

Research Article

Assessing the Status User Performance of Personal Protective Equipment, the Functional and Clinical Respiratory Symptoms of Smoke-induced Toxic Inhalants, Amongst Journalists- Exposed at the Plasco Tower Trade Center Disaster:In the Early days of the Accident. Tehran – Iran - 2017

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Abstract

Background: The use of the best quality performance of personal protective equipment can lead to reducing the risk of injuries among subjects in facing a crisis. Journalists are the non-professional between the rescue teams. They should be a presence in the disaster site and highly stressful environments.

The scope of this study assessed the status of user performance of personal protective equipment, clinical respiratory symptoms of smoke-induced toxic inhalants, pulmonary function test, among journalists -exposed at the Plasco Trade Center (PTC) disaster.

Material & Methods: All the press- journalists enrolled based on the announcement of agency news. They were evaluated using personal protective equipment, functional, and clinical respiratory system symptoms based on the protocol of the study.

Results: A total 132 press-journalists had completed the criteria of the study. The frequency of standard use of wear the face mask was detected in 8% of journalists in their work shift time. Free of respiratory symptoms were found in 5% of the population. Various frequency of upper and lower respiratory symptoms was detected among exposed- subjects of smoke-induced inhalation toxicity. Lower airway symptoms also were remarkable.

Conclusion: Self- protection with types of personal protective equipment (face mask) is the most reliable method of protective health of the respiratory system in non-professional subjects during a fire disaster. A face mask can decline the respiratory symptoms of smoke-induced inhalation among target populations.

Keywords: Personal protective equipment, Face mask, Smoke inhalation toxicity, Respiratory symptoms, Pulmonary function test, Journalist, Trade center, Disaster, Iran.

Introduction

Disaster is a complex set that may occur naturally or by man-made and is described as severe disruptions a community's performance based on the defined capacity in the face up to the events [1]. The outbreak of the disaster during the years 1900-2006 has been reported in more than 15,000 cases around the world [2]. However, the reported data manifest that the economic and demographic damages have been huge and estimated globally over two billion affected individuals, and in 1,5 trillion USD property damage (2006-2015 years) [3].

The Plasco tower Trade Center (PTC) was the oldest trading center in Tehran city. A terrible fire and collapse took place in the PTC in 2017. There is a complex relationship between human exposures, adverse health outcomes, and health-hazardous materials (i.e; settle the dust, complex chemical compounds) that they appear in the catastrophic environment of the collapsed and fired tower [4] - Victims -exposed may be encountered frequently with smoke inhalation injuries [5] and mortality [6]. The main participating operations teams of PTC included firefighters from various fire stations, rescue teams of emergency, and press-journalists in Tehran.

Journalism is employment for gathering information and presentation of the news in society. Journalists are relatively considered as non-professional between the rescue teams, although their presence is mandatory in the disaster. Any individuals suffer from a variety of physical and even psychological injuries in one's life-

time when they are located in a stressful situation such as work-related catastrophe, traumatic events, and disaster [7]. Journalists are more likely to have a potential risk of physical and psychological trauma in the crisis. However, the workplace and daily work of newspapers are occasionally full of the various stressors [8]. They may be led to adverse health outcomes among those in a short period (physical injury, acute disorders) [9] and long -time (psychological disorders, chronic diseases) [10,11]. The severity of these injuries is probably influenced by various factors, including the level of training in the use of different types of personal protective equipment based on the defined conditions of the accident, skills, and previous experiences.

The face mask is a device of types of personal protective equipment. It has various kinds as cloth, medicine, respirator. The aim to wear a face mask is to prevent the transfer of the airborne pathogens (source control) and also to block the entrance of environmental pollutants into the conducting zone of the airways (community setting) [12,13]. The filtering efficiency and a mask performance are evaluated to prevent penetration of aerodynamics particulates of less than 2,5 μm with 95% efficacy [14]. The substantial impact of the wear a face mask efficacy of personal protection is multivariate and also depends on both the pore size, the structure of the material layers as well as mask usability (adherence, fitting on the face, and desire to use). The efficiency of the surgical mask has good and acceptable infiltration performance [15]. The competence of face mask use is a necessity for a journalist for self-pro-

tection to participate in the fire -disaster [16].

The scope of this study assessed the status of user performance of personal protective equipment, clinical respiratory symptoms of smoke-induced toxic inhalants, pulmonary function test, among journalists -exposed at the Plasco Trade Center (PTC) disaster.

Material & Methods

This study was a descriptive cross-sectional study that was conducted in the Loghman Hakim Teaching Hospital affiliated to the Shihad Beheshti University of Medical Sciences.

Loghman Hospital is the oldest general hospital and located in the south of Tehran. Several hospitals, including Loghman Hakim, were assigned to rescue teams at the time of the Plasco disaster. The emergency planning was that the injured patients were quickly transferred to the triage centers, and medical care and emergency management were initiated as soon as possible. The victims were hospitalized and monitored after emergency treatment if needed.

The PTC was one of the commercial centers located in the central part of Tehran city, the heart of the traditional business (BAZAR), and overcrowded. Plasco tower was the oldest trade center and highest building and iconic in Tehran. PTC was founded in 1660 and opened in 1668. It had 17- stories, the fire, and then collapse occurred in June/2017.

On the other day of the Plasco disaster, we decided to formally invite all members of the rescue teams and reporters to follow up and medical care. The Pars Official News Agency was one of the official news that published disaster news coverage, and it had the most reporters in the incident. The call was announced through this news agency and invited to all journalists who were stationed at the site of the disaster.

We enrolled all-volunteer reporters that they were agreed to treat by the chest clinic during and after the emergency phase. The physicians have completed the treatment, clinical, and laboratory examinations according to the designed protocol.

The questionnaire was based on demographic information, disease status (previous illnesses), upper and lower respiratory tract symptoms of smoke-induced inhalation injury, use of self-protection device (face mask), duration of contact. Paraclinical tests were performed next to initial management. They included stan-

dard radiography of the chest (C-XR) and pulmonary function tests (PFT) if possible.

Inclusion criteria included press- reporters stationed at the scene of the disaster or frequent traffic at the site of the PTC, a positive response to the public call, and consent to continue the study protocol.

Exclusion criteria included severe respiratory symptoms and dissatisfaction to continue the study. Of course, the chest clinic was treated all the victims exposed –smoke.

Data were collected in the SPSS program analysis software (version 20). Data were summarized with mean and percent. The figures for the study were generated with Excel and SPSS programs.

Results

A total number of 132 press -journalists were focused population. The mean age was 32, 2 ± 5.9 SD years. It ranged between 21-49 years, with Mode=30 and Median=31.

Resident time at the disaster workplace was 43, 5 ± 33.5 SD hours, range 2- 200 hours, Median= 36, and Mode =24. 88% of subjects were in the younger age class (20-40) and 12% of those were in the age class 40-49 years.

A total of 97% of journalists were the belief that was the healthiest in response to the related- questions and the presence of illnesses was reported amongst them 3%.

Figure 1 shows the frequency distribution of journalist's health status based on the self -belief. Allergy, hypertension, dyslipidemia, kidney diseases, and bronchial asthma were noticeable among reported disorders. Figure 2 reveals the frequency distribution of self -reported diseases among journalists, individually. Personal protective types of equipment have consisted of a simple face mask and a surgical mask. Only 8% of them have used the standard face mask during a long time of their missions and shift work time. Over 67% of the subjects wear face masks partially. Figure 3 represents frequency distribution users wear a face mask based on the self-reported.

5% of journalists were free of respiratory symptoms. They included cough, dyspnea, wheezing, hemoptysis, chest pain. The frequency of number respiratory symptom complaints was two (27%), three (23%), one (17%), four (15%), five (8%), and six (4%), respectively.

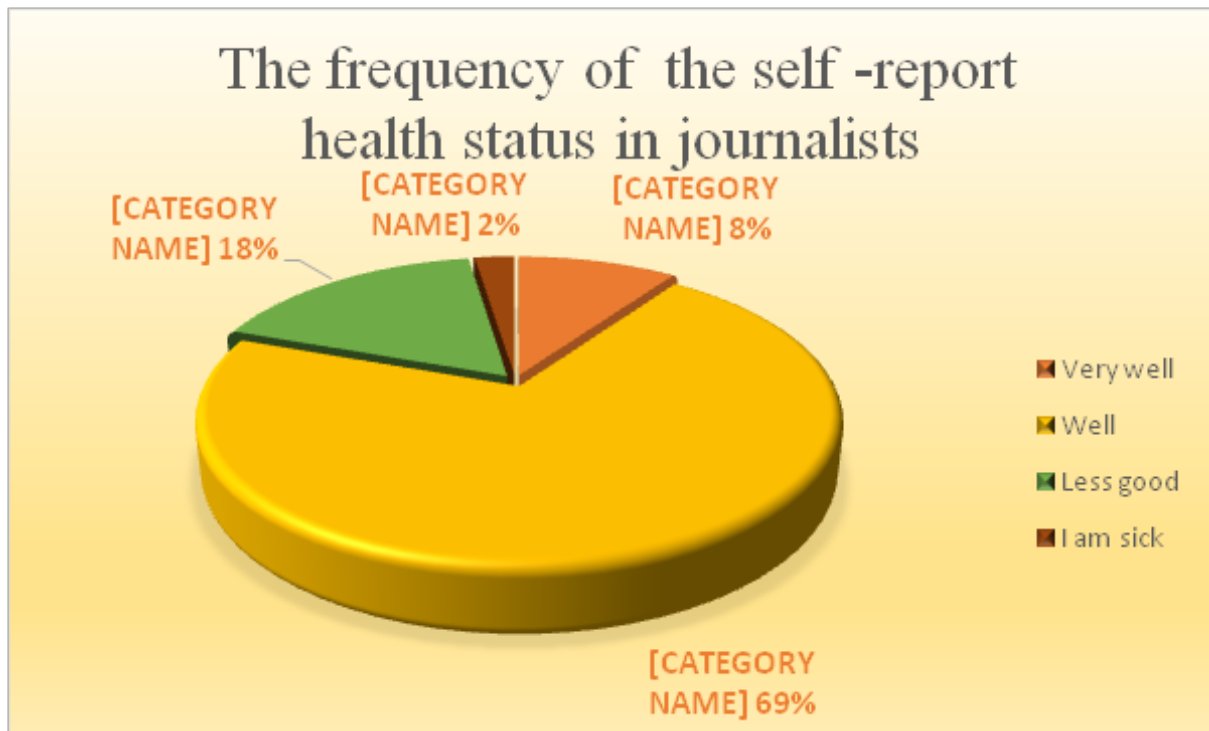


Figure 1: Frequency distribution of the health status in journalists based on the self-belief

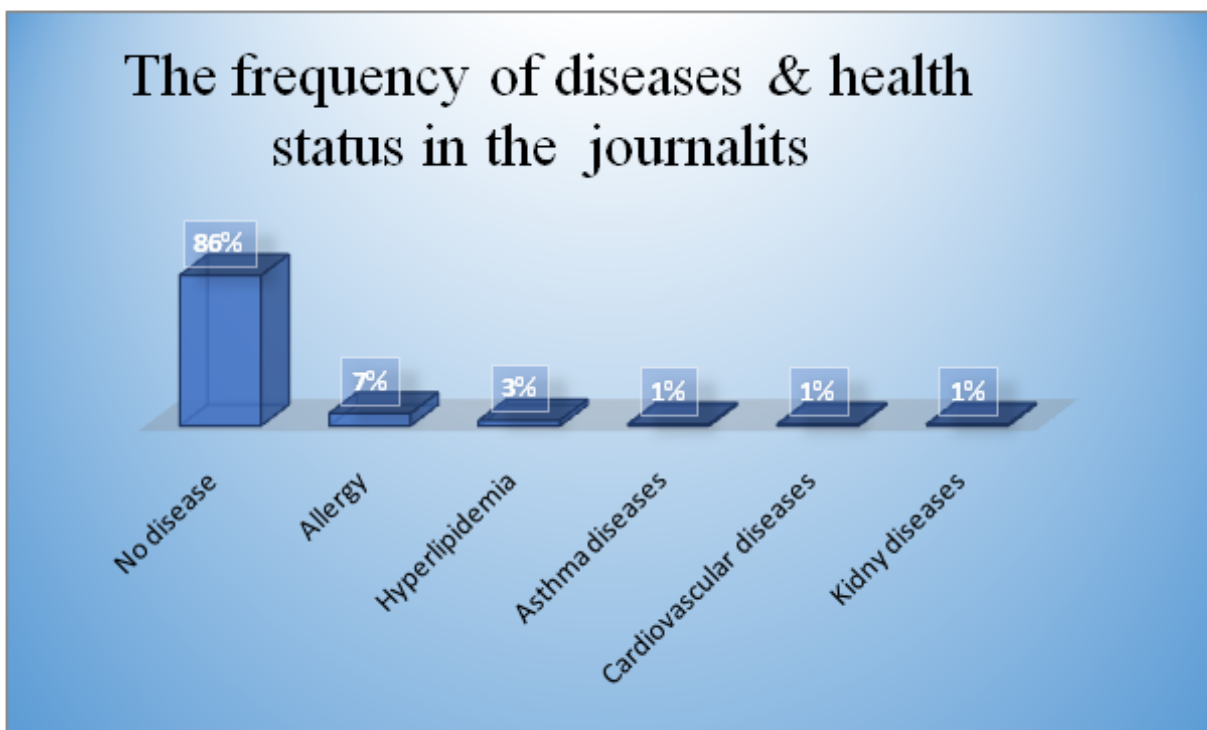


Figure 2: The frequency distribution of self-reported diseases among journalists, individually.

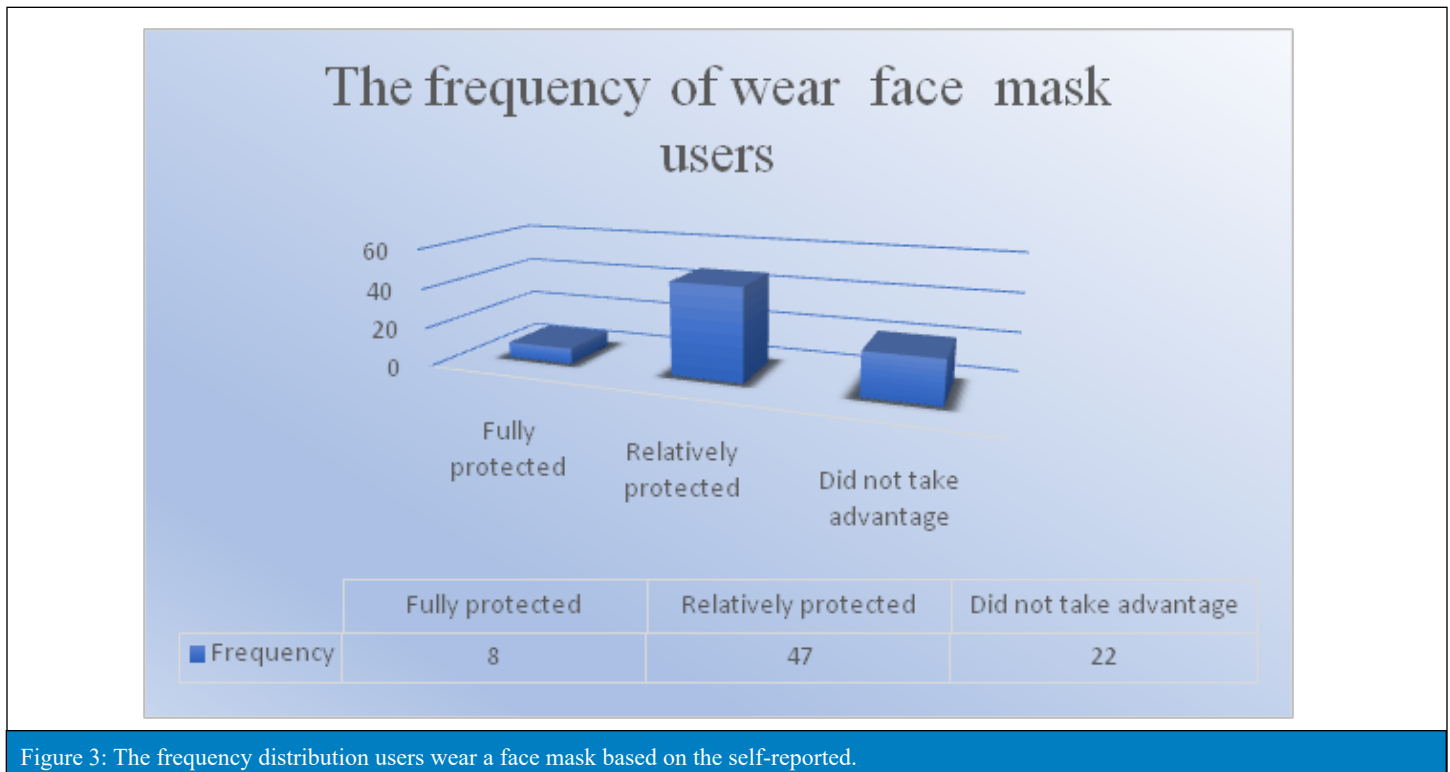


Figure 3: The frequency distribution users wear a face mask based on the self-reported.

Figure 4 discloses the status frequency age -class distribution of journalists, numbers of respiratory symptoms, and wear face mask user. Figure 6 presented the frequency distribution of Lower airway respiratory symptoms. Wheeze and haemoptysis respiratory symptoms had a higher (75%) and lower frequency (9%). Figure 5 demonstrates the frequency distribution of lacrimation and the upper airway respiratory symptoms. Lacrimation, sore throat and hoarseness were almost equal frequency of around 20%.

Chest X-ray (CX-R) abnormality was found in 23% of victims. Pulmonary Function Test (PFT) profile patterns were found as normal (76%), restrictive (22%), and obstructive (2%). A low frequency of obstructive pattern and high normal CX-R detected in the sample population. Figure 7 presents the status of chest x-ray finding respect to the self-report wheeze symptoms and PFT patterns.

Discussion

PTC disaster was one of the serious health events that took place in the capital of Iran in recent years. Besides the resident's city, operation teams of firefighters, rescue teams, and journalists who were exposed to mass fire productions. In addition to the exten-

sive fire, the building was destroyed and partially collapsed in the early days of the disaster. This event leads to the release of large amounts of toxic substances and dust in the environment. Mass media fire is considered as a critical care setting. It may have occurred at a trade center [17]. Toxic inhalants are categorized as airborne particulates (dust particles), coarse particulate, toxic chemical compounds, asbestos fiber, leads, and thermal injury [18]. Smoke inhalation injury is a common risk factor in inducing the morbidity and mortality among the fire victims [19] they may be able to induce different diseases in early or acute [20] and late or chronic conditions, [21].

The disasters are coping with the various challenge and track issues in human society that usually proceeds from the onset of events until the long -time after the end of the incident. The most common highlight of these topics includes the complications and aftermath of accidents that are reflected in the issues of the wide variety of professional settings as medicine, health, prevention, protection, economic, social, security, and so on.

The time spent on the shift works (residency time) of journalists was significant in the sample study. They were the overt limit. It

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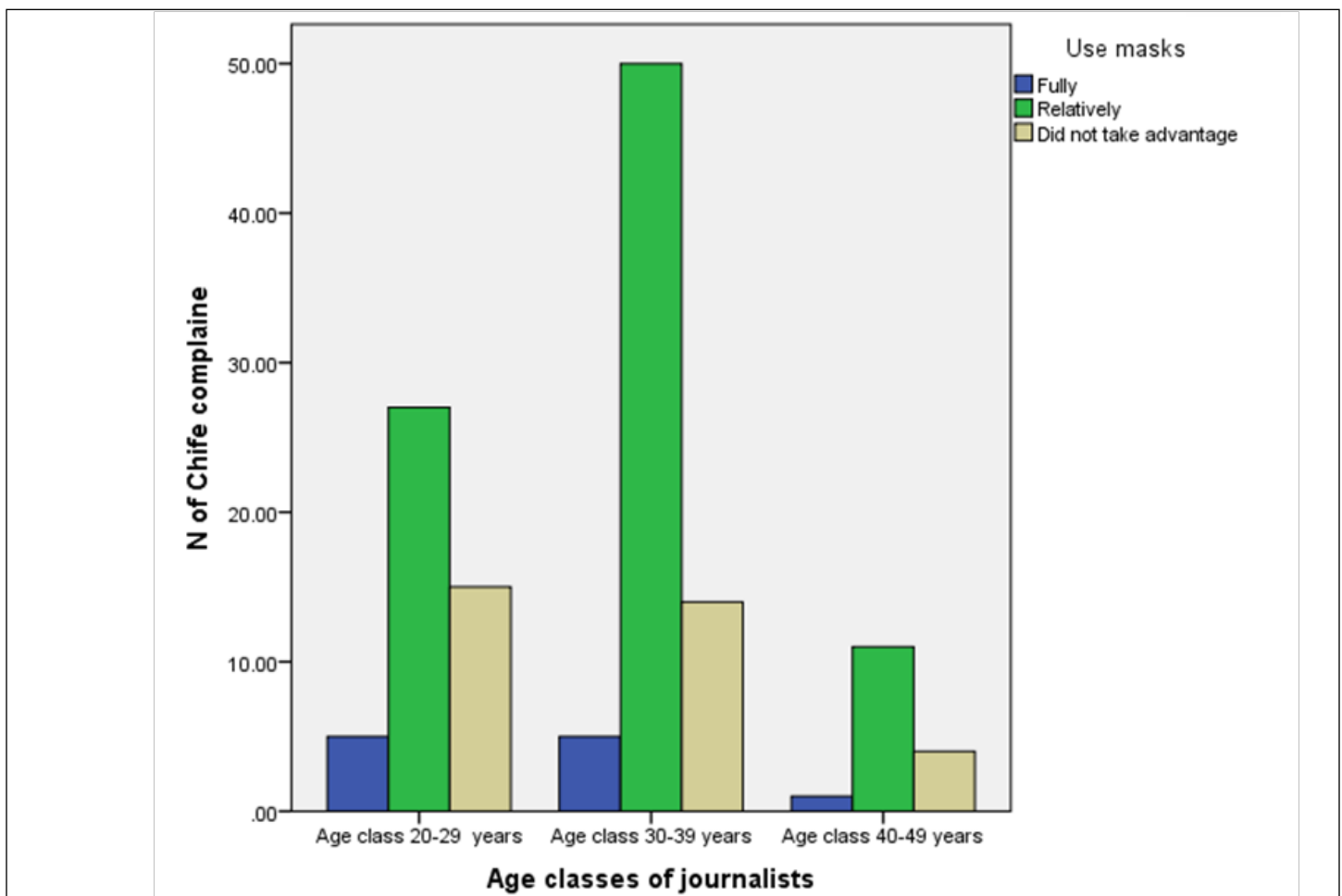


Figure 4: The status age -class distribution of journalists, numbers of respiratory symptoms and frequency of mask protection.

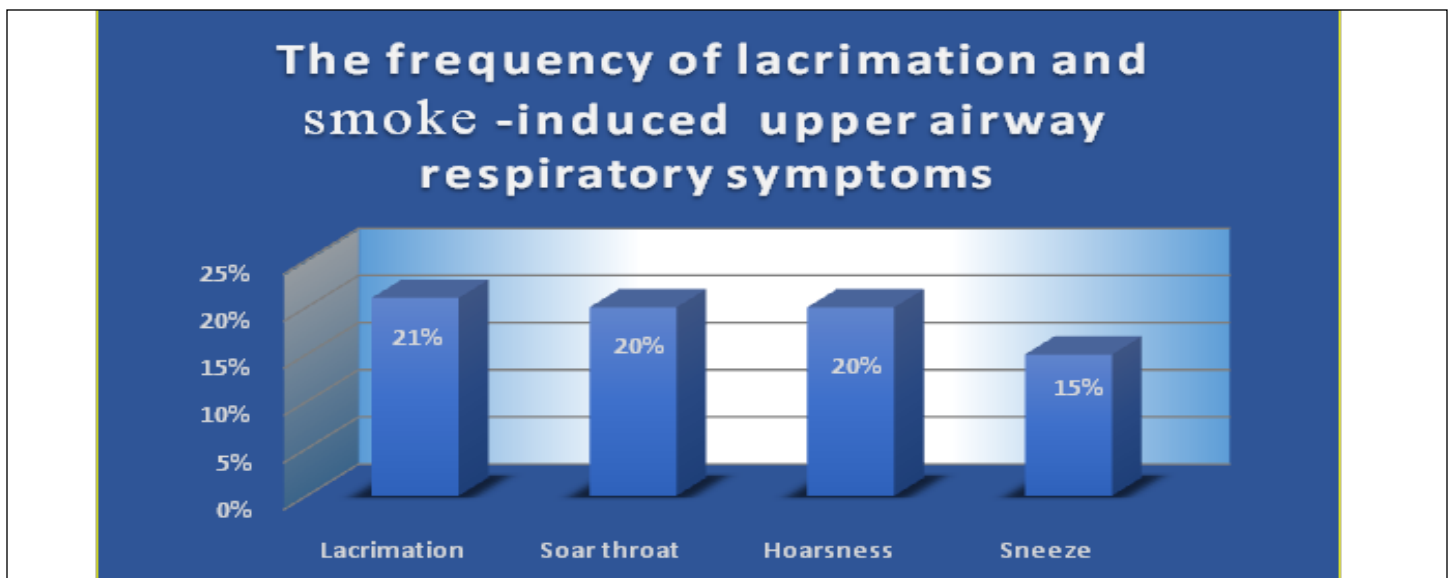


Figure 5: The frequency of lacrimation and smoke-induced upper airway respiratory symptoms profile.

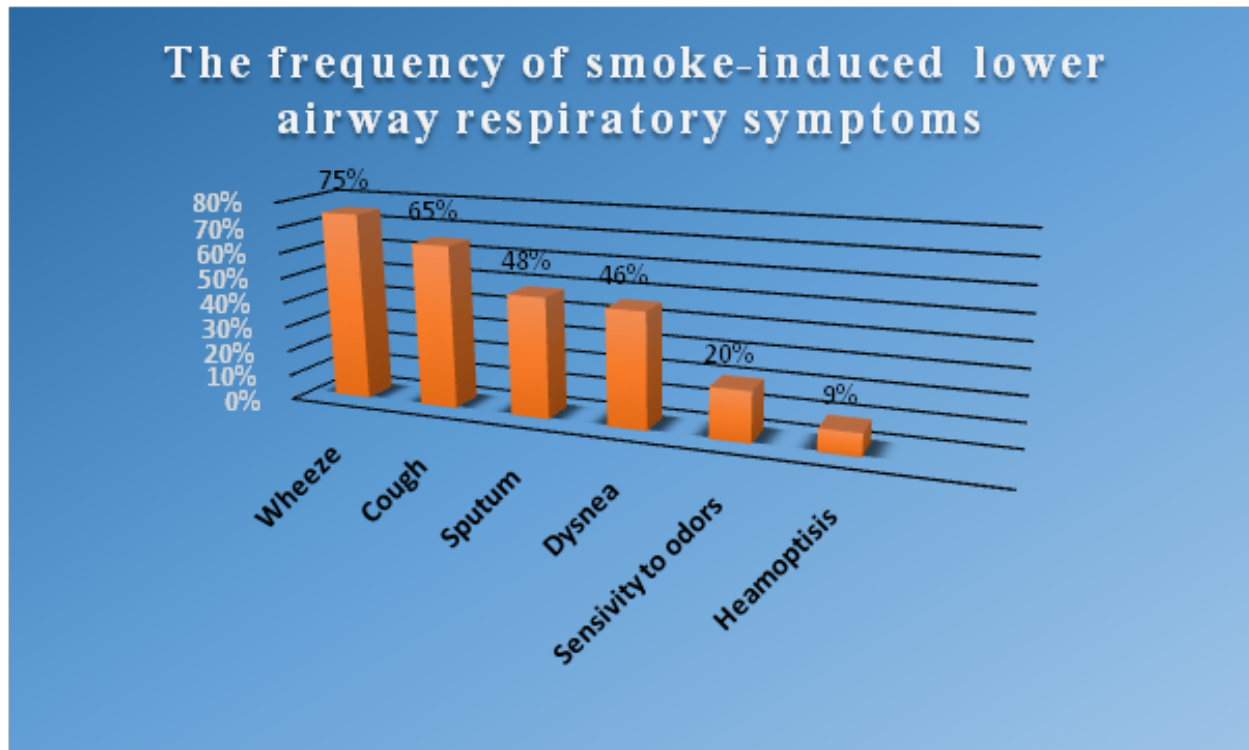


Figure 6: The profile frequency of smoke -induced lower airway respiratory symptoms.

may be reflected in the intensity of responsibility and the spirit of sacrifice among them that have been observed during a disaster. On the other hand, it indicated a greater share of injuries caused by inhaled toxic smoke. Adherence and full-time complete use of personal protective equipment (face mask) were detected in only 8% of subjects. It was well shown in figure 4. There was an inverse relationship between using of self-protection equipment and the numbers of smoke-induced toxicity of the respiratory symptoms. The low frequency of respiratory symptoms was related to the complete protection of the face mask. It seems that the relative user group of the face mask did not pay attention to this criterion and its duration in using the face mask was probably far less than 50% of the working time. Therefore, a higher frequency of smoke-induced symptoms of respiratory tract injuries should be found among them as a partially unmasked user. Unfortunately, however, the frequency distribution of smoke-induced respiratory symptoms was diagnosed in both younger and middle- age old victims. This may be due to the psychological excitement of a catastrophe that has led to non-compliance with the rules, disruption of the rescue team, and limited experience attending the large-scale events.

The frequency differences in acute clinical respiratory symptoms of smoke-exposed toxicity were significant between the upper and lower respiratory tracts. The results of the study indicated that the frequency of clinical symptoms of the upper respiratory system was overall markedly less than (20%) that of the lower respiratory. The hoarseness, sneezing, and perhaps cough were the cardinal symptoms of irritant -induced upper respiratory tract amongst the victims- smoked. The outcome of the study may be interpreted as follows. The upper respiratory airway was the first-line of defense mechanism in preventing enhanced smoke-exposed injuries and it is accompanied by a severe reaction to the airway irritants like cough, and sneezing. The workplace disaster was exposed to dangerous conditions such as toxic fumes, irritating gases, heat, and dust in the early days of the accident. Victims of the smoke without masks and even with masks maybe not be able to cope with this situation due to severe pollution, leading to an early departure from the incident area. Therefore, they may have been presented with fewer upper airway clinical symptoms.

A significant frequency of lower respiratory tract symptoms induced by smoke may be related to as follows. First, the chemical

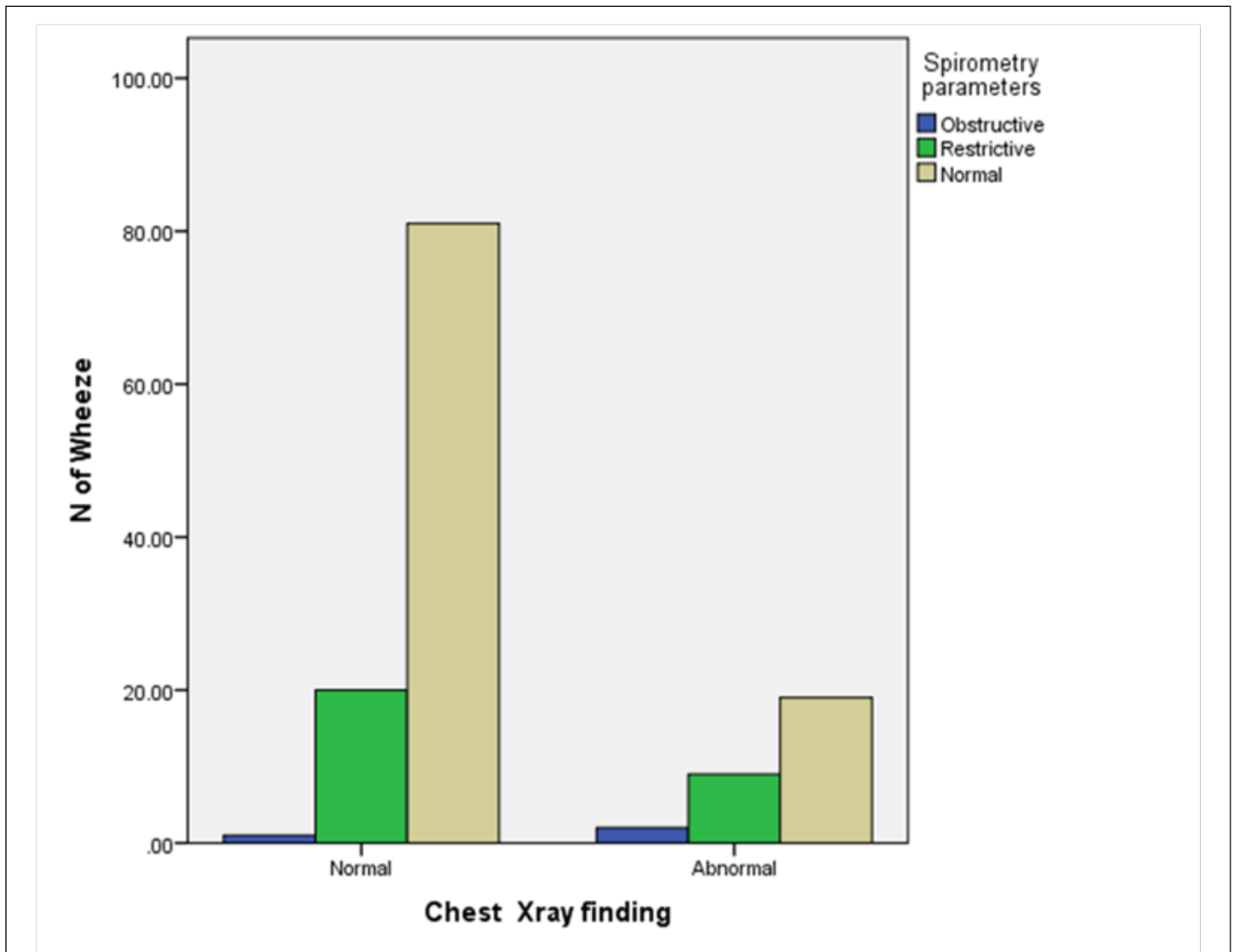


Figure 7: The status chest x-ray, PFT patterns, and wheeze.

and irritant induced- toxic materials may be inhaled in a mass volume. They passed through the protected pathway of the upper airway beyond the using protective face mask and despite the existence of an effective defense mechanism. It ultimately spreads rapidly the lower zone of the airway.

Second, a relatively low volume of smoke-induced stimulants has entered the respiratory system over a longer period his condition may be caused by the late days of disaster or placing subjects in more peripheral areas of the accident site. It was compatible with the study results showed that the journalists had been over shifted- times in the workplace and using the low frequency of protective face masks.

The clinical features of toxic inhalers depend on the types of stimulus and the size of the aerosol particles that are entered in different respiratory zones. Reaction airway inflammation appears in the large and medium airways (bronchitis) or small airways (small airway diseases). Wheeze and perhaps hypersensitivity to odor symptoms can be considered as the relatively specific of small airway involvement. However, cough and shortness of breath symptoms were common findings between the two categories of the airway tract diseases. Significant sputum production may be due to irritation of the respiratory tract by the air pollutants and acute bronchitis between victims. Hemoptysis has detected in the injured patients were mild and led to hospitalization and treatment.

It may be due to a severe cough between the involved respiratory tract.

An obstructive pattern in PFT revealed the smoke-induced small airway disease and CXR was clear in 77% of the focus population. The study showed no significant impairment and sequels in the respiratory system of victims-exposed. The PFT can be a basic guide in victims for following up on possible a pulmonary disability that may be occurring in the forthcoming [22,23].

The recent study demonstrated the frequency of upper and lower respiratory symptoms was detected between journalists globally was lower than the firefighters participating in PTC in the same period [24] these may be due to the firefighters were the first line of rescue line. Although they are equipped with professionals and all kinds of protective equipment. They have to be in a catastrophic situation for a longer period than journalists. Therefore the frequency of injuries is expected to be more likely.

he key features for improving health status among journalists are related to the rising level of awareness in the knowledge of health issues (less than 35% unaware) [25,26] improving the quality of health care, establish policy, and create a belief to use the skills of self-protection with personal protective equipment.

Conclusion

Self-protection with types of personal protective equipment (face mask) is the most reliable method of protective health of the respiratory system in non-professional subjects during a fire disaster. A face mask can decline the respiratory symptoms of smoke-induced inhalation among target populations.

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Ethical Considerations

Compliance with ethical guideline authors met the criteria of authorship based on the recommendations of the international committee of medical journal editors

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Conflict of interest

The authors declared no conflict of interest

Author's contributions

All authors contributed in preparing this article.

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