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Original Article

Prevalence of Respiratory Disorders among Petrol Pump Workers: A Cross-Sectional Descriptive Study

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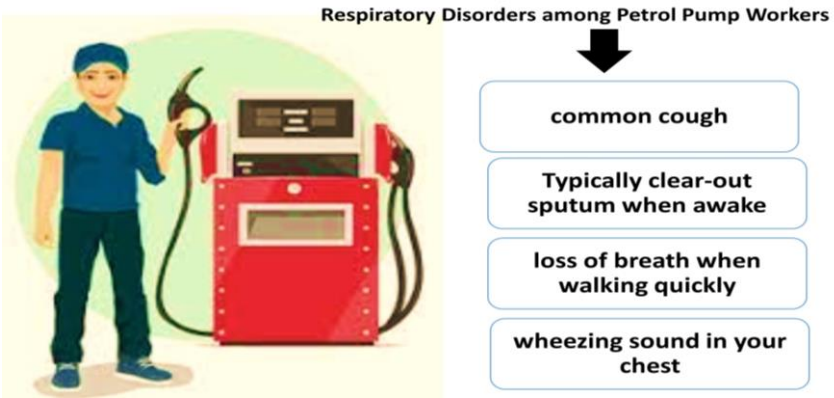
ABSTRACT

Objectives: Gas station workers who are continuously exposed to gasoline/diesel smoke, are at high risk of causing respiratory problems. This study was conducted to determine the prevalence of respiratory disorders in gas station workers in Erbil City, Iraq.
Methods: All (146) of the petroleum outlets in Erbil City overseen by the Ministry of Natural Resources were the subject of this cross-sectional descriptive study. A researcher-made checklist with four sections-Socio-demographic characteristics, a checklist of respiratory disorders' signs and symptoms to evaluate the frequency of respiratory symptoms, auscultation of the chest to evaluate any abnormal breath sounds, and peak flow meter to evaluate peak expiratory flow rate-was used to gather data. A p-value of ≤ 0.05 was considered statistically significant.
Result: Most of the employees (54.1%) were between the ages of 23 and 27 and were unmarried (65.5%). The most frequent symptoms were listed in the symptoms part as a common cough, typically clear-out sputum when awake, loss of breath when walking quickly on a level surface or when ascending a moderate incline, and a wheezing sound in your chest. Wheezing was detected in 189 of the employees (37.7%), while rhonchi was detected in 71 (14.2%).
Conclusion: Gas station workers in Erbil are exposed to gasoline and vapors produced while filling cars and smoke from cars. It was also proven that workers used poor protective measures despite their knowledge of the adverse health effects of gasoline.

GRAPHICAL ABSTRACT



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Introduction

The term 'air pollution' indicates the presence in the ambient atmosphere of matters such as gases, the mixture of gases, and particulate matter, produced by the activities of man. The sources of air pollution in city areas are mainly cars [1]. It is expected that 60 to 70 percent of air pollution comes from cars [2]. As a result of the increase in the consumption of gasoline by cars, a wide range of environmental pollutants enter the atmosphere, among which volatile organic compounds play an important role [3, 4]. Therefore, the air in cities is becoming, directly and indirectly, more polluted. This is an environmental problem in developing countries that has dangerous consequences for human health and the environment [4].

Gas station workers are exposed to the organic and inorganic substances which exist in gasoline, volatile aromatic hydrocarbons in the atmosphere of service station and gas stations [5]. Benzene is a solvent that leads to lung dysfunction, asthma, lung infection, central nervous system suppression, blood poisoning, genetic effects, chromosomal abnormalities, deoxyribonucleic acid DNA damage, and carcinogenesis [6, 7]. Ethylbenzene is a colorless, flammable liquid with a benzene-like odor that is more commonly used as a solvent. Acute respiratory effects of ethylbenzene vapors include irritation of the airways, shortness of breath, eye pain, sore throat, neurological disorders, dizziness, drowsiness, and fatigue [8].

Petroleum refinery workers and service station attendants are exposed to benzene due to the emission of volatile aromatic hydro-carbons (VAHs) [9]. The International Agency for Research on Cancer (IARC) and the American Conference of Governmental Industrial Hygienists (ACGIH) place benzene in Group 1 (definitely carcinogenic to humans) [10].

Particles of diesel and gasoline exhaust can be easily inhaled and cover a large area where organic materials can be absorbed rapidly [6]. Constant exposure of gas station workers to gasoline and diesel vapors affects lung function. The severity of respiratory distress depends on the duration of exposure [11]. Gas station workers are unaware of the health risks of air pollution as well as gasoline smoke. Also, gas station operators do not use personal protective equipment and personal hygiene in the workplace varies. Personal protective equipment and other control measures can reduce respiratory problems. Therefore, early detection of adequate symptoms and preventive strategies can reduce the incidence of lung dysfunction among gas station workers [5].

Although researchers have conducted numerous studies in this regard in different countries, but in relation to the proposed subject, according to the researcher's internet and library searches, there are little researches on gas station among workers in Iraq, and especially in the Kurdistan region. Therefore, concerning the importance of the subject, this study was conducted to determine the prevalence of respiratory disorders in gas station workers in the city of Erbil, Iraq.

Materials and Methods

A cross-sectional observational strategy was used for this study. All (146) of the gas stations in Erbil City that are managed by the Ministry of Natural Resources participated in this research. The research was carried out between 2021 and 2023. Employees of gas stations managed by the Erbil Ministry of Natural Resources are part of the target population. A total of 501 Pump employees were present in the Fuel full station, according to records received from the Presidency of the Council of Ministers of the Kurdistan Region/Ministry of Natural Resources/Directorate of Oil and Minerals. The research took into account the complete well-liked pump crew at the fuel station in the city of Erbil.

The total numbers of pump workers during data collection were (568) but (50) pump workers were excluded because of their participation in the pilot study and (10) pump workers refused to participate in the study and also (7) pump workers were unavailable during data collection because of their sick leaves. Finally, the sample size of the study became (501) pump workers. Since the entire population of pump workers staff

was considered for the study, the sample estimation was not required. The sampling method is the census method. Inclusion criteria include employees who have worked in this industry for more than five years, work at urban gas stations, and perform oil changes and gasoline fills on vehicles. Exclusion criteria included the participant's unwillingness to continue participating in the study, suffering from incurable diseases such as cancer, and death of the participants during the study.

To collect data from pump employees and gas station employees, a checklist made by the researcher was used which included four parts:

Socio-demographical characteristics

A checklist of signs and symptoms of respiratory disorders was used to assess the prevalence of respiratory symptoms. This part was designed to assess the signs and symptoms of respiratory morbidities. The checklist consisted of five items which were classified into five cardinal respiratory symptoms such as cough, phlegm, wheezing, dyspnea, and chest tightness. It was based on ATS – DLD 78 questionnaire to elicit respiratory morbidities developed by the American Thoracic Society**,** Auscultation of the chest to assess the abnormal breath sounds. Auscultation of the chest was done to assess wheezing and other adventitious breath sounds like Ranchi, rales, and crackles, using a stethoscope, and Peak Flow Metry to assess Peak Expiratory Flow Rate. Mini Wright's Peak Flow Meter was used to assess Peak Expiratory Flow Rate and height scale to check height of workers. The Wright Peak Flow Meter was designed as a simple and reliable device for measuring the maximum expiratory flow rate during forced expiration. It is now used as a measure of flow rates. Peak Expiratory Flow rate as a measurement of ventilatory function was introduced by Hadorn in 1942 and was accepted in 1949 as an index of spirometry [5].

A common Lung Function Test that provides a reliable indicator of airflow that is contingent on exertion is the peak expiratory flow rate. Peak expiratory flow rate refers to the maximum flow rate that a person can maintain for at least ten seconds. Peak expiratory flow rate measurement is useful for determining whether a patient has a limiting lung disease. Ask the subjects to stand erect and blow as forcefully as possible after the maximum inspiratory effort. The best of the three efforts made by subjects was selected as the value. Normal value was identified based on the height and age of the individuals.

The questionnaire has been validated through the panel of 12 experts in different fields to investigate the content of the questionnaire for its clarity, relevancy, and adequacy. They are five faculty members of the College of Nursing/Erbil Medical University, faculty members of the College of Science/Salahaddin University, faculty members of the College of Medicine/Erbil Medical University, one faculty member of the College of Management and Economic/ Salahaddin University, and one faculty member of Medical Technical institution. The expert's responses were rated according to whether they agreed or disagreed with the statement. The findings showed that, with few comments and recommendations, the majority of the experts concurred with the study's findings. In order for the constructed instrument to be a suitable tool for carrying out the study, the investigator has taken into account their comments and ideas, and the final copy has been completed. The test-retest technique was used to determine dependability. The correlation value was calculated and found to be 0.80, indicating that the instruments used to evaluate the understanding of respiratory disorders among pump employees were precise and thorough.

Ethical considerations were the main principle of data collection. First, the research proposal was reviewed and approved by the Research Council of the Faculty of Nursing, and then by the Research Council of Erbil Medical University. Next, the Ethical Review Committee of the Erbil College of Nursing/University of Medicine issued its permission to conduct the research in February 2022. This study was approved by the ERB2022.1267.3 Ethical Code by the Research Ethics Committee of Erbil University and its protocol is in accordance with the Declaration of Helsinki. After obtaining permission from the ethics committee, the researcher went to the

research environment and obtained permission from the officials there to conduct the study. Thereafter, written informed consent was obtained from all participants to participate in this study.

The Statistical Program for the Social Sciences was used to evaluate the data (SPSS, version 25). To evaluate proportions, the Chi-square measure of association was employed. To determine the degree of connection between two numerical factors, the Pearson correlation was used. Statistical significance was defined as a -value of less than 0.05.

Table 1: Socio-demographical characteristics of petrol pump workers (N=501)

Variable	Frequency	Percent
Age Group		
18-22	90	18
23-27	271	54.1
28-32	53	10.6
33-37	55	11
38-40	32	6.4
Marital Status		
Single	328	65.5
Married	173	34.5
Economic status		
Earnings higher than expenses	68	13.6
Earnings equal to expenses	309	61.7
Earnings lower than expenses	124	24.8
Physical Activity		
Regular	501	100
Irregular	0	0
Alcohol abuse history		
Yes	0	0
No	501	100
Quitted	0	0
Opoid abuse history		
Yes	0	0
No	501	100
Shift status		
Morning	80	16
Afternoon	160	32
Night	261	52
Years of Education		
Less than 6	58	11.6
7-12	300	59.9
13 and above	21	4.2
Working by years		
5-6	409	81.6
7-8	71	14.2
9 and above	21	4.2
Working hours per week		
40-60	275	54.9
61-80	135	26.9
81-100	34	6.8
101 and above	57	11.4
Total	501	100.0

Table 2: Prevalence of respiratory symptoms among petrol pump workers (N=501)

Variable	Statement	Yes Frequency (%)	No Frequency (%)
Cough	Cough present, on most days for more than 3 consecutive months.	116(23.2)	385(76.8)
	Has been suffered with cough for: weeks/ months/ years.	32(6.4)	469(93.6)
	Do you usually cough? (Do not consider coughs for throat clearing).	199(39.7)	302(60.3)
	Do you cough before doing anything else when you wake up?	66(13.2)	435(86.8)
	Do you cough for more than three consecutive months in a year?	68(13.6)	433(86.4)
	How many years have you been coughing?	0	
Chest tightness	Feels tightening of chest while 1-resting / 2-walking /3 working.	82(16.4)	419(83.6)
Sputum excretion	Does sputum usually come out of your chest?	174(34.7)	327(65.3)
	Do you usually clear out sputum when you wake up?	99(19.8)	402(80.2)
	Do you clear out sputum for more than three consecutive months in a year?	139(27.7)	362(72.3)
	How many years have you been clearing out sputum? (mean±S.D)	0.13±0.34	
Cough attacks and airway mucus hypersecretion	Do you have cough attacks and sputum hypersecretion for more than three weeks in a year?	43(8.6)	458(91.4)
	How many years have you been experiencing such attacks? (mean±S.D)	0.0938± 0.29	
Shortness of breath	Do you have shortness of breath when walking fast on a flat surface or when climbing a gentle slope?	143(28.5)	358(71.5)
	Do you have to move slowly on a flat surface compared to your peers due to shortness of breath?	90(18)	411(82)
	Have you ever had to stop at a flat surface due to shortness of breath while walking at your usual speed?	113(22.6)	388(77.4)
Wheezing	Do you feel wheezing in your chest every day when you breathe?	156(31.1)	345(68.9)
	Do you feel wheezing in your chest when you breathe during the week?	134(26.7)	367(59.3)
	Have you ever felt a wheezing sound in your chest?	204(40.7)	297(59.3)
	Do you always feel the wheezing?	154(30.7)	347(69.3)
	Do you feel wheezing while walking?	156(31.1)	345(68.9)
	Do you feel wheezing while running	117(23.4)	384(76.6)
	Do you feel wheezing when you wake up?	129(25.7)	372(74.3)
	Do you feel wheezing at night or during the rest of the day?	126(25.1)	375(74.9)

Results and Discussion

Information about the sociodemographic traits of survey participants who work at gas pumps is provided in Table 1. The mean age of the employees was 26.38 years old, with the majority of them being unmarried (65.5%) and falling within the age range of 23 to 27. The majority of the employees' economic circumstances were balanced budgets (61.7%). None of the employees had a history of using booze or opioids, and they all engaged in regular physical activity. 52% of the employees worked night hours. The majority of employees, who made up 81.6% of the workforce, put in 40 to 60 hours per week.

Information about the frequency of lung diseases among gas station attendants is provided in Table 2. Examination of cough on most days for more than 3 consecutive months showed that 385 people (76.8%) did not have a cough on most days for more than 3 consecutive months; While 116 people (23.3%) had a history of coughing on most days for more than 3 consecutive months. According to the findings of looking at the factors of chest tightness during rest, walking, and activity, 82 (16.4%) people reported having this sensation, while 419 (83.6%) people did not. The findings of an investigation into the variable of sputum discharge from the chest in gas station employees revealed that 174 (34.7%) individuals had a history of discharge from the chest and were affected by It. 327 (65.3%) individuals, on the other hand, had no history of sputum discharge from the thorax.

The findings of the study that looked at the variable of coughing attacks and excessive phlegm secretion for more than three weeks per year in gas station workers revealed that 43 (8.6%) individuals experienced coughing attacks and excessive phlegm secretion for more than three weeks per year. Simultaneously, 458 (91.4%) individuals did not experience coughing fits or abundant phlegm production. None of the subjects had a history of experiencing these problems, according to the questionnaire data analysis. Examination of shortness of breath while walking fast on a flat surface or climbing a gentle slope showed that 143 (28.5%) people had shortness of breath and 358 (71.5%) people did not have shortness of breath. The results of examining the variable chest wheezing while breathing in gas station workers showed that 156 (31.1%) people had this complication while breathing. The remaining 345 people (68.9%) did not have this experience. Table 2 presents the information about prevalence of respiratory symptoms among Petrol Pump Workers in study.

Table 3 presents information about the Auscultation of the chest among petrol pump workers in the study. The results of examining chest auscultation variables among gas station workers showed that the first frequency of chest problems was wheezing, which was observed in 189 people (37.7%). Rhonchi ranked second with 14.2% involvement. Rales and crackles were not observed in working people. Also, the results of the mean peak flowmeter variable investigation showed that gas station employees have a mean peak flowmeter of 549.03 ± 71.81.

Table 4 lists percentage distribution of overall prevalence of respiratory morbidities among petrol pump workers. According to the results, 53.5% of petrol pump workers have respiratory morbidities.

Table 3: Auscultation of chest among petrol pump workers

Auscultation of chest	Frequency	Percent
Wheezing		
Present	189	37.7
Absent	312	62.3
Rhonchi		
Present	71	14.2
Absent	430	85.8
Crackle		
Present	0	0
Absent	501	100
Rales		
Present	0	0
Absent	501	100
Peak Flow Metry		
mean±S.D	549.03 ± 71.81	
Total	501	100.0

Table 4: Prevalence of respiratory morbidities among petrol pump workers

Variable	Frequency	Percent
Respiratory morbidities		
Absent	233	46.5
Present	268	53.5
Total	501	100

Table 5 provides an association between knowledge and prevalence of respiratory morbidities among petrol pump workers. According to the results, there was significant relationship between knowledge and prevalence of respiratory morbidities among petrol pump workers (p=0.008).

Information about the mean peak flow metry among gas pump employees with marital staues and who have had Covid-19 before is shown in Table 6. The findings showed that there were extremely significant variations between the mean of peak flow metry with marital status and have previously had Covid-19 (p<0.0001).

Comparing the Mean Max Flow Metery among Petrol Pump Employees with their demographic traits is shown in Table 7. The results show that the mean of peak flowmetry and demographic factors vary significantly (Economic status, Age Group, Years of Education, and Working hours per week) (p<0.0001).

Table 8 shows an association between PeakFlowMetry and prevalence of respiratory morbidities among petrol pump workers. According to the results there was significant relationship between PeakFlowMetry and prevalence of respiratory morbidities among petrol pump workers (p=0.00001).

The present study focuses on the evaluation of knowledge about respiratory problems among employees of gas stations under the management of the Erbil Ministry of Natural Resources.

The results of this research revealed that the mean age of the employees was 26.38 years old, indicating that the majority of the populace started working at gas stations when they were still quite young.

In contrast to the current study's findings, the study by Yassin *et al.* (2009) on the knowledge of gas station attendants found that 75.6% of the workers were between the ages of 30 and 49, which raises the mean age [12].

Table 5: Association between knowledge and prevalence of respiratory morbidities among petrol pump workers

Variable	Respiratory morbidities		Total	P-value*
	Absent F (%)	Present F (%)		
Knowledge				
Low	1(0.4)	5(1.9)	6(1.2)	0.008
Moderate	172(73.8)	221(82.5)	393(78.4)	
High	60(25.8)	42(15.7)	102(20.4)	
Total	233	268	501	
* Fishers exact test				

Table 6: Comparison of mean of peak flow metry among petrol pump workers according to marital status and have Covid-19 before

PeakFlowMetry	N	Mean	S.D	P-value
Marital Status				
Single	328	576.43	52.39	<0.0001
Married	173	497.08	75.03	
Covid -19 before				
No	56	541.60	73.41	<0.0001
Yes	445	549.96	71.63	

Table 7: Mean of Peak Flow Metry among Petrol Pump workers according to demographical characteristics

PeakFlowMetry	N	Mean	S.D	95% CI for Mean		Min	Max	P-value
				Lower Bound	Upper Bound			
Economic status								
Earnings higher than exoenses	68	516.91	24.15	511.06	522.75	475	600	<0.0001
Earnings equal to expenses	309	567.10	79.34	558.22	575.98	380	670	
Earnings lower than expenses	124	521.61	52.27	512.32	530.90	400	610	
Age Group								
18-22	90	563.50	40.75	554.96	572.03	450	670	<0.0001
23-27	271	585.05	56.57	578.28	591.82	400	650	
28-32	53	495.09	25.56	488.04	502.13	460	620	
33-37	55	492.63	7.50	490.60	494.66	485	505	
38-40	32	389.53	22.51	381.41	397.64	380	445	
Years of education								
Less Than 6	58	491.81	17.41	487.23	496.38	460	570	<0.0001
7-12	300	537.68	74.89	529.17	546.19	380	640	
13 and above	143	596.04	48.88	587.96	604.1301	440	670	
Working by years								
5-6	409	567.86	59.33	562.09	573.62	400	670	<0.0001
7-8	71	451.83	62.42	437.05	466.60	380	620	
9 and a above	21	510.95	33.78	495.57	526.33	500	615	
Working hours per week								
40-60	275	571.47	63.03	563.98	578.95	400	650	<0.0001
61-80	135	513.70	81.51	499.82	527.57	380	620	
81-100	34	601.76	15.01	596.52	607.05	570	670	
101 and above	57	492.98	14.23	489.20	496.75	400	515	

Table 8: Association between PeakFlowMetry and prevalence of respiratory morbidities among petrol pump workers

Variable	Prevalence of respiratory morbidities	N	Mean	S.D	P-value*
PeakFlowMetry	Absent	233	608.99	36.93	0.00001
	Present	268	496.90	51.05	
*t-test					

Also, in a cross-sectional study in Palestine conducted by Belal Rahhal et al. (2022), the effect of occupational exposure to gasoline on pulmonary function parameters was investigated. The mean age was 40.65 years old, which is not consistent with our study [13]. The majority of respondents were single, according to the findings on their marital status. This is consistent with their age distribution, which revealed that the bulk of respondents were between the ages of 22 and 23-27. The majority of young people in this age group were single. These findings are consistent with the study conducted in Nigeria in 2016 [14].

Body mass index (BMI) is one of the most important factors affecting pollutant absorption

because lipophilic volatile pollutants produced in gas stations are absorbed proportionally to both adipose mass and BMI [15]. The mean BMI of the participants was in the range of 24.45 kg/m^2, which was not consistent with the study conducted in Egypt in 2023 [16]. The reason for the inconsistency of the mean BMI in the studies can be attributed to the number of participants, the ratio of male and female workers, and the lifestyle pattern of the people.

The duration (years) of working in the station (pump) was similar to the study conducted in Suburban Areas of Chennai 2017 as equal to 5.72 years [17]. In a study done in India in 2020 [18], most of the participants had between 0-10 years of work experience. Similar to this study, In a study done in India in 2020 [19], most of the participants had work experience between 0-10 years, which is similar our study. The reason for this mean working time at the pump station, which is between 0 and 10 years, is that most of the workers are young people.

There is epidemiological evidence linking workplace stress to an increased risk of cardiovascular diseases, including coronary heart disease and hypertension. Therefore, working outside of the 8-hour working window set by many nations' labor laws (Working Time Directive), as standardized by the International Labor Organization [20], is considered as a part of what is known as an "abnormal work plan". The fact that the working, eating, and sleeping phases are altered is another physiological issue related to shifting work and the night shift in particular. Shift workers and those who work long hours may find it difficult to maintain relationships with family, friends, and social activities, which may result in poor sleep, exhaustion, anxiety, sadness, and an increase in neuroticism [21].

For qualitative and quantitative evaluation of pulmonary function in individuals with cardiorespiratory system disorders, lung function studies are being used more and more. When compared to other people, over time, gas station employees' lung damage (restrictive pattern), and pulmonary function have decreased due to the increased exposure to fuel vapor and automobile emissions [13].

Regarding the lung function of gas station employees along with the length of exposure, the results shows that participants who had worked at the gas stations for an extended amount of time had lower mean peak flow metre values. The fact that gas stations are situated near busy roads and expose their workers to air pollution as driver's approach to load up on gasoline or diesel may be a factor in this decline in addition to the subjects' advancing age.

Occupational solvents infiltrate the body through the respiratory system or by coming into contact with the epidermis. Examples include the benzene found in fuel and diesel vapors. This decline in peak flow meter in the present study may be caused by air pollutants and occupational solvents irritating the bronchial epithelium, which also affects the Cilia and Clara cells of the lungs and causes macrophages to produce proteolytic enzymes. These changes reduce the lungs' capacity for elastic expansion. A buildup of dust-laden macrophages results in varying degrees of wall thickness and change in terminal and respiratory bronchioles. This damage to the small passageways may result in decreased pulmonary performance [22].

The results of variable distribution of the percentage of the overall prevalence of respiratory complications among gas station workers showed that more than half of the workers have respiratory complications. This is contrary to the results of studies conducted in Nigeria in 2016 [14], and a community-based cross-sectional study in 2023 [16]. Because in these studies, most people did not experience respiratory complications. This may be due to differences in knowledge of using personal protective equipment, duration of exposure, and aptitude of individuals.

The results of the examination of chest auscultation variables in gas station workers showed that wheezing is the most common complication among workers. A study conducted in India in 2011 [23] showed that long-term exposure to gasoline vapors can cause severe bronchospasm and alveolitis, leading to obstructive and restrictive lung disease. In another study conducted in Pakistan in 2016 [24], the results showed that respiratory

symptoms such as chronic cough, shortness of breath, and wheezing were reported among gas station workers; In addition, these findings were confirmed by a study conducted in 2014 to investigate pulmonary function and symptoms among Nigerian petrol station attendants. Also, in this study, pointed that these complications are more in developing countries, because safety rules are not fully followed. These findings are consistent with our study [25].

In a meta-analysis conducted in 2019 with the aim of the effect of occupational exposure to gasoline on pulmonary function parameters; it was found that exposure to petroleum over an extended period of time has negative effects linked to the chance of pulmonary function. This conclusion is in line with our research. On the other hand, this study advocated for routine monitoring of the pulmonary function metrics of service station workers. Because these tests identify more sensitive employees before they experience permanent and chronic problems. This study also highlighted the use of safety gear and adherence to safety regulations at fueling stops [15].

In this study, we measured the variables of cough, chest tightness, coughing attacks and airway mucus, shortness of breath, and wheezing in situations that patients can experience. The results of the cough variable showed that most of the patients cough and the cough is present on most days for more than 3 consecutive months. Examining the chest tightness variable showed that 16.4% of the employees felt chest tightness while resting, walking and while working. Regarding the phlegm elimination variable, a small percentage of people removed phlegm from their chest and had little awareness. The variable of coughing attacks and airway mucus showed that a small percentage of people experience coughing attacks and excessive phlegm secretion more than three weeks a year. In addition, regarding shortness of breath, 28.5% of patients stated that they experience shortness of breath when walking fast on a flat surface or when climbing a gentle slope. Furthermore, less than half of the people claimed that they feel wheezing in their chest every day when they breathe. There are limited studies with which to compare these results. But in a study conducted in Iran in 2012, the prevalence of respiratory symptoms was investigated in gas station workers. The results of the comparison between the control group and the case showed that the incidence of cough, sputum, and both together for 3 consecutive months or more in a year has a significant difference. Also, the occurrence of wheezing most days and nights, shortness of breath compared to the same age group were among the statistically significant parameters which are consistent with the results of our study [26].

Benzene-containing petroleum products are not the only natural pollutants that can irritate the airways. Regular medical checkups, the supply of air pollution masks, and health instruction of the workforce regarding the negative impacts of fuel have all been shown to reduce mortality [13]. Similar results were reported in studies conducted in India in 2008 [27], 2011 [23], and 2013 [28]. In addition, in another study conducted in China in 2022 [29], it was discovered that exposure to summer heat over the course of a lifetime is strongly linked to a decline in young adults lung function. These results show that the employees of gas stations are exposed to many stimuli that can cause significant pulmonary effects and complications to the employees along with gasoline.

In a study conducted in India in 2012 [30], it was found that the ventilatory efficiency of the lung is decreased in petrol pump workers in a study to assess ventilatory impairment in petrol pump workers, and that the decline in lung functions in petrol pump workers could be due to exposure to petrol fuel vapours, diesel exhaust, and airborne particulate matter at petrol pumps.

The results of examining the variable of the relationship between awareness and the prevalence of respiratory diseases showed that there is a significant relationship between awareness and the prevalence of respiratory complications in gas station workers. This finding is consistent with the study conducted in Pakistan in 2021. Ebeid *et al.* in this study, found that higher income and higher educational awareness have a significant relationship with awareness of the prevalence of respiratory

complications, which is in line with our results [31].

The results of examining the relationship between Peak FlowMetry and the prevalence of respiratory complications among gas station workers showed that there is a significant relationship between Peak FlowMetry and the prevalence of respiratory complications. In a study conducted in Nigeria in 2019 by Oni *et al.* [32], FEV1 and PEFR values were found to be very low among gas station attendants, which could possibly be attributed to long-term exposure to air pollutants. Therefore, it can increase the prevalence of respiratory complications among gas station workers. Also, in a meta-analysis conducted in 2019, it was determined that occupational exposure to gasoline fumes is a risk factor for lung function and the prevalence of respiratory complications [33]. These results are consistent with our study.

Conclusion

Workers at gas stations in Erbil are subjected to fumes from vehicles as well as fuel and the vapors created when filling up automobiles. It has been demonstrated that a variety of factors, including socioeconomic and environmental factors, have an impact on the frequency of respiratory diseases among gas station employees who load up vehicles with gasoline. It was also established that employees took inadequate safety precautions despite being aware of the harmful impacts of gasoline on health. It is generally recommended to implement prevention, intervention, and training programs regarding the use of safety equipment, keeping track of workers' health, and enhancing their understanding of gas station operations.

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References

[1]. Almetwally A.A., Bin-Jumah M., Allam A.A., Ambient air pollution and its influence on human health and welfare: an overview, *Environmental Science and Pollution Research*, 2020, **27**:24815 [Crossref], [Google Scholar], [Publisher]

[2]. Thomas, J.S., Mercy P.J., Joseph M., Joseph B., Awareness, Prevalence and Factors Associated with Respiratory Morbidities Among Selected Petrol Pump Workers in Bengaluru City? *Indian Journal of Occupational and Environmental Medicine*, 2020, **24**:199 [Crossref], [Google Scholar], [Publisher]

[3]. Manisalidis I., Stavropoulou E., Stavropoulos A., Bezirtzoglou E., Environmental and health impacts of air pollution: a review, *Frontiers in public health*, 2020, **8**:14 [Crossref], [Google Scholar], [Publisher]

[4]. Kerchich Y., Kerbachi R., Measurement of BTEX (benzene, toluene, ethybenzene, and xylene) levels at urban and semirural areas of Algiers City using passive air samplers, *Journal of the Air & Waste Management Association*, 2012, **62**:1370 [Crossref], [Google Scholar], [Publisher]

[5]. Vijayashankar U., Rajeshwari L., Effect of rice mill dust on peak expiratory flow rate among rice mill workers of Mysore district, *National Journal*

of Physiology, Pharmacy and Pharmacology, 2018, **8**:1240 [Crossref], [Google Scholar], [Publisher]
[6]. Zolfaghari A., Zarei A., Mostaghaci M., Mihanpour H., Effect of respiratory exposure to benzene, toluene, xylene and ethyl benzene on the spirometric indices in two consecutive years among the petroleum products loading workers, *Occupational Medicine Quarterly Journal*, 2020, **12**:69 [Crossref], [Google Scholar], [Publisher]
[7]. Lakhouit A., Alsulami B.T., Evaluation of risk assessment of landfill emissions and their impacts on human health, *Arabian Journal of Geosciences*, 2020, **13**:1 [Crossref], [Google Scholar], [Publisher]
[8]. Kuranchie F.A., Angnunavuri P.N., Attiogbe F., Nerquaye-Tetteh E.N., *Occupational exposure of benzene, toluene, ethylbenzene and xylene (BTEX) to pump attendants in Ghana: Implications for policy guidance.* Cogent Environmental Science, 2019, **5**:1603418 [Crossref], [Google Scholar], [Publisher]
[9]. Edokpolo B., Yu Q.J., Connell D., Health risk characterization for exposure to benzene in service stations and petroleum refineries environments using human adverse response data, *Toxicology reports*, 2015, **2**:917 [Crossref], [Google Scholar], [Publisher]
[10]. Megahed N.A., Ghoneim E.M., Indoor Air Quality: Rethinking rules of building design strategies in post-pandemic architecture, *Environmental Research*, 2021, **193**:110471 [Crossref], [Google Scholar], [Publisher]
[11]. Rattanajongjitrakorn P., Prueksasit T., Temporal variation of BTEX at the area of petrol station in Bangkok, Thailand, *APCBEE procedia*, 2014, **10**:37 [Crossref], [Google Scholar], [Publisher]
[12]. Yassin M.M., Baroud N.S., Knowledge, attitude, practice and self reported symptoms among gasoline station workers exposed to leaded gasoline in the Gaza Strip, *Turkish Journal of Public Health*, 2009, **7**:9 [Crossref], [Google Scholar], [Publisher]
[13]. Rahhal B., The effect of occupational exposure to petrol on pulmonary function parameters: a cross sectional study in Palestine, *Journal of Materials and Environmental Science*, 2022, **13**:732 [Google Scholar], [Publisher]
[14]. Ifeyinwa A.E., Emerole C.O., Amadi A.N., Johnkennedy N., Gasoline fumes exposure and risk of respiratory disease among fuel pump attendants in Owerri Municipal Council, Nigeria, *Journal of Advances in Biological and Basic Research*, 2016, **2**:10 [Google Scholar], [Publisher]
[15]. Rahimi Moghadam S., Afshari M., Moosazadeh M., Khanjani N., Ganjali A., The effect of occupational exposure to petrol on pulmonary function parameters: a review and meta-analysis, *Reviews on Environmental Health*, 2019, **34**:377 [Crossref], [Google Scholar], [Publisher]
[16]. Moneim A., Hady A., The Potential Biochemical and Clinical Hazards in some Petroleum Station Workers, *Zagazig Journal of Forensic Medicine*, 2023. **21**:92 [Crossref], [Google Scholar], [Publisher]
[17]. Santhalingam B., Mahajan M.V., Lung Function Abnormalities in Petrol Pump Workers in Suburban Areas of Chennai, *Annals of International Medical and Dental Research*, 2017, **3**:1 [Google Scholar], [Publisher]
[18]. Mandal A., Mukherjee N., Pulmonary Function of Petrol filling Workers from West Bengal, India, *International Journal of Occupational Safety and Health*, 2020, **10**:28 [Crossref], [Google Scholar], [Publisher]
[19]. Jaiswal A., Effect of petrol fumes on an anthropometry and ventilatory function among petrol pump workers of, *Human Biology Review*, 2020, **9:**358 [Google Scholar], [Publisher]
[20]. Afolabi O.J., Akibo K.O., Urban challenges and informal public transport services in Nigeria, *Revista de Management Comparat International*, 2020. **21**:319 [Google Scholar], [Publisher]
[21]. Benson C., Dimopoulos C., Argyropoulos C.D., Mikellidou C.V., Boustras G., Assessing the common occupational health hazards and their health risks among oil and gas workers, *Safety Science*, 2021, **140**:105284 [Crossref], [Google Scholar], [Publisher]
[22]. Smita V.P., Patil S., Kanitkar S., Study of Peak Expiratory Flow Rate as the Assessment of Lung Function in Occupationally Exposed Petrol Pump Workers of Western Maharashtra, *Journal of Krishna Institute of Medical Sciences (JKIMSU)*, 2016, **5** [Google Scholar], [Publisher]

[23]. Aprajita P.N., Sharma R., A study on the lung function tests in petrol-pump workers, *J. Clin. Diag. Res*., 2011, **5**:1046 [Crossref], [Publisher]
[24]. Zafar M., Correlation of respiratory symptoms and spirometric lung pattern among petrol pump workers Karachi, Pakistan: Cross-sectional survey, *International Journal of Health System and Disaster Management*, 2016, **4**:36 [Crossref], [Google Scholar], [Publisher]
[25]. Adeniyi B.O., Pulmonary function and symptoms among petrol pump attendants in Nigeria, *International Journal of Biological & Medical Research*, 2014, **5**:3780 [Google Scholar], [Publisher]
[26]. Neghab H.M., Respiratory MorbidityAssociated with Inhalation Exposure to Aporphous Carbon (Crock), *Iran Occupational Health*, 2012, **9** [Google Scholar], [Publisher]
[27]. Uzma, N., Khaja Mohinuddin Salar B.M., Kumar B.S., Aziz N., David M.A., Reddy V.D., Impact of organic solvents and environmental pollutants on the physiological function in petrol filling workers, *International journal of environmental research and public health*, 2008, **5**:139 [Crossref], [Google Scholar], [Publisher]
[28]. Dube, S., S. Mungal, and M. Kulkarni, Evaluation of respiratory functions in petrol pump workers at Nanded, *International Journal of Recent Trends in Science And Technology*, 2013, **8**:149 [Google Scholar], [Publisher]
[29]. Miao, J., et al., *Life-time summer heat exposure and lung function in young adults: A retrospective cohort study in Shandong China.* Environment International, 2022. **160**: p. 107058.. [Crossref], [Google Scholar], [Publisher]
[30]. Sharma N., Gupta N., Gupta R., Ventilatory impairment in petrol pump workers, *JK Science*, 2012, **14**:5 [Google Scholar], [Publisher]
[31]. Ebeid A.A.A., Knowledge of petrol station workers about the health effects from their occupation in Karari locality in Omdurman, 2021 [Google Scholar], [Publisher]
[32]. Oni T.M., Ana G.R.E.E., Ambient air pollution exposure and lung function assessment of filling station attendants in Ibadan, Nigeria, *Reviews on Environmental Health*, 2019, **34**:211 [Crossref], [Google Scholar], [Publisher]
[33]. Rahimi Moghadam S., Afshari M., Moosazadeh M., Khanjani N., Ganjali A., The effect of occupational exposure to petrol on pulmonary function parameters: a review and meta-analysis, *Reviews on Environmental Health*, 2019, **34**:377 [Crossref], [Google Scholar], [Publisher]

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