

The Effects of Haze on General Health of Women Employed in Zabol University of Medical Sciences in 2018

Maryam Ghaljahi*, Somayeh Bagheri¹ and Khadejeh Rezaie Keykhaei²

Department of Occupational Health Engineering, School of Public Health, Zabol University of Medical Sciences, Zabol Iran and Zabol Medicinal Plants Research Center, Zabol University of Medical Sciences, Zabol, Iran

¹Department of Public Health, School of Public Health, Zabol University of Medical Sciences, Zabol, Iran

²Department of Obstetrics and Gynecology, Zabol University of Medical Sciences, Zabol, Iran

✉ occmgh@gmail.com

Received August 25, 2018; revised and accepted February 2, 2019

Abstract: Over the last decade, the invasion of haze to the southwest of Iran and Sistan region has seriously threatened the health of the residents in this region, leading to a lot of financial and human losses. Some of the health-relevant effects of this phenomenon include the aggravation of respiratory, psychological, cardiovascular, ocular and skin diseases. Hence it seems of necessity to conduct some research to investigate the effects of haze on individuals' health. To this end, the present study aimed to examine the effects of haze on the general health of women employed in Zabol University of Medical Sciences. This descriptive cross-sectional study was carried out in Zabol University of Medical Sciences and the required data regarding the effects of haze on the employed women's general health was collected using a researcher-made 21-item questionnaire.

The validity of the questionnaire was confirmed by some experts and its reliability was also accepted by a Cronbach's alpha coefficient of 92%. More than half of the participants complained of psychological problems imposed by exposure to haze. The most and the least frequent complaints recorded by the participants were about respiratory problems (dyspnea, 78.1%) and skin problems (urticarial, 16.1%), respectively. Moreover, 6.2% of the women also reported abortions caused by exposure to haze. The findings of the study about the various complications caused by exposure to haze necessitate the immediate and urgent measures to solve the haze problems and to use all facilities and public media to train people how to deal with this hazardous phenomenon.

Key words: Dust, general health, employed women.

Introduction

Haze is an atmospheric phenomenon, which is a mixture of smoke, airborne dust, air humidity, and other airborne pollutants, and is suspended in the air (Ghorbani, 2011). The haze phenomenon or storm dust is a phenomenon through which the wind remains a large volume of dust and reduces horizontal visibility (Parungo, 1994). These storms are natural incidents mostly occurred in

arid and semi-arid regions worldwide (Squires, 2002). No comprehensive study has been conducted on this phenomenon yet; however, various factors such as overexploitation of surface and groundwater resources, degradation of vegetation and soil weakening by agricultural activities have been considered as effective in the occurrence of this phenomenon (Ghaljahi, 2018). Airborne dust can also be transported about 4000 kilometres farther away from its source.

*Corresponding Author

Considering the importance of this phenomenon, many scholars have examined this phenomenon from different perspectives and for different purposes (Ghaljahi, 2019). These studies have addressed the origin, nature, features, dislocation paths, the composition of the storms, the effects and consequences of the haze over different cities and villages (Delkhah, 2015). Depending on their origin and the regions they have passed, they carry different organic and mineral compounds (Wang, 2010). Generally, Asian haze particles are divided into four groups in terms of their chemical composition: Particles saturated with sea salt, particles saturated with superficial compounds, particles saturated with sea salt-superficial compounds, particles saturated with sea salt, superficial compounds, and sulfur (Wanga, 2005). According to these studies, the dust particles interact with each other because of the long path they travel and their long-term contact.

These particles contain iron ions, which are often Fe. Furthermore, when passing industrial regions, these dusts absorb some heavy metals (East Asian haze contains Na^+ cations, and SO_4^{2-} anions) (Ghaljahi, 2019). The main external causes of haze incidence in recent years can be atmospheric instability, severe low rainfall, droughts, loss of proper vegetation and its rapid reduction, destruction of forests and rangelands, air pressure changes, strong winds from deserts, changes in surface and groundwater resources management, the occurrence of war and insecurity, and the work culture shifts towards working abroad (Gholizadeh, 2009). The internal factors such as water and soil resources mismanagement, vegetation and unsustainable exploitation from exchange resources, even though, have their own impacts (Ghaljahi, 2017).

With the aggravation of the haze phenomenon over the recent years, it has become a biological, economic, social, cultural, and health problem, especially in the southeast of Iran. Some of these effects are threatening human health, the emergence of plant pests and diseases, threatening plant and animal species, the quantitative and qualitative reduction of livestock and agriculture, the degradation of agricultural lands, pastures, and forests, social and economic effects, the arousal of incentives for emigration from the affected regions, increased incidents caused by decreased vision, reduced useful work hours and productivity, cancellation of flights, and financial losses (Mohammadi, 2016). In addition to its effects on the environment, the haze phenomenon also affects the human health (Geravandi, 2015). The employed individuals are more exposed to the effects of such a phenomenon (Godarzi, 2014).

In this study, we examined the effect of haze on the physical health of the employed women. Many epidemiologic studies have been conducted over recent years worldwide to determine the relationship between the effects of air pollution and human health (Taghavirad, 2014). Many individuals annually die of cardiovascular, respiratory and lung diseases caused by air pollution. Sulfur oxides are the air pollutants with the largest number of studies. The effects of sulfur oxides are narrowed respiratory channel, reduced respiratory efficiency and dyspnea, decreased depth of respiration, decreased efficiency of lung immune system, and increased complications such as vascular and respiratory ones (Sakwari, 2009). Some epidemiological studies have revealed that increased air pollution is correlated with increased mortality caused by cardiovascular and respiratory diseases. For example, some studies are conducted in North and South America, Europe, Australia, Hong Kong, and Iran. Since no study has been conducted on the effect of haze on employed women yet, the present study addressed this issue. Based on the research done by various researchers in various occupations, reliable questionnaires can be used as a convenient and inexpensive tool to assess the clinical status of individuals exposed to haze (Stolt, 2010).

Materials and Methods

This applied research was done descriptively in 2018. The statistical population of the study encompassed all women working in Zabol University of Medical

Sciences. Using the sample size formula
$$n = \frac{Z_{1-\frac{\alpha}{2}}^2 p(1-p)}{d^2}$$
,

confidence level of 95%, the error rate of 5%, and women health rate of 0.6%, the sample size was estimated to be 370. The participants were selected using simple random sampling method. The information was collected by a researcher-made questionnaire containing 21 dual-choice questions. Measurement and coding criteria were taken into consideration (Yes-1, No-0). Some items were related to respiratory problems (6 Questions), eye problems (3 Questions), mental problems (5 Questions), and the other items were about abortion caused by exposure to dust, infectious diseases, heart problems, taking sick leaves, absence from work, and referral to hospital.

To determine the face and content validity, the questionnaire was submitted to seven faculty members and their comments were considered. In the next phase,

the questionnaire was distributed among 20 persons. Using the Cronbach's alpha coefficient, its internal reliability was confirmed (92%).

The questionnaires were then distributed by the researcher among women working in Zabol University of Medical Sciences. In order to observe ethical considerations, participation in the research was optional and the individuals' personal specifications were not included in the questionnaire. Data was described by using frequencies and percentages calculated by the software spss 19.

Result and Discussion

According to the results of the questionnaire, a majority of the participants complained of dyspnea (78.1%). Of the study participants, 40 persons were suffering from tuberculosis, and about 68% of the women used masks when being exposed to haze. Javad Salimi et al. (2015) conducted a study entitled "Air quality in Zabol and haze-induced mortality rate". They found that air quality in Zabol in 2011 exceeded the standards in 68% of the year days, and that there were 41 cases of hospital admissions for respiratory diseases and 227 cases for cardiovascular diseases, indicating the constant effects of this phenomenon. The most frequent complaints of eye problems were about eye allergies (66.8%), redness and irritation and the other eye problems ranked next. Of the six questions on mental health, the highest percentages of complaints were for those who were obsessed with exposure to haze in their workplace (63.5%). The following complaints were feelings of decent concentration in work, boredom, job stress, aggression, and bad-temperedness. Twenty-three participants reported abortion induced by exposure to haze at their workplace.

In a study by Hafez et al. (2001) examining the effect of air pollution on abortion, the prevalence of abortion was 29.2% (Hafez, 2001). Rubes et al. (2005) also showed that permanent exposure to air pollution may lead to abortion and other fertility complications. These findings are in a similar vein with the findings of the present study. The least frequent complaints were associated with infectious diseases (20.5%). Approximately 36% and 26.8% of the participants reported accumulated leave and sick leave, respectively. In this regard, about 28% of the subjects had to be absent from their workplace, about 38% of the women were suffering from heart problems, and 27% of the participants referred to health care centres because of their problems (Table 1).

In Iran, studies have not dealt with the effects of haze on skin. This might be due to the priority of cardiovascular and respiratory problems that pose a risk to individuals' lives. The present study also indicated that skin problems reported by the subjects were less frequent than other problems (Table 2).

The results of this study showed that about 38% of the women had heart problems caused by exposure to haze. Emamgholipour et al. (2014) studied the effect of air pollutants on heart attacks in Tehran, and found a significant relationship between these two variables. Various studies have been conducted to investigate the relationship between air pollutants and heart problems in different regions, some of which are consistent with the findings of the present study. Hashemi et al. (2014) in Kerman only detected a significant relationship between ozone pollutant and heart diseases in women. According to a study in Chile, there is a significant correlation between hospital admissions for heart diseases and air pollutants (Frank, 2014). Furthermore, a study in Rome revealed a significant relationship between air pollutants and heart diseases (D'Ippoliti, 2003).

In this study, 59 (15.9%) outpatients referred to health care centres and 12 (3.3%) women were hospitalized. In Mohammadi et al. (2016) study, the number of outpatients for problems caused by exposure to dust in one year was 1551 persons in Ahvaz, indicating that people encounter a variety of problems when being exposed to haze.

Conclusions

1. Soil erosion is always considered as one of the most important sources of haze and dust transmission.
2. Suspended particles can be isolated from soil structures through erosion factors such as wind, travel long distances because of their specific physical features, including size, shape, and weight, and finally settle in the respiratory system.
3. An increase in temperature as well as the intensity of wind in the south part of Iran in summer promotes soil erosion, resulting in 20 to 30% increase in suspended particles over these regions.

Acknowledgement

The authors would like to express their gratitude to all women employed in Zabol University of Medical Sciences for their cooperation. The project was approved by the ethics committee of the university under the ethics No. IR.ZBMU.REC.1397.145.

Table 1: Frequency distribution of items about the effects of haze on general health of women employed in Zabol University of Medical Sciences

<i>No.</i>	<i>Items</i>		<i>Frequency</i>	<i>%</i>
1.	Have you ever suffered from dyspnea during stormy days because of exposure to haze in your workplace?	Yes	289	78.1
		No	81	21.9
2.	Have you ever experienced coughing and sore throat during stormy days because of exposure to haze in your workplace?	Yes	285	77
		No	85	23
3.	Have you ever suffered from wheezing and chest pain during stormy days because of exposure to haze in your workplace?	Yes	200	54.1
		No	170	45.9
4.	Have you ever experienced respiratory infections during stormy days because of exposure to haze in your workplace?	Yes	189	51.1
		No	181	48.9
5.	Are you suffering from tuberculosis?	Yes	40	10.8
		No	330	89.2
6.	Have you ever worn masks during stormy days because of exposure to haze in your workplace?	Yes	255	68.9
		No	115	31.1
7.	Have you ever experienced allergy and eye redness during stormy days because of exposure to haze in your workplace?	Yes	247	66.8
		No	123	33.2
8.	Have you ever felt eye irritation during stormy days because of exposure to haze in your workplace?	Yes	219	59.2
		No	151	40.8
9.	Have you ever experienced other eye disorders such as corneal ulcer and pterygium during stormy days because of exposure to haze in your workplace?	Yes	86	23.2
		No	284	76.8
10.	Do you feel aggressive and angry during stormy days because of exposure to haze in your workplace?	Yes	202	54.6
		No	168	45.4
11.	Do you feel bored during stormy days because of exposure to haze in your workplace?	Yes	219	59.2
		No	151	40.8
12.	Do you feel decent concentration during stormy days because of exposure to haze in your workplace?	Yes	224	60.5
		No	146	39.5
13.	Do you feel job stress during stormy days because of exposure to haze in your workplace?	Yes	217	58.6
		No	153	41.4
14.	Have you ever experienced obsessive disorder during stormy days because of exposure to haze in your workplace?	Yes	235	63.5
		No	135	36.5
15.	Have you ever had abortion during stormy days because of exposure to haze in your workplace?	Yes	23	6.2
		No	347	93.8
16.	Have you ever had heart problems during stormy days because of exposure to haze in your workplace?	Yes	142	38.4
		No	228	61.6
17.	Have you ever been infected during stormy days because of exposure to haze in your workplace?	Yes	76	20.5
		No	294	79.5
18.	Have you ever referred to health care centres during stormy days because of exposure to haze in your workplace?	Yes	100	27
		No	270	73
19.	Have you ever taken accumulated leave during stormy days because of exposure to haze in your workplace?	Yes	133	35.9
		No	237	64.1
20.	Have you ever taken sick leave during stormy days because of exposure to haze in your workplace?	Yes	99	26.8
		No	271	73.2
21.	Have you ever been absent from your work during stormy days because of exposure to haze in your workplace?	Yes	103	27.8
		No	267	72.2

Table 2: Frequency distribution of participants suffering from skin problems induced by exposure to haze

Problems	Frequency	%
No	22	5.9
Itching	185	50
Urticaria	60	16.2
Eczema	82	22.2
Itching and urticaria	10	2.7
Itching and eczema	6	1.6
Urticaria and eczema	2	0.5
All of the three skin problems	3	0.8

Table 3: Frequency distribution of the participants' heart diseases caused by exposure to dust

Disease	Frequency	%
Heart palpitations	116	31.3
Other heart problems	26	7.1
None	228	61.6

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