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A Cross Sectional Study of Respiratory Health Status of Traffic Police Personel in U.P, At Tertiary Care Center.

Dr. B.B Tayal[1], Dr. Nishant Tayal[2], Alok Kumar[3], Dr.Sudhanshu[4], Dr. Shikha[5]
[1]*Assistant Professor Department of Physiology MSY.Medical College, Meerut*
[2]*Assistant professor Department of Medicine.LLRM Medical College Meerut*
[3]*Tutor Department of Microbiology MSY Medical College, Meerut.*
[4]*HOD Professor Department of Physiology MSY Medical College, Meerut.*
[5]*Associate professor Department of Physiology MSY Medical College, Meerut.*
Corresponding author- Dr.Nishant tayal

Abstract: *The study is undertaken to assess the respiratory health status of traffic policemen at Hapur,Uttar Pradesh. According to Nielsen et al, Traffic related air pollution due to vehicular exahaust is an occupational health hazard to individuals who work close to traffic(1).Traffic police personnel are posted at major traffic junctions through which maximum number of vehicles pass and they remain in this duty for years together allowing assimilating forces to act in conjunction and cause long term respiratory problems. The fumes, chemical and particles present in the emission are reported to be damaging to the lung functions of these individuals. In the long run the pollutants may produce respiratory disease diseases like asthma and bronchitis. Based on the inclusion and exclusion criteria Spirometry was done to access the 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) were compared with predicted values (expected values).*

Results: *A total of 100 traffic policemen were included in the study. Mean duration of working in traffic department was 4.5 years (SD ± 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: ***PFT*** *-Pulmonary function test, TP- traffic policemen, RF- respiratory function, RI- respiratory illness*

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I. Introduction

During the last few decades, air pollution of the urban atmosphere has received much attention and several studies have linked it with serious health risks especially respiratory diseases [2] According to the World Health Organization (WHO), air pollution is responsible for increase in out-patient visits, hospital admissions, and mortality due to respiratory and cardiovascular diseases [3] Traffic police personnel (TPP) working in outdoor urban environments are occupationally exposed to pollutants generated by engine combustion. Prolonged exposure to dust can cause bronchial problems. [4] 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.[4,5] In the long run, the pollutants produce diseases like asthma, COPD and malignancy in the exposed individuals apart from significant changes in lung functions.

Vehicular exhaust in the major metropolitan cities amount for -

- 70% of all carbon monoxide
- 50% of all hydro carbons
- 30-40% of all oxides and
- 30% of all particular matter

The particles emitted from vehicular exhaust of more than 10 micron size are held in upper respiratory tract & particle less than 10 micron size are accumulated in the lungs & produces respiratory abnormalities. Hence PM10 are of great concern in air pollution studies.

Recent evidence suggests that diesel engine emissions are more dangerous than previously considered. Numerous studies have found association between occupational exposure to diesel exhaust and lung cancer (US EPA 2002 & IARC 1989)

Carbon mono oxide interfere with Oxygen transport through the formation of carboxy-haemoglobin (U. S. EPA 1995)

Exposure to sulphur dioxide even at low levels makes the airway in lung more sensitive to broncho-constrictors. This in turn inhabits oxygen exchange and can result in respiratory disease.

Nitrogen oxide is known to irritate the alveoli leading to symptoms resembling emphysema. Suspended particulate matter (aerosols). Particle pollution contributes to excess mortality and hospitalization for cardiac and respiratory tract diseases (US EPA 2001). They cause disturbance in the cardiac autonomic nervous system, cardiac arrhythmias or increases the blood concentration of markers of cardiovascular risk. (son warty 2001)

There are limited studies done in Hapur, U.P. India regarding respiratory health status of traffic police. The prevalence of Obstructive Restrictive and mixed type of functional impairment of the lung was found to have direct relationship with the dust concentration and duration of exposure (5).Prolong exposure to dust can lead to chronic bronchial problems(6). Investigations of the respiratory health effects from vehicular pollution exposures are necessary in order to predict the risk factors that may cause an asthmatic response (7).

Workplace programmers to promote the health and fitness of police officers are commonly lacking, but can be effective means for reducing the respiratory risk. It is hoped that the present study would guide the implementation of intervention for addressing the health concerns for this important occupational group.

The present study is carried at Mulayam Singh Yadav Medical college & hospital, Hapur road Meerut, between the period DEC 2017 to MARCH 2019.

II. Aims And Objective

Present study was undertaken in order to—

1. Study the respiratory functions PFT[PEFR & FEV1%]in traffic policemen[study group with other persons[control]
2. See the effect of duration of exposure to air pollution on above parameters.
3. Recommend the preventive measures for upliftment of study group, the traffic policemen.

III. Material and Method

Study was conducted dividing the subject in two groups, Group A & group B

Group A [control group]100 normal, non smoking persons belonging to reference group & having the life style similar to that of traffic police men, engaged in work other than traffic police men, who are native of Meerut.

Group B]: [study group]:100 non smoking traffic policemen selected randomly, working in different areas of Hapur District.

The control subjects are either working in private institutions or offices and these should be less exposed to traffic pollution.

Permission for study was obtained from the superintendant of police, Hapur. Subjects were properly explained about the aim, objective ,methodology and expected outcome before the commencement of the study. Written informed consent were obtained from all the subjects.

All the subjects were males.

Exclusion criteria:

- A primary screening was done to exclude gross pulmonary diseases, heart diseases, obesity and history of smoking, anatomical deformity of vertebral column that may affect the respiratory parameter.
- Any infective lung diseases were also excluded from the study.
- Any history of tuberculosis, chest pain, diabetes Mellitus type II or hypertension.
- Non co operation or inability to perform pulmonary function tests.

Inclusion Criteria:

- Healthy non smoker traffic police men in the age group of 26-55 years who are working in traffic junction for more than two years are included in study.
- Healthy non smoker control population of the same age and sex are selected from general population and included for study .

Physiological variables studied are -

Pulmonary function test:

Traffic police men and control subjects were subjected to Pulmonary Function Test. Before the test, all the data's including age, height and weight were entered in the spirometer (Medispiror, Recorder and Medicare systems, India.]

We measured –
1. FVC--- Forced vital capacity
2.FEV1—Forced expiratory Volume in one second
3.PEFR--- Peak expiratory flow rate

The spirometer gives two values, one is expected value and other is actual value. The expected values are based on height, age and weight of the subjects. Medispiror software using a set of prediction equation for adult calculate the expected values.
The equation for prediction are as follows—

FVC[L] 0.050H-0.014A-4.49
FEV1[L] 0.040H-0.021A-3.13
PEFR[L/SEC] 0.071H-0.035A-1.82
Where ,

H: Is Height in cms
A: Is age in years
The test were conducted in the morning hours and ensured that the subject was not exposed to air pollution at least for 10 to 12 hours b Following parameters were recorded by the computerized spirometer
FVC; Forced vital capacity- is the maximum amount of air that can be exhaled following a maximal inspiratory effort.
FEV1: Forced expiratory volume in one second is the volume of air exhaled in a one second during a forced vital capacity effort.
PEFR: Peak expiratory flow rate- It is the maximum amount of air exhaled with forced effort during FVC.
Before the test.
The actual values (observed values) were compared with predetermined Predicted values of the subjects Other physiological parameters were age in years, height, weight, body surface area.
The subject included in both group A &B were in between 18-45 yrs of age group.

IV. Data analysis

Sigma stat version 3.5 was used for statistical analysis .The data were analyzed as percentage mean and ± Standard error. Comparisons of the mean of different parameters of both group A & group B were prepared by student's, test $P<0.05$ as a limit of significance

V. Results

Pulmonary Function Test- PFT.

Our studies indicate that there is high rate of occurrence of respiratory problem among T.P. and a significant number of them become victims of lung disorders.

Table No 1:-GENERAL CHARACTERISTICS AND SYMPTOMS of respiratory disease in the target in terms of duration

Sr. No	Parameter	Result	
		T. Policeman	Control
1	Age (year)	31.50 ± 7.10	31.10 ± 6.50
2	Height (cm)	167.79 ± 5.63	166.88 ± 5.91
3	Weight (kg)	71 ± 12.2	68 ± 8
4	Duration of exposure		
	<10 year	66.6%	N.A.
	≥10 year	33.3%	N.A.
5	Symptoms		
	Frequent coughing	42%*	18%*
	Shortness of breath	12%*	8%*
	Irritation in respiratory tact	30%*	5%*

Table no.1 shows an average age, height and weight of traffic police and control group. The analysis of questionnaire shows that

- 42% of T.P. are suffering from frequent coughing
- 12% from shortness of breath
- 30% from irritation of respiratory tract.

The data on the length of service shows that 33.3% of T.P are in traffic service for more than ten yrs.
The long term exposure to pollution may be the reason for respiratory symptoms among the T.P.
In comparison of traffic police, the cases were less in control group. In control GP only –

- 18% suffered from frequent coughing
- 08% shortness of breath
- 05% from irritation in respiratory tract.

The data on odd ratio [table-1] shows the higher risk for T.P. exposed to the ambient air prevailing at workplace environment.

Table No.2 Comparison of **PULMONARY FUNCTION TESTS** in study and Control group

Pulmonary Function test	Study group	Control group	t value	p value
FVC	3.51 ± 0.32	4.10 ± 0.39	10.159	<0.001**
FEV_1	2.61 ± 0.54	3.47 ± 0.39	12.954	<0.001**
PEFR	7.63 ± 1.32	8.93 ± 0.86	8.293	<0.001**

**Significant at 1% level of significance
Mean FVC, FEV1, PEFR of study group was less than control group and the difference was statically highly significant.[p<.001]

Table No 3 Comparison of **PULMONARY FUNCTION TESTS** according to duration of exposure

Pulmonary Function test	1-5 years	6-10 years	11-15 years	>15 years	Control Group	F VALUE	P value
FVC	3.90±0.42	3.32±0.45	3.41±0.62	3.04±0.35	4.09±0.39	46.260	<0.001**
FEV_1	3.23±0.45	2.56±0.36	2.55±0.54	2.22±0.26	3.48±0.39	79.889	<0.001**
PEFR	9.03±0.60	7.43±1.19	7.19±1.27	6.87±1.06	8.92±0.86	40.269	<0.001**

Significant at 1% level of significance
There was highly significant negative correlation with duration of exposure ($p<0.01$). The observed volume of PEFR was in the range of 225-600 ltr/min.

Table 4 correlation of PEFR with age, weight, height, BSA and duration of exposure in STUDY SUBJECTS

Parameter	Range of observed value	Co-efficient of correlation (r)	´p´ value	Significance
Age (in yrs)	18 yrs-45 yrs	-0.78	<0.01	HS
Weight (in kgs)	45 kgs-88kgs	-0.01	>0.05	NS
Height (in cms)	167.79cms-177cms	+.17	>0.05	NS
BSA (in m^2)	$1.43m^2$-$1.83m^2$	+0.08	>0.05	NS
DOE (in yes)	1-21 years	-0.89	<0.01	HS

Table 4 shows correlation of PEFR with age, weight, height, BSA and duration of exposure among study subjects. The result shows that PEFR had highly significant negative correlation with age (r = -0.78, ´p´ <0.01), Non-significant positive correlation with weight (r = +0.01), height (r= =0.17) and BSA (r =+0.08). There was highly significant negative correlation with duration of exposure (r = -0.89, ´p´ <0.01). The observed value of PEFR was in the range of 220-600 liters per minute

Table 5 correlation of PEFR with age, weight, height and BSA in CONTROL SUBJECTS

Parameter	Range of observed value	Co-efficient of correlation (r)	´p´ value	Significance
Age (in yrs)	18 yrs – 45 yrs	-0.79	<0.01	HS
Weight (in kgs)	45kgs – 88kgs	-0.26	<0.01	HS
Height (in cms)	167.79cms- 177cms	+0.15	>0.05	NS
BSA (in m^2)	$1.65m^2$ – $1.89m^2$	+0.11	>0.05	NS

Table 5 shows correlation of PEFR with age, weight, height and BSA among control subjects. The result shows that PEFR had highly significant negative correlation with age (r = -0.79, ´p´<0.01) and weight (r = -0.26, ´p´<0.01), non-significant positive correlation with height (r = +0.15) and non significant negative correlation with BSA (r = +0.11).
The observed range of PEFR was 240-600 lpm in the control group.

The values show significant prevalence of symptoms studied in traffic police than the control group. There is significant excess risk of respiratory problem for the T.P. exposed to high way Traffic pollution.
The results obtained in our study are in agreement with Wongsurakiat P, Pramila T, B Girija who also found the same result.

VI. Discussion

In the present study, to see the effect of automobile exhaust on respiratory health status of traffic police, PFT FVC FEV_1, PEFR, were recorded. We observed that these parameters are reduced in traffic police personal when compared to control group. Similar observations have been ob served inn studies [9, 10].

Diesel exhaust induce reactive oxygen species in macrophages & bronchial epithelial cells. Reactive O_2 species activate the promoters of cytokines & chemokines involved in allergic inflammation through activator protein-1. & nuclear factor- korpper B signaling pathways. Organic diesel exhaust particle chemical also induce apoptosis & necrosis in bronchial epithelial cells via a mitochondrial pathway. Poly aromatic hydrocarbons are major chemical components of diesel exhaust particulates & they have enhanced the production of IgE. Inhalation of hydrocarbons also leads to lung inflammation. This may be the reason for decreased FVC & FEV_1 & PEFR in traffic police.

The chronic inflammation of respiratory tract may be the reason for decreased Pulmonary function parameters in Traffic police with respect to duration of exposure..Traffic police suffer higher morbidity & mortality rate from all cause then the general population. respiratory disorders account for a significant portion of every illness with repeated prevalence as high as twice that of general population (8).

Although limited in number, study from India also reported similar finding [4] It was observed that FVC in traffic police was (3.0L) less than expected [3.70L]

- The FVC in traffic police in our study was 80.6% of the expected value.
- In control group the FVC observed was 4.10 L. which was close to expected FVC (4 .24).
- The average FVC of control group was 99% of the expected value. Our result matched with (9).
- Peak expiratory Flow rate is the best test of expiratory effort. PEFR was worst affected in traffic police. It was 64.5% of expected value.In control group the observed PEFR was 92% of the expected value in control group. expiratory muscles. In this study, the significant decrease in PEFR value in case of TPP indicates that there was some obstruction during expiration. This is similar to the finding of other investigators [10].

The observed FEV1 in traffic police was 72% of the expected value & in control group it was 112% of the expected value.

In the present study PFT parameters in traffic police also revealed a liner relationship with respect to duration of exposure.

TPP and the controls revealed that many of the participants had short term respiratory effects such as cough, phlegm, and breathlessness confirming the findings of other studies (11) Assessment of respiratory status by spirometry along with clinical history and examination by chest physicians adds strength to the study.

VII. Conclusion

.THIS STUDY SHOWED THAT adverse health impacts of automobile pollution can be significant on respiratory system. This reduction in pulmonary function can be detected with the help of spirometry before appearance of major symptoms or before pulmonary functions are grossly impaired.

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References

[1]. Nielsen O R , Nielsen M L , Gehi J . Traffic – related air pollution : Exposure and health effects in Copenhagen street cleaners and cementery workers . Arch Environ Health 1995 ; 50 (3) :207-13 .
[2]. Krzyzanowski M, Cohen A. Update of WHO air quality guidelines. Air QualAtmos Health. 2008;1:7-13.doi:10.1007/s11869-008-0008-9.
[3]. English P, Neutra R, Scalf R, Sullivan M, Waller L, Zhu L. Examining association between childhood asthma and traffic flow using geographic information system. Environ Health Perspect 1999; 107: 761-7.
[4]. Chattopadhyay BP, Alam J, Roychowdhury A. Pulmonary function abnormalities associated with exposure to automobile exhaust in a diesel bus garage and roads. Lung 2003; 181: 291-302.
[5]. Sydbom A, Blomberg A, Parnia S, Stenfors N, Sandstorm T, Dahlen SE. Health effects of diesel exhaust emissions. Eur Respir J 2001; 17: 733-46.
[6]. Chatterjee B P , Alam J , Gangopadhyay P K (1989) A study of dynamic lung function in jute mill workers . Indian J Indus Med 35 . 157-65 .
[7]. Taggart S C (1996) Asthmatic bronchial hyper responsiveness varies with ambient levels of summertime air pollution . Eur Respir J 9 . 1146-54 .
[8]. Stone V (2000) Environmental air pollution . Am J Crit Care Med 162 . s 44 – 7 .

[9]. Annes W , Gannon P F , Huggins v , Pantin C F A , Burge P S. Effect of peak expiratory flow data quantity on diagnostic sensitivity and specificity in occupational asthma. *Eur Respir J* 2004 23 : 730-4 .
[10]. Pajanivel Ranganadin etal:, International Journal of Current Pharmaceutical Review and Research 5(7):87-91 · April 2013
[11]. Kandel P. Study on respiratory health conditions of traffic police personnel working in Kathmandu valley [dissertation]. Kavre: Kathmandu University; 2009.
[12]. Hari Sunder Shrestha etal,Annals of Clinical Chemistry and Laboratory Medicine A cross-sectional study of lung functions in traffic police personnel at work in Kathmandu Valley, Nepal Vol 1 No 1 (2015).

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