesel fuels. Air quality crisis in cities, is mainly due to vehicular emissions. This study was carried out to assess the effects of vehicular exhaust in lung functions of traffic policemen working at Batticaloa town. The study settings of this investigation were Chest clinic, Teaching Hospital, Batticaloa and Police station, Batticaloa.

Data were collected by the investigators through the Pre Designed Structured Self-Administered Questionnaire and the measurements of Spirometer which is testing pulmonary function. Statistical analysis was performed by statistical software (SPSS 16.0) and the p-value < 0.05 was considered significant for all analyses. The occurrence of shortness of breath was high among traffic policemen and occurrence of cough had higher value among controls. The values of Odds ratio for shortness of breath and frequent coughing were 1.80 & 0.64 respectively, however occurrence of shortness of breath was high and significantly differ from control group. Parameters of lung functions declined in the group of traffic policemen compared to the control; however FEV1 of the traffic policemen significantly (p=0.038) reduced compared to the control group. All parameters were declined in the group of traffic policemen who had exposure more than 5 years compared to the police men with less than 5 years exposure, however FEV1 significantly (0.041) reduced in the policemen had the more than 5 years exposure. Respiratory illness of traffic police men has been become considerable problem in Batticaloa town and initial state of impairment of lung's functions of traffic policemen has been observed. It is recommended to seek the necessary solutions for the arising problems in traffic policemen in Batticaloa.

Keywords: Respiratory Disorders, Traffic Police Officers, Batticaloa

1. INTRODUCTION

Today's urban streets environment is polluted by vehicular exhaust due to increased number of automobiles working on petrol and diesel fuels. Air quality crisis in cities, is mainly due to vehicular emissions. 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. They emit hydrocarbons (HC), Carbon monoxide (CO), Lead (Pb), Nitrogen oxides (NO's) and particulate matters.

Police officers spend much more of their working hours on the roads exposing themselves to polluted air and thus at a higher risk of developing impairment in respiratory functions. Among them, traffic police officers are the people who work in heavy traffic roads in main cities of the island during most of their hours.

It is very important to find out the degree of deterioration of lung's function among traffic policemen, so that remedial measures can be established. It is also important

to assess the protective effect of face masks on decline of lung's function to make appropriate recommendation.

There were no studies conducted so far in Batticaloa district regarding this health problem in traffic policemen. Therefore, the objective of the study was to assess the significance of the lung impairment in traffic policemen who exposed to vehicle exhaust and to necessitate immediate preventive measures have to be taken to control the air pollution in Batticaloa district.

2. METHODOLOGY

It was a Descriptive and Analytical Cross Sectional study conducted at Chest clinic, Teaching hospital Batticaloa and Police Station, Batticaloa during May to October 2014. Data was collected by the investigators from the respondents of this study through the Pre Designed Structured Self-Administered Questionnaire and the measurements of Spirometer which is testing pulmonary functions. The informed written consent by participants and the written permission from the Director, Teaching Hospital, Batticaloa, District Tuberculosis Control Officer, Chest Clinic, Batticaloa and HQI, Police Station, Batticaloa was obtained prior to the study.

The traffic policemen and the controls were subjected to pulmonary functions test. Before the test, age, height, and weight of the subjects were measured and entered in the spirometer. The two values indicated by spirometer, one was actual value and the other was expected value. The expected values for adults calculated by spirometer software, using the following set of prediction equations: FVC (L) (0.05 × H) – (0.014 × A) – (4.49) (1), FEV1 (L) (0.04 × H) – (0.021 × A) – (3.13) (2), PEFR (L/s) (0.071 × H) – (0.035 × A) – (1.82) (3), Where; H = height in centimeters and A = age in years.

Statistical software (SPSS 16.0) was used to analyze the data and p-value < 0.05 was considered significant for all analyses. Ethical approval was obtained from Ethical Review Committee, Faculty of Health - Care Sciences, Eastern University, Sri Lanka.

3. RESULTS AND DISCUSSION

There were fifty six policemen participated in the study. The average age in years (Traffic 35.33 ± 8.79 vs Control 41.88 ± 9.11), height in centrimeter(Traffic 169.13 ± 5.24 vs Controll 168.00 ± 6.06), and weight (Traffic 72.67 ± 12.82 vs Control 77.09 ± 16.00) of the both traffic policemen and the control group and the period of exposure of traffic policemen (less than 5 years - 66.67% vs more than 5 years - 33.33%) were summarized as below. The mean age of traffic police was lesser than that of general police.

Table 1. Anthropometric measurements of traffic policemen & controls

Parameter	Traffic police Officers	Police Officers in general duty
Age (years)	35.33 ± 8.79	41.88 ± 9.11

Height (cm)	169.13 ± 5.24	168.00 ± 6.06
Weight (kg)	72.67 ± 12.82	77.09 ± 16.00
Duration of exposure (years) < 5years > 5years	66.67% 33.33%	NA NA

The prevalence of various respiratory symptoms and the Odds ratios in both traffic police officers and controls also recorded. It was seen that among the 24 traffic police officers examined, 25% reported having shortness of breath and 8.33% complained of frequent cough. In case of controls, 9.38% had shortness of breath and 12.5% complained of frequent cough.

The occurrence of shortness of breath was high among traffic police officers and occurrence of cough had higher value among controls. The values of Odds ratio for shortness of breath and frequent coughing were 1.80 & 0.64 respectively and shortness of breath shown significance increase in traffic police officers.

Table 2. Comparison of risk of respiratory symptoms among the traffic policemen (exposed) and control (none exposed) groups.

Symptoms	Study population	Presence of symptoms		Odds ratio
		Yes	No	
Frequent coughing	Traffic control	2 4	22 28	0.64
Breathlessness	Traffic Control	6 5	18 27	1.80*

* All values are statistically significant

The spirometric parameters: FVC (L) (Controls 3.88 ± 0.38 vs Traffic 3.66 ± 0.48), FEV1(L) (Controls 3.25 ± 0.33 vs Traffic 3.03 ± 0.41) and PEF(L/s) (Controls 8.93 ± 0.68 vs Traffic 8.55 ± 0.83) were compared among the traffic policemen (exposed) and control (none exposed) groups however the significant reduction had been noticed in FEV1 (p=0.038) in traffic police officers .

Table 03. Comparison of spirometric parameters among the traffic policemen (exposed) and control (none expose Controls d) groups

Parameters	Controls	Traffic police Officers	P value
FVC (L)	3.88 ± 0.38	3.66 ± 0.48	0.072
FEV1(L)	3.25 ± 0.33	3.03 ± 0.41	0.038*
PEF(L/s)	8.93 ± 0.68	8.55 ± 0.83	0.070

* All values are statistically significant

Comparison of spirometric parameters: FVC (L) (>5years 3.71± 0.30 vs <5 years 3.96 ± 0.40), FEV1(L) (>5years 3.06±0.26vs <5 years 3.35 ± 0.33) and PEF(L/s) (>5years 8.65±0.42 vs <5 years 9.08 ± 0.75) were made among the traffic policemen (exposed) with respect of period of exposure, however the reduction had been noticed in FEV1 with statistical significance (p=0.041) in traffic police officers who had more than 5 years exposure.

Table 4. Comparison of spirometric parameters among the traffic policemen (exposed) with respect of period of exposure

Parameters	Exposure > 5years	Exposure < 5years	P value
FVC (L)	3.71± 0.30	3.96 ± 0.40	0.147
FEV1(L)	3.06±0.26	3.35 ± 0.33	0.041*
PEF(L/s)	8.65±0.42	9.08 ± 0.75	0.153

* All values are statistically significant

The significant odd ratio values (1.80) of shortness of breath, significant reduction in FEV1 (P =0.038) in traffic police Officers compared to the control group and significant reduction in FEV1 (P =0.041), considerable reduction in FVC and PEFR among the traffic police Officers with the more than five years of exposure to the pollutants indicated that the risk of respiratory morbidity in traffic police Officers had been increased than the controls of the study. Even though all parameters were not tally with the studies in the literature, some of them are matched with the findings of literature.

The increased prevalence of respiratory symptoms and the lung's function impairment in the traffic police officers in Batticaloa town due to prolonged exposure to vehicular pollution and failing to take the precautions such as wearing mask while on duty, which leads to chronic airway irritation and increased mucus production and ultimately to chronic obstructive pulmonary diseases.

4. CONCLUSION

Respiratory illness of traffic police officers is a highly considerable problem in Batticaloa town. State of impairment of lung function of traffic policemen has been observed in the form of FEV1. It is advisable to conduct the study in future to evaluate trend and impact of vehicular exhaust in traffic policers.

It is commendable to take the following precaution to prevent and reduce the prevalence of respiratory illness in the traffic police officers those are: Compulsory use of protective equipment such as masks by traffic police officers during duty hours, Rotation of duty between traffic policemen which allows them to do their duties in alternate days and time shift within the day reducing the risk of prolonged exposure to vehicle exhaust, Health education and conducting regular medical checkups for traffic policemen, Intensive promotion of electrical and hybrid vehicles by Government, Use of a single vehicle by 3-4 people who in the same office (Car pool method), Frequent vehicle emission tests for the vehicles.

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