

Original article

## Health Profile of Traffic Police Personnel at Panvel Zone, District Raigad- A Cross-Sectional study

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### Abstract-

**Aim-** To primary objective was to assess the morbidity pattern of traffic police personnel working in the Panvel city. The secondary objective was to assess the pulmonary function by determining peak expiratory flow volume (PEFV) with the help of a portable peak flow meter, assess the usage of various personal protective devices

**Methods-** Descriptive cross-sectional study was conducted at 7 different traffic police stations on 156 traffic policemen. Anthropometric measurements and peak expiratory flow volume were determined using a portable peak flow meter. The subject's value was compared with the reference value and thereby was interpreted as having lung impairment.

**Results-** The mean age was 39.01±7.77 years. The most common cause of morbidity was musculoskeletal (54.5%), followed by pulmonary conditions (48.1%). One-third used face masks while working whereas only 4.1% used some form of respirator. The mean PEFV for females and males was seen as 393.57±47.32 Vol/L and 509.12± 64.1Vol/L respectively. The duration of service (>3 years) was associated with twice the risk of developing pulmonary morbidity.

**Conclusions-** The most commonly observed musculoskeletal and respiratory morbidities can be managed by lifestyle modifications and proper use of personal protective equipment. Awareness campaigns along with medical check-ups for traffic police personnel should be arranged at a regular interval to adopt healthy lifestyle.

**Keywords:** Traffic Police Personnel, Morbidity, Peak Expiratory Flow Volume (PEFV)

### Introduction-

The health of a person is largely affected by the environment in which they work, thus making occupation an important determinant of health.<sup>1</sup> Occupational hazards cause early deaths to millions of people worldwide and also result in avoidable morbidity that adversely affects the quality of life. As per the Indian Council of Medical Research (ICMR) studies<sup>2,3</sup> there has been a paradigm shift in the disease burden from communicable to non-communicable diseases between 1990 and 2016 in India. Moreover, air pollution remains to be the second leading cause of disease burden in India after malnutrition.<sup>2,3</sup> India ranks 4<sup>th</sup> in the world for annual exposure to ambient pollution and 77% of India's population is exposed to more than 40µg/mm<sup>3</sup> of mean ambient pollution levels than the limit set by the National Ambient Air Quality Standards of India.<sup>3,4</sup> As per the WHO report, around 4.2 million deaths every year are due to ambient air pollution.<sup>5</sup> A study has attributed that the number there is an underestimation in the mortality rates due to air pollution in India, and that estimated that the average life expectancy could be raised by 0.9 years if the present pollution levels are less than that associated with the health loss.<sup>3</sup> The impact of air pollution includes is not only limited to respiratory disorders but cardiovascular diseases and diabetes can also add to more than one-third of the disease.<sup>3,6</sup>

A variety of people are affected due to ambient air pollution namely, the roadside vendors, small and big automobile drivers, hawkers, street and sewage sweepers, and traffic police personnel.<sup>7</sup> Traffic police personnel are key persons in maintaining day to day traffic and are exposed to environment polluted by fumes, the exhaust of vehicles, blowing horns, blow off dust in the air by fast moving vehicles thereby prone for various morbidities. These personnel also pursue a near-sedentary type of work as they only stand at one place for long hours or just walk a few meters, only when necessity arises.<sup>8</sup> The health hazards get more severe when the duration of the exposure increases.<sup>9,10</sup>

The primary objective of the present study was to assess the morbidity pattern of traffic police personnel working in the Panvel city. The secondary objective was to assess the pulmonary function amongst these populations by determining peak expiratory flow volume (PEFV) with the help of a portable peak flow meter, assess the usage of various personal protective devices.

Material and Methods-

#### **Study Design-**

A descriptive cross-sectional study was conducted at 7 different traffic police stations of the Panvel zone over 3 months between Jan 2018 and March 2018. Institutional ethical committee approval was obtained before the commencement of the study. Prior permission from the relevant additional commissioner of traffic police, Panvel was obtained.

Sample size determination-

Based on a previous study<sup>9</sup>, considering the prevalence of any health problem 0.496, amongst traffic personnel, at 5% level of significance, keeping a margin of error as 8% and 4% as a non-response rate, the required sample size was found to be 156.

Sample Size: 156

Study participants-

A list of 173 police personnel was obtained from each police station from the concerned authorities, of which, 156 police personnel working in the city for at least past one year and those who consented to the study were included. Police personnel not giving consent and with a previous history of COPD, TB and asthma were excluded. Traffic policemen who refused to give consent and presently working at the non-traffic zone (police headquarter constabulary, class-1 police officers, administrative officers, clerks) were also excluded from the present study (Flowchart 1).

Data collection and measurement-

After obtaining informed written consent, a pre-structured, pre-tested questionnaire which included demographic profile, anthropometric examination, and physical examination was used as a data collection tool. Anthropometric details such as weight and height along with a clinical examination recording pressure, pulse, and presence of visible varicose veins were done. BMI was calculated to assess Obesity. The blood pressure was recorded using a mercury sphygmomanometer in a sitting position. Assessment for morbidities was based on various symptoms like acute or chronic cough, wheezing, breathlessness, chest tightness, haemoptysis, chest pain, nasal allergy, diminution of vision, redness and pain in eyes, pain and discharge from ear, lower back pain, joint pain.

The pulmonary function was assessed using a portable peak flow meter (Cipla<sup>®</sup>, Mumbai, India) was used in all the subjects. All the policemen were explained the procedure in detail. The test was performed with the subject seated comfortably and relaxed on a chair. The subjects were asked to do maximum inhalation and exhalation while holding the disposable plastic mouthpiece of the peak flow meter tightly with lips closed. All the readings were performed by a single observer and the best of three efforts was taken as the peak flow value for analysis and was entered into the peak flow metric analysis sheet, which contains a scale for a specific age, sex, and height. The subject's value was compared with the reference value and thereby was interpreted as having lung impairment. The reference values were given in the reference manual provided by Cipla Portable Peak Flow Meter using EU Scale.

Statistical analysis-

The data collected was entered in Microsoft Excel and analysed using Epi Info software (Version 3.5.4). Analysis was done using the Mean, SD, percentages, and Chi-square test. The level of significance was at 5%, all p-values < .05 were treated as significant.

**Results-**

The mean age of the subjects was 39.01±7.77 years. More than 90% of the subjects in the present study were males. The level of education amongst majority of the subjects was secondary (37.8%) followed by higher secondary (32.1%). Nearly two-thirds of the subjects served as policemen for > 3 years. The demographic details were as shown in Table 1.

The most common cause of morbidity in the present study was musculoskeletal conditions comprising more than half of the subjects (54.5%) which were followed by pulmonary conditions (48.1%). The least common cause of morbidity was visual disabilities (4.5%) and those with varicose veins (2.6%) respectively (Table 2).

Only one-third (31.4%) of the subjects used face masks while working whereas only 4.1% of the subjects used some form of a respirator. The least commonly (3.2%) used protection were earplugs or earmuffs. While quarter of the subjects complained that personal protective equipment (PPE), was unavailable, equivocal subjects believed that the use of PPE was either unnecessary or they were uncomfortable (Table 3).

The mean peak flow volume of Peak expiratory flow volume for females was seen as 393.57±47.32 Vol/L and the mean peak flow volume of peak expiratory flow volume for males was 509.12± 64.1Vol/L, showing 66 (42.3%) subjects who had fall in peak expiratory flow volume.

There was no significant association between mask usage and respiratory morbidity as seen in Table 4. Police personnel having duration of job ≥ 3years had a higher prevalence of musculoskeletal morbidity (55.6%) and respiratory morbidity (57.8%) as shown in Table 5.

Variable (n=156)	Frequency (%)	Mean peak flow meter reading	P value
<b>Males</b>	<b>141</b>		
<30 years	35 (24.8)	519.6 ± 28.3	
30-44 years	57 (40.4)	538.4 ± 43.1	
45-54 years	49 (34.8)	529.3 ± 36.5	
<b>Females</b>	<b>15</b>		
<30 years	5 (33.4)	439.5 ± 48.9	
30-44 years	7 (46.6)	452.2 ± 54.6	
45-54 years	3 (20)	391.6 ± 36.1	
<b>Job experience</b>			
< 3years	54 (34.6)	537.3 ± 44.2	
> 3years	102 (65.4)	421.7 ± 37.7	
<b>Use of mask/respirator</b>			
Yes	51 (32.6)	542.3 ± 33.1	
No	105 (67.4)	438.2 ± 38.2	

**Table 1- Demographic details**

Type of Morbidity	Frequency* (%)
Musculoskeletal	85 (54.5)
Pulmonary	75 (48.1)
Gastric Problems	52 (33.3)
Hypertension	18(11.5)
Due to physical agents (Heat and Cold)	15(9.6)
Diabetes	13(8.3)
Obesity	12 (7.7)
Hearing difficulties	11(7.1)
Visual difficulties	07(4.5)
Varicose Veins	4(2.6)

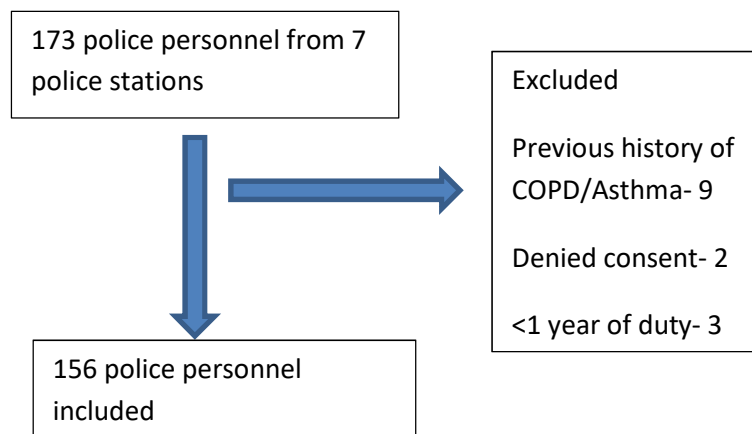
**Table 2: Morbidity pattern of Traffic Police Personnel**

Variable	Frequency (%)
Use of face mask during traffic duty	49(31.4)
Respirator	2(1.2)
Others (Disposable mask, handkerchief)	47(95.9)
Use of protective eye wear during traffic duty	40(25.6)
Use of earplugs/ earmuffs during traffic duty	05(3.2)
<b>Reasons for not using Personal Protective Equipment</b>	
Uncomfortable	77 (49.3)
Unnecessary	26 (16.7)
Unavailable	53 (34)

**Table 3- Usage of PPE and reasons for the same**

Mask usage	Respiratory Morbidity		Total	P value
	Present	Absent		
Non-Usage of face mask	58(77.4)	49(60.5)	107(68.6)	5.12 0.023 2.23
Usage	17(22.6)	32(39.5)	49(31.4)	
Total	75(48.1)	81(51.9)	156(100.0)	

**Table 4: Association between mask usage and respiratory morbidity**



**Flowchart 1- Subjects Recruitment**

**Discussion-**

The most significant finding of the present study was that the duration of service (>3 years) was associated with twice the risk of developing pulmonary morbidity (p=0.0013) than those with a shorter duration of service. Similarly, Gupta et al<sup>12</sup> showed that the odds of acquiring chronic respiratory morbidity was nearly three times more in policemen who have served for more than 6 years on the field. Similar were the findings of other studies worldwide.<sup>11-18</sup> Long duration of exposure to ambient pollutants such as volatile organic compounds, suspended particulate matter (SPM), Oxides of Sulphur (SO<sub>2</sub>), and carbon monoxide (CO), induce reactive oxygen species formation which further activates the cytokines leading to allergic inflammation cascade and chronic lung diseases. Overall, 48.1% of subjects in the present study had some type of pulmonary complaints, making it the second most common cause of morbidity. The presence of pulmonary morbidities amongst different studies worldwide has been between 12.2% and 42%.<sup>13, 14, 19-22</sup> The higher rate of morbidity in the present study could be attributed to a higher rate of ambient air pollution and heavy traffic around the Panvel zone. The peak expiratory flow rate is a handy and easy to use tool that can be used in grading as well as monitoring the response to treatment in chronic obstructive pulmonary disease.<sup>23</sup> In the present study, PEFV was used just as a basic screening tool to determine the high-risk group amongst the traffic personnel. Our observation was that

42.3% of the subjects had decreased PEFV. The mean PEFV was  $393.57 \pm 47.32$  Vol/L and  $509.12 \pm 64.1$  Vol/L for females and males respectively. This was in accordance with other studies where reference PEFV values using peak flow meter were studied.<sup>23-25</sup> Based on these observations, we believe that a routine periodical health check-up would help in the early diagnosis of COPD.

The Occupational Safety and Health Administration (OSHA) guidelines<sup>26</sup> recommends the use of personal protective equipment (PPE) such as a mask or a respirator for the persons exposed to ambient air pollutants. In the present study, 96% of subjects used some form of respiratory protection such as a disposable mask or a handkerchief which is usually inefficient for ambient pollutants. Similarly, in a study by Gowda et al<sup>22</sup>, 93% of the subjects use a disposable mask while on duty. It has been observed that the use of respirators, especially like N95 can prevent severe respiratory morbidities.<sup>27</sup> Only 4% of the subjects in the present study reported the use of a respirator which is more preventive for respiratory infections which was comparable to a study by Gowda et al<sup>22</sup> where 7% of the subjects used a respirator.

A Nepalese study<sup>28</sup> observed that the level of knowledge was more than actually practiced to avoid respiratory health problems amongst traffic policemen. Similarly, despite good knowledge regarding the use of personal protective equipment, only 31.4% of subjects used a face mask, 25.6% used protective eyewear, and 3.2% used earplugs respectively. Interestingly, a study by Sabale et al<sup>29</sup>, the average usage of the mask was around 1 hour during duty hours, amongst the traffic policemen of Mumbai city, which was below average. Furthermore, a study<sup>21</sup> observed that the usage of PPE was more amongst females and in policemen, who had some respiratory morbidity in the recent past and with more than 6 years of experience.<sup>14,21</sup> Nearly 50% of the subjects (n=77) in the present study believed that the primary reason for the non-usage of PPE was discomfort which includes difficulty to communicate, use of whistles, or some allergic reaction on the face. While more than 1/3<sup>rd</sup> (34%) of them complained that they did not receive adequate PPE, 16.7% felt that the use of PPE was unnecessary. Around 1/4<sup>th</sup> (n=40) subjects used protective eyewear while only 3.2% of subjects used earplugs/earmuffs on duty. The prevalence of visual and hearing difficulties was 4.5% and 7.1% respectively in the present study which could be because of less usage of ear and hearing associated PPE. Contrary to this, other studies had a higher prevalence of visual as well as hearing difficulties

Only 9.6% of the subjects in the present study were females. This was greater than<sup>29</sup>, or equivalent to<sup>22, 28</sup> but less as compared to other studies.<sup>13</sup> We believe that the reason for women not preferring this job could be attributed to long standing working hours, polluted, hot and noisy working environment, and special and extended duty hours. Around 2/3<sup>rd</sup> of the subjects in present study qualified up to higher secondary followed by graduates and above. Similar were the observations of other studies<sup>21, 22, 30</sup> in different parts of Asia.

The present study also highlighted the musculoskeletal problems amongst the traffic policemen. The most commonly observed musculoskeletal morbidity was low back pain seen in 78% of the subjects. This was then followed by knee joint and neck pain respectively. Some of the risk factors for the same could be long standing working hours, years of service, and abnormal posture, and tobacco or alcohol consumption, comorbidities such as diabetes. Few other authors had the same findings.<sup>31, 32</sup> Moreover, 46.8% of the subjects in the present study consumed tobacco in some or the other form making them more vulnerable for musculoskeletal morbidities.

#### **Limitations-**

The present study is not without limitations. Firstly, this study was based on the responses given by the subjects who can have a possibility of generating recall or information bias. However, the possibility of measurement bias was prevented since all the recordings were done by a single person. Secondly, lack of control group remains the inherent weakness and limitation. Lastly, the validation of portable peak flow meter was not done with that of a spirometer and also, no laboratory tests were performed to assess the morbidity status. Nonetheless, the purpose to use the peak flow meter was diagnostic in the present study.

#### **Conclusions-**

Musculoskeletal and respiratory morbidities remain the most commonly seen ones amongst traffic police personnel. The majority of these morbidities can be managed by lifestyle modifications and proper use of PPE. Awareness campaign along with medical check-ups for traffic police personnel should be arranged at regular interval to adopt healthy lifestyle and prevent any avoidable morbidity.

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