International Journal of Advanced Pharmaceutical Sciences and Research (IJAPSR)
ISSN: 2582-7618 (Online), Volume-6 Issue-3, April 2026

To Assess Pulmonary Function Tests in Traffic Police Personnel in Jammu

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Abstract: ***The present study aimed to assess lung function tests (PFTs) among Traffic Police personnel in the Jammu region, who work in a high-exposure zone. It is a cross-sectional study conducted after obtaining ethical approval from the committee vide no. IEC/GMC/2022/1013, dated 05-03-2022. The study involved 120 traffic police officers and compared them with healthy individuals, including subgroup analyses between rural and urban areas. PFTs, including FVC, FEV, FEV3, PEFR, and MVV, were recorded for all participants using the computerised spirometer MESPIROR. Results revealed a significant reduction in mean FEV and PEFR among police personnel with longer exposure to traffic duty, with a more pronounced decrease among urban traffic police. Overall, the study concludes that periodic respiratory assessments and preventive strategies are recommended.***

Keywords: PFTs, LFT, Traffic Policemen, Occupational Hazards

Nomenclature:
PFTs: Pulmonary Function Tests
FVC: Forced Vital Capacity
FEV: Forced Expiratory Volume
FEV1: Forced expiratory volume in 1 second
FEV3: Forced expiratory volume in 3 seconds
LFT: Lung Function Test
MVV: Minute Voluntary Ventilation

I. INTRODUCTION

Air pollution has become a major environmental and public health concern worldwide, especially in rapidly developing countries like India [3]. Rapid urbanisation, industrial growth, and a sharp increase in vehicles have considerably deteriorated air quality in cities. Traffic police officers face higher risks due to their prolonged, direct exposure to vehicle emissions.

Manuscript received on 23 March 2026 | First Revised Manuscript received on 26 March 2026 | Second Revised Manuscript received on 04 April 2026 | Manuscript Accepted on 15 April 2026 | Manuscript published on 30 April 2026.

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Vehicular emissions are the primary source of pollution, including particulate matter, nitrogen oxides, sulfur dioxide, carbon monoxide, and volatile compounds. These pollutants are known for their harmful effects. Long-term exposure to air pollution greatly contributes to the development of chronic respiratory diseases [6]. Pulmonary function tests (PFTs) are essential tools for assessing respiratory health. These tests are non-invasive, reliable, and widely used. Dutta et al. (2019) [2] reported increased systemic inflammation and oxidative stress among traffic police personnel exposed to air pollution. Patel (2020) [5] conducted a comprehensive review of studies on the health impact on traffic police personnel.

There is limited published data on PFT abnormalities among traffic police personnel exposed to air pollution during field duties. This study was conducted in the Jammu region to evaluate the PFTs of traffic police personnel and compare them with those of healthy individuals.

Agarwal (2021) [1] assessed pulmonary function tests (PFTs) in traffic police personnel and observed a notable decrease in spirometric parameters FEV and FVC compared with the control group.

II. MATERIAL & METHODS

The study was conducted on 120 traffic police personnel after obtaining ethical approval and permission from MCI/Jammu/University C275, Vide No. IEC/GMC/ 2022 /1013 dated 05-03-2022, and after securing consent from the personnel of both the test and control groups in the Jammu region. Each participant was provided with a questionnaire that included demographic data, duration of posting, mask-wearing, health status, and consent to participate in the study.

A. Inclusion Criterion:

- Age 18 to 55 years (Traffic Police personnel).
- Non-Smoker.
- Minimum one-year traffic duty exposure
- Subjects willing to participate.

B. Exclusion Criterion:

- Known chronic respiratory disease.
- Acute respiratory infection
- Smoking history
- History of any thoracic Surgery.

Group I consisted of 120 traffic police personnel, including 65 study subjects working in the urban area of Jammu city and 55 on duty in the rural area neighbouring Jammu City.

Group II is the control group of the same age range at the Government Medical College, Jammu, aged 18 to 55 years, not exposed to traffic pollution, and served as the control.

All subjects received a questionnaire to record demographic details, health status, length of service, and

consent to participate in the study.

PFTs of subjects were performed using MEDSPIROR, a computerised spirometer that records all PFTs and their percentage values. The test includes FVC, FEV1, FEV3, PEFR, MVV, and FEF 25% -75%.

C. Statistical Analysis:

The data was analysed using SPSS version 10, with means, standard deviations, and statistical differences tested using the unpaired Student's t-test.

III. RESULTS

Table I: Mean age in Group I (Cases) and Group II (Control Group)

Age (years)	Mean	Std. Deviation (±)	p-value
Group I	32.27	5.992	0.919
Group II	30.25	5.716	

*p-value ≤ 0.05 Significant; **p-value ≤ 0.001 Highly Significant

Table II: Comparison of Height and Weight

Parameters	Group I	Group II
Height (cm)	166.6±3.30	170.4±4.15
Weight (kg)	64.8±9.60	68.6±8.40

Table III: Comparison of Hemodynamic Parameters Between Urban and Rural Traffic Police Personnel

Parameters	Urban n-65 (Mean±SD)	Rural (Mean±SD)	p-value
Pulse (beat/mt)	73.14±2.88	72.36±4.79	0.34
Respiratory Rate/mt	17.68±2.81	15.81±1.24	0.001
SBP (mmof Hg)	124.18±66.05	124.95±5.48	0.50
DBP (mmof Hg)	80.07±6.77	80.72±5.34	0.59

Table IV: Comparison of PFTs among Group I and Group II

Groups	FEV_1		t-value	p-value
	Mean	STD Deviation (±)		
Group I	3.01	0.843	-4.848	0.000
Group II	3.63	0.746		
	FVC			
Group I	3.19	0.623	-1.978	0.050
Group II	3.40	0.705		
	FEF 25% - 75%			
Group I	3.71	0.246	-14.234	0.000
Group II	4.42	0.367		

*p-value ≤0.001 Highly Significant; **p-value ≤0.05 Significant; ***p-value ≤0.000 Highly significant

Table V: Comparison of PEFR & MVV Among Group I and Group II

Groups	PEFR		t-value	p-value
	Mean	STD Deviation (±)		
Group I	7.07	1.707	-3.088	0.002
Group II	7.92	1.789		
	MVV			
Group I	89.27	8.416	-8.928	0.000
Group II	115.94	25.187		

*p-value ≤0.002 Significant; **p-value ≤0.000 Highly Significant

IV. DISCUSSION

The present study was undertaken to establish the effect of air pollution on pulmonary function in traffic police personnel and to compare them with a control group. Table 2 suggests that anthropometric differences are not confounding factors in the study, and impairment in lung function tests is likely due to occupational exposure rather than body composition. This was in accordance with a study conducted by Omole et al. (2018) [4].

The PFTs between traffic police personnel posted in urban and rural areas were lower for urban personnel, except for FEV3/FVC. These results were consistent with Gambel et al. [2016] [3].

In the current study, PFTs among traffic police personnel working in urban areas were significantly lower than those among personnel posted in rural areas, possibly due to lower traffic density and greater green cover in rural regions. The PFTs are lower among Group I traffic police personnel than among the Group II control group. FEF 25% - 75% (Forced expiratory Flow rate at 25% to 75% of FVC), PEFR, MVV (Maximal Voluntary Ventilation) were significantly decreased in Group I, indicating airflow obstruction likely resulting from prolonged exposure to air pollution from vehicular exhaust.

V. CONCLUSION

PFTs of traffic police officers who are occupationally exposed to vehicular emissions and dust are significantly lower compared to those of healthy individuals. Controls indicate that working in rural areas results in less deterioration of PFTs than in urban areas.

RECOMMENDATIONS

There should be the use of N95 protective masks
Annual spirometry screening,
Pollution control strategies.

ACKNOWLEDGEMENT

I want to express my sincere gratitude to the SSP Traffic Police, City Jammu, SSP Koshal Sharma, and SSP Mushtaq Ahmad for Rural Traffic, Jammu, for granting permission to conduct my research work.

DECLARATION STATEMENT

As the article's author, I must verify the accuracy of the following information after aggregating input from all authors.

- **Conflicts of Interest/ Competing Interests:** Based on my understanding, this article has no conflicts of interest.
- **Funding Support:** This article has not been funded by any organizations or agencies. This independence ensures that the research is conducted objectively and without external influence.
- **Ethical Approval and Consent to Participate:** The content of this article does not necessitate

ethical approval or consent to participate with supporting documentation.

- **Data Access Statement and Material Availability:** The adequate resources of this article are publicly accessible.
- **Author's Contributions:** The authorship of this article is contributed equally to all participating individuals.

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AUTHOR'S PROFILE

Dr. Shazia is an Associate Professor in the Department of Physiology at Government Medical College (GMC), Jammu, with over 19 years of postgraduate teaching experience. She has significantly contributed to medical education through teaching undergraduate and postgraduate students, promoting strong conceptual understanding and clinical application of physiology. She has an extensive research background, with numerous publications in national and international journals. She has guided many postgraduate students and mentors, both UG and PG learners. Dr. Shazia has delivered lectures and served as a jury member in CME programs within and outside Jammu, reflecting her commitment to academic excellence and medical education.

Omar Faizan, a final-year student at ASCOM, exudes confidence and dedication in this image. He has actively participated in numerous Continuing Medical Education (CMEs), strengthening his academic and clinical understanding. Alongside his studies, he has collaborated effectively on research projects, demonstrating a keen interest in scientific research. His commitment, discipline, and enthusiasm for growth highlight his potential as a future healthcare professional, prepared to take on responsibilities with competence and integrity.

Dr. Sonia Mushtaq, MD (Physiology), is working as an Assistant Professor in the Department of Physiology at Government Medical College, Jammu. I am dedicated to teaching undergraduate and postgraduate students and am keenly interested in advancing medical education. My areas of interest include cardiovascular physiology, lifestyle-related disorders, and clinical research. I actively engage in academic and research activities to contribute to the growing body of medical science.

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Dr. Vanita Sharma is Professor and Head of the Department of Physiology at Government Medical College (GMC), Jammu, with over 25 years of teaching experience. She has been actively involved in teaching both undergraduate and postgraduate students, fostering a strong academic and clinical understanding of physiology. She has an extensive research background, with numerous publications in national and international journals. Dr Sharma has guided many postgraduate students and continues to mentor learners in their academic and research pursuits. She is also actively engaged in ongoing research projects, reflecting her commitment to innovation, academic excellence, and advancement in medical education and physiology.