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RESPIRATORY HEALTH HAZARDS FACED BY TRAFFIC WARDENS IN HEAVILY TRAFFICKED ROADSIDE: A STUDY FROM DISTRICT LAHORE, PAKISTAN

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ABSTRACT

Auto exhaust gaseous pollutants and roadside dust in the populated areas are quite high and this is major health hazards to the public at large and particular to the inhabitants of these areas. The worst thing about pollution caused by vehicles is that the pollutants are emitted at the near ground level where we breathe. Pollution from numerous sources gets reflected in increased mortality and morbidity and is revealed through symptoms like cough, headache, irritation of eyes, various bronchial problems among others. The present study was conducted to monitor air Quality of PM2.5 and PM10 in Defense, Gulberg, Jail Road, and Model Town Lahore by using portable air sampler. Samples were taken for two weeks. Readings were taken in morning and evening. The readings of PM2.5 and PM 10 were higher than the permissible limits by National Ambient Air Quality standards (NAAQS). On the basis of these findings it is concluded the increasing number of vehicles have negative impacts on the air quality of Lahore, long term exposure to gases, fumes and chemicals which are present in the environment near heavy traffic are harmful and dangerous for the lungs. So it is suggested that during the duty hours in busy traffic areas, the traffic wardens should use personal protective equipment and the Government should provide the proper personal protective equipment to traffic wardens.

Keywords: Respiratory Health Hazards, Spirometry in Traffic Wardens, Heavily Trafficked Roadside.

INTRODUCTION

Background

Every metropolis is expanding on a daily basis, and this expansion is accompanied by a massive increase in automotive traffic, which emits pollution and pollutes the atmosphere. The vehicle population has been identified as a significant contributor to respiratory ailments among city dwellers (Simpson et al., 2021). The negative health implications of inhaling such particulate matter, as well as the impairment of pulmonary function, are well known. Although acute health effects have been investigated in the past, chronic health consequences associated with outdoor traffic (automobiles) air population have not been thoroughly examined (Gowda et al., 2020).

Vehicular pollution on roads due to consumption of fuel leads to high ambient air contamination levels at a larger scale. Commuters and travelers are exposed to elevated levels of contamination to the extent time consumed in travelling (Butt et al., 2020). The People like road side shop vendors and traffic police are exposed to elevated levels for long chronic period of time. The exposure of vehicular contaminants for long term has been linked to adverse health issues and according to the estimation of World Health Organization the particulate matter (PM) air contamination causes 800,000 premature deaths each

year. Worldwide the 13th leading cause of deaths is particulate matter air contamination. Air pollution portion of Particulate Matter (PM) is made up of very small liquid droplets and particles containing organic chemicals, acids, soil or dust particles and metals (Chaudhuri et al., 2020).

Air pollution is one of the most serious problems that affect most industrial towns and cosmopolitan cities across the world. Vehicular emissions, smoke from various businesses and power plants are the main sources of problems caused by various air contaminants (Madhoun et al., 2020). The respiratory passage is the most common way for pollutants to enter the human body, causing lung disorders such as asthma, emphysema, bronchitis, and chronic obstructive pulmonary disease (COPD). One of the most frequent work-related ailments is occupational lung disease thus making it a high-priority concern in developed countries and, increasingly, in countries who are in developing phase (Dey et al., 2021). The closeness of a busy road to a home is linked to a variety of respiratory health complications and asthmatic aggravation. The job of a traffic police officer is one of the most unpredictable and difficult of all jobs. Their job descriptions, salary system, leave status, weapons and arms are not in the system of standard, and duty rotation shifts are disorganized and irregular. During their service period, they are exposed to a variety of stresses, which cause them to have a variety of physiological and psychological issues (Jamil et al., 2018).

A traffic policeman's tasks under Section 21 of the Police Act of 1967 include regulating, controlling, and maintaining the flow of traffic on public highways. With such duties, they have no alternative but to complete the task at hand (Jamil et al., 2018). Their task was regarded difficult because they had to cope with crowded traffic and selfish drivers. As a result of occupational variables, their health will deteriorate if combined with contaminated air. Individuals who conduct manual labour near traffic have a health risk from traffic-related air pollution (Butt et al., 2020).

As a result of the increasing traffic burden on roads urban centers in the country are suffering from bad quality of air and increasing respiratory allergies (Chughtai et al., 2020). Overall, the situation of ambient air quality (AAQ) in urban centers in Pakistan is dangerous and the levels of various air contaminants, especially, Particulate matter are many times higher than the international standards and WHO guidelines (Yaqub et al., 2019). The fastest growing source of a range of ambient air contaminants are motor vehicles (e.g. particulate matter (PM), hydrocarbons (HCs), carbon monoxide (CO), and oxides of nitrogen (NO2) in the region. In Pakistan, the leading contributor of bad air quality is motor vehicles along with industrial sector (Sasikumar et al., 2020).

Traffic wardens encounter a variety of occupational dangers, as profession played a big factor of health. The impact of workplace related hazards on the health of traffic police officers was investigated (Saqlain et al., 2020). They are constantly exposed to traffic pollutants and working in a noisy and dirty environment. In order to give a balanced evaluation, attempts were made to obtain studies that indicated un-favorable associations. The majority of researches (Dey et al., 2021) have found that lung function has decreased and respiratory morbidity has increased. There are epidemiological evidence that there is incidental link between automobile pollution and its carcinogenic effect. Most of the time traffic wardens are extremely anxious and stress among traffic wardens has been linked to a variety of occupational conditions (Thapa et al., 2019). Occupational health studies aid in our understanding of the consequences of traffic pollution and its negative impact on workers. They also allow for exact risk assessment and monitoring of defined exposures. These research' findings are easily generalized and can aid in our understanding of the effects of air pollution on the general public.

Air pollution is the most threatening kind of environmental pollution that is reported in most industrial town and metropolitans of Pakistan. The second largest city of Pakistan is Lahore and Lahore is supporting a lot of population. On daily life atmospheric pollution of Lahore has a strong impact. The main sources of the pollution in Lahore are industrial emissions and motor vehicular. The pollution indicators are Sulfur Dioxide, Oxides of Nitrogen, Carbon Dioxide, Carbon Monoxide, Ozone and Particulate Matter. In this study, it was intended to explore the respiratory health hazards by Spirometry in traffic wardens in heavily trafficked roadside

Objectives of this study

- To examine the existing working environment for traffic wardens and their exposure towards impacts of air pollution
- To estimate the Respiratory health hazards by Spirometry in traffic wardens in heavily trafficked roadside area.

Review of Literature

The environment and health of human beings is being seriously impacted by air pollution from past few decades, in fact air pollution has now reached to a hazardous level and qualifies as a substantial issue of recent century. The cause of this pollution varies from a minor activity like smoking to major activities i.e. industrial, automobiles emission etc. Long term exposure to air pollution may lead a person towards number of respiratory diseases, infections, heart issues, inflammation and even cancer.

Putri and colleagues (2020) highlighted the various health problems are encountered in Malaysian traffic policemen as in the outdoors; they are exposed to polluted air. This study is based on an investigation of traffic policemen in Kaula Lumpur and Johar Bahru along with the understanding of their lung functions and the relationship of the personal exposure level to PM2.5. To measure the lung function, a pulmonary function test was conducted using a Spirometry. In addition to this, to test the lung function abnormalities, a questionnaire based on the background data like age, height and weight was also taken into account. On the other hand, a pump with a PVC filter and 5.0μm pore size was used to measure the personal exposure level to PM2.5. At p-value < 0.05, it was found that the PM2.5 personal exposure level was related to lung function (predicted FVC and predicted FEV1). The emission of fine particular pollutants from the vehicles is one of the main causes of health hazards of the traffic policemen. A trend of lung function deterioration is signaled by this study, among traffic policemen. As the traffic police are not covered by the occupational safety and health act, this baseline data can serve as a brick for the employment of safety and health guidelines for police officers.

Gowda and colleagues (2020) revealed in India through a study in order to monitor the air pollution. As the Indian population is increasing day by day on a rapid speed and due to this increased population the use of vehicles are also increasing which eventually leads the atmosphere towards increased air pollution levels. Although air pollution is harming each and every member of the country but there is a certain group for whom this pollution is more hazardous than any other individual's group and this group is traffic police because they are more exposed to traffic than any other individual. Hence researchers in this study take traffic police as their sample and study extent of their respiratory health and pulmonary disease with the help of Spirometry. Researcher continuously research for 6 months using random selection method in various areas of South Bangalore and Karnataka under cross sectional research design. Areas of demographics, history of smoking, history of any respiratory disease, protective measures and duration of exposure has been covered by researchers by using semi structured interviews. This study also resulted in affected lung functions in traffic police personnel.

Research Methodology

For this study Aeroquip portable monitor 500 series was used to monitor the toxic vehicular pollutant gases both values of PM 2.5 and PM10 were recorded at 15 minute intervals. Two hundred (200) traffic wardens were selected randomly from four towns of Lahore such as Jail Road, Gulberg, Defense, Model Town and the cantonment. The study comprised 200 nonsmoking traffic policemen, aged 20-55 years, working in and around Lahore city. The healthy persons were selected while those with wheezing, history of smoking/tobacco chewing, history of cardiac and respiratory disease (eg, overt asthma), history of medications, such as antiasthmatics and others, were excluded from the study.

All participants were interviewed for their general health and wellbeing parameters. Each site was monitored for two weeks and running time for each sample was set for 40 minutes. Readings were taken in morning and evening. Wardens work in two shifts of 8 hours each from 700 to 1100hours on the roads but the traffic sectors are open during the night with no more than one staff member each. Data at each of the site was collected for, PM 2.5, PM10.

All the subjects were physically healthy on basis of clinical examination, without any symptoms of any acute respiratory illness. Subjects were given practice and minimum three attempts. All recordings were accomplished in the morning and evening before the police personnel could resume their duty. Spirometry was conducted on 30 wardens by a digital

portable spirometer MDX Spiro Tron with disposable mouth pieces.

Results and Major Findings

The Questionnaire based survey was designed to collect the data from traffic wardens. The general demographic profile includes Age, Gender, Marital Status, Years of service, Standing Height, Weight, Body Mass Index, Educational Status.

Table 1: Demographic characteristics of Study Participants

Demographics	Characteristics	Frequency	Percent
Age in Years	22 -.30	90	45.0
	31-40	57	29.0
	41-50	45	22.0
	>50	8	0.04
Gender	Male	193	96.5
	Female	7	3.5
Marital Status	Unmarried	102	51.0
	Married	96	48.0
	Divorced/ Separated	2	1.0
Educational Status	Graduation	152	76
	Post-Graduation	47	24

From the Questionnaire survey it was revealed as shown in Table 1 that there were (97 %) male and (3 %) females on Field. The 75% wardens Age Group was 22-30 The 25% wardens Age Group was 31-40. The 20% wardens Age Group was 41-50. The 8% wardens Age group was >50. The Marital status of Traffic wardens was 48 % married and 51 % unmarried and 1 % divorced or separated. The educational status of wardens was 76 % were Graduated and 24 % done post- Graduation.

Table 2: Characteristics of personal and working conditions of traffic wardens

Demographics	Characteristics	Frequency	Percent
Years Of Service	<10	123	61.5
	10-20	55	27.5
	>20	22	11
Standing Height	5.3-5.6	12	6.0
	5.7-5.9	115	57.5
	5.10-6	60	30.0
	>6	13	6.5
Weight	50-60	15	7.5
	61-70	83	41.5
	71-80	86	43.0
	81-90	10	5.0
	91-100	4	2.0
	>100	2	1.0
Body Mass Index	Underweight	6	3.0
	Healthy	175	87.5
	Overweight	19	9.5

Table 2 indicates the Years of service of Traffic wardens were 61% were <10 years The 55% wardens were 10-20 years of service and 22% wardens years of service were > 20 years. The ratio of Height was 6 % wardens standing height was 5.3-5.6. The 57.5 wardens standing height was 5.7-5.9. The 30 % wardens standing height was 5.10-6. The 6.5% wardens standing height was >6. The Body Mass Index Of traffic wardens was 3% were Underweight. The 87.0% wardens were Healthy. The 9 % wardens were overweight.

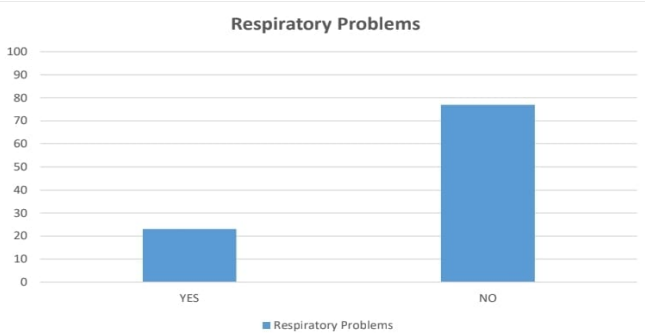

Figure 1: Percentage of respiratory problems among traffic wardens in last three months

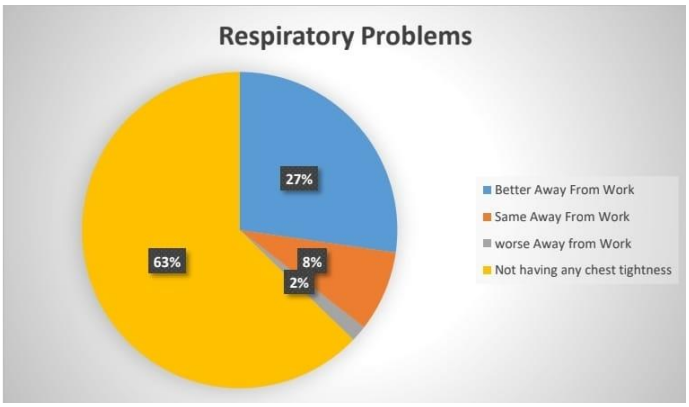

Figure 2: Pie Graph showing the respiratory problems during last three months

From the Questionnaire based survey it was revealed that In last three months 16% wardens have respiratory problems as shown in Figure 1 In 14 %

traffic wardens chest tightness gets better away from work in 3 % chest tightness gets same away from work and 1 % wardens chest tightness gets worse away from work In 1 % wardens chest tightness gets better away from work as shown in Figure 2

Discussion

High Contamination levels essentially vehicular contamination and debasement of both open air also indoor quality identified with suspended particles in air has been recognized in Pakistan. This study was conducted to monitor the PM2.5 and PM10 at heavy traffic sites of Lahore and assessment of work-related health hazards in traffic wardens of Lahore. The air pollution has different negative impacts on the pulmonary system of wardens. Moreover, the results obtained from monitoring of different heavy traffic sites of Lahore shows that the value of PM2.5 and PM10 were mostly high than the standards of NAQS and due to high levels of PM2.5 and PM10 the health of traffic wardens are affected in different ways.

Present study was conducted to monitor the concentration of particulate matter from heavy traffic sites. Two weeks study was conducted and the size ranges which were observed in this study PM2.5 and PM10. The first week morning concentration were observed and compared with standard and then concentration of evening of first week were measured and compared with standards. A comparison was made between morning and evening concentration of PM10 and PM2.5. Readings of second week were taken and compared with standard. Then a comparison was made between morning and evening concentration followed by comparison between two weeks. Results were high than the standard value.

In Lahore, research was conducted to determine the concentrations of PM2.5 and PM10. They discovered that ambient PM2.5 and PM10 concentrations in Lahore were equivalent to those in other Asian megacities. The level of particulate air pollution in this megacity is expected to have a substantial influence on the surrounding area. Carbonaceous components made up a significant portion of ambient PM2.5; PM10 values in Lahore were equivalent to those in other Asian megacities. The level of particulate air pollution in this megacity is expected to have a substantial influence on the surrounding area. Carbonaceous components were found to be a considerable contributor to ambient PM2.5, implying that unidentified sources could include coal co-combustion with other materials and pointing to brick kilns. The majority of coarse-mode particulate matter (PM10–2.5) was attributable to crustal sources, such as dust, which offers a challenge in terms of air quality management. PM2.5 sources, particularly the anthropogenic ones identified in this study, offer a better chance of lowering emissions.

This study was conducted to investigate the negative impacts of air pollution and analyzing work-related health hazards among traffic wardens. Wheezing and whistling is also one of the negative impacts of air pollution as a result, (16.5 %) wardens have experienced wheezing and whistling which mostly becomes better away from work. In 2005 a study was conducted “Prevalence of respiratory symptoms, reduction in lung function and allergic sensitization in a group of traffic police officers exposed to urban pollution” They found that when compared to an unexposed control group, exposure to road traffic fumes resulted in an increased prevalence of chronic bronchitis (cough), allergic sensitization, and asthma (wheeze) to the most prevalent allergens, as well as diminished lung function. The difference in the mean age between the truly exposed and truly non-exposed groups was statistically significant ($p < 0.01$). When compared to the "really non-exposed group," the "truly exposed group" had a higher prevalence of symptoms (cough, wheeze, and dyspnea), as well as a positive reaction to skin allergy tests, but the difference was not statistically significant. When compared to the exposed group, changes in pulmonary function tests were more common in the non-exposed group

Conclusion:

The present study was conducted to monitor air Quality of PM2.5 and PM10 in Defence, Gulberg, Jail Road, Model Town Lahore by using portable air sampler. Samples were taken for two weeks. Readings were taken in morning and evening. The readings of PM2.5 and PM 10 were higher than the permissible limits by National Ambient Air Quality standards (NAAQS). On the basis of these findings it is concluded the increasing number of vehicles have negative impacts on the air quality of Lahore, long term exposure to gases, fumes and chemicals which are present in the environment near heavy traffic are harmful and dangerous for the lungs. The high level of Particulate Matter near heavy traffic sites decreases the lung functions of traffic wardens that results in changes in PFT (pulmonary function test)

parameters. So it is suggested that during the duty hours in busy traffic areas, the traffic wardens should use personal protective equipment and the Government should provide the proper personal protective equipment to traffic wardens.

Recommendations:

- Study provides the information regarding the high level of particulate matter at heavy traffic sites. The data can be used for further enhancement of methodology for cutting down particulate matter in air.
- There is no proper awareness regarding work related health hazards among traffic wardens so it is suggested, that training programs should be arranged by authorities for wardens regarding health hazards during duty.
- The Government should work towards the making and implementation of standards within Pakistan. It is important to implement strict laws and monitoring programs in major cities.

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