



The Prevalence of Occupational Risk Factors and Occupational Diseases in Kerman, Iran

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Abstract

Background and aims: Many workers face significant hazardous workplace exposures, especially in developing countries. The objective of this study was to investigate the prevalence of occupational risk factors and common occupational diseases in Kerman.

Methods: This study was based on data from occupational risk factor and disease monitoring systems available at Kerman Province Health Center during 2011-2015. These data are gathered semiannually by occupational hygienists based on standard checklists provided by the Ministry of Health and Medical Education and these checklists include exposures and diseases related to the workplace.

Results: Based on the results, 292 (3.7%), 281 (3.58%), 261 (3.32%), and 115 (1.47%) cases were found regarding occupational hearing loss, respiratory conditions, work-related back pain, and musculoskeletal disorders, respectively, which were related to different occupational exposures diagnosed in Kerman during 2011-2015. Moreover, dust, work tools, wrong body position during work, and noise were the most common risk factors in this respect.

Conclusion: Overall, occupational hazards are considered as an important health issue in Kerman. Therefore, it is necessary to control exposure to these risk factors in order to prevent occupational diseases.

Keywords: Prevalence, Occupational exposures, Occupational disease

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Introduction

An occupational disease is any disease contracted primarily as a result of exposure to risk factors arising from work activity. Work-related diseases have multiple causes, and factors in the work environment together with other risk factors may play a role in the development of such diseases.¹ According to the World Health Organization, about 120 million occupational accidents with 200 000 fatalities are estimated to occur annually around the world and some 68-157 million new cases of the occupational disease may be caused by various exposures at work.¹ It is estimated that 2.1% of all deaths and 2.7% of the disease burden worldwide are attributed to quantified occupational risks.² Many of these exposures are still present in developing countries and affect a large number of workers daily.³ Workers in low- and middle-income countries bear the largest share of deaths and disability from workplace exposures.² The International Labor Organization has provided a list of occupational diseases⁴ that are caused by hazardous occupational factors that have adverse effects

on the function of various human body parts.^{5,6} Such diseases comprise a broad range of human illnesses such as occupational asthma, which has a high prevalence among Iranian workers,^{7,8} chronic obstructive pulmonary disease,⁹ lung diseases,³ amyotrophic lateral sclerosis,¹⁰ chronic back pain,¹¹ and cancers.¹²

The workplace can be a hazardous environment. Many individuals spend one-third of their adult life in such hazardous work environments. Approximately 30%-50% of the workers report hazardous physical, chemical, or biological exposures or an overload of unreasonably heavy physical work or ergonomic factors that may be hazardous to health and working capacity.¹ Many workers still confront substantial hazardous exposures whose risks are well-known and for which there are established and effective means of control.¹³ According to the existing data, more than two million workers are exposed to potentially hazardous levels of noise (just one factor) in occupational environments in Iran.¹⁴ Occupational health not only ensures the health of the workers but also

positively contributes to their productivity, the quality of products, work motivation, job satisfaction and thus to the overall quality of the life of individuals and society.¹ In addition, occupational accidents have important health, psychological, economic, and social consequences,¹⁵ the recurrence of which causes stress and job insecurity.¹⁶ Therefore, working environments should have the proper requirements for good performance and productivity.

Kerman is one of the richest mining and industrial provinces of Iran. The right control measures for eliminating or reducing work-related accidents while increasing safety and productivity can be achieved by identifying workplace risk factors. Accordingly, this study aimed to estimate the prevalence, patterns, and determinants of harmful occupational exposures and some common occupational diseases in order to prevent and control occupational diseases in the city of Kerman.

Methods

This cross-sectional study was conducted on workers whose data were available at the Health Center of Kerman, Iran. The data were inquired from 2011 to 2015. These data are routinely collected by occupational hygienists based on a standard checklist provided by the Ministry of Health and Medical Education Center for Environmental Health and Labor. These checklists are completed semiannually and contain information about the distribution of workshops and their employees, the number of workers exposed to hazards in the workplace, workers who have been through occupational screening, occupational diseases (i.e., occupational hearing loss, occupational asthma, pneumoconiosis due to asbestosis, specific respiratory conditions, allergic contact dermatitis, inflammatory dermatitis, musculoskeletal disorders, work-related back pain, and cataract) and other potential risk factors related to the workplace. Environmental measurements were performed by the occupational health team of the Health Center. The checklist included occupational exposures such as noise, vibration, light, radiation, heat, humidity, cold, chemicals, dust, gases, steam, smoke and smog, as well as body position during work, work tools, and the transportation of cargo. Further, workshops were categorized as “Home-based businesses” and “Non-home-based businesses”. Non-home businesses were classified into four categories (i.e., <20 workers, 20-49, 50-449, and

≥500 workers) although only worker information recorded in the health-care system were used in this study. This system covers more than 95% of the workers. Percent and frequency were utilized for descriptive analysis and chi-square test was applied to compare qualitative variables. Finally, SPSS, version 11 was used for data analysis and *P*<0.05 was considered statistically significant.

Results

Among 7846 workers (aged 18 or older) who were covered by the occupational hygienists of the Health Center of Kerman, 5020 subjects were males (63.98%) and 2826 of them were females (36.02%). Among the entire businesses, 5.5 % (459) of them were home businesses and included 2.8% (875) of the total number of workers in this study. In non-home businesses, 92.8% (7761) of them had less than 20 workers including 53.7% (15804) of the total number of workers in such businesses. Other descriptive statistics about the businesses are shown in Table 1.

Table 1 also shows the number of workers that need to use personal protective equipment and the percent of those who do use personal protective equipment in the home and non-home businesses. The number of working days during which the workers were exposed to harmful agents is presented in Table 2. Several parameters such as dust, work tools, and body position during work were the most common risk factors in home businesses; and noise, the body position during work, and dust were the most common harmful agents in non-home businesses. In non-home businesses with more than 500 workers, skin contact with chemicals, dust, gas, and steam were the most frequent risk factors that workers were exposed to. Table 3 represents the prevalence of some occupational diseases. There were 1013 occupational disease patients in Kerman during 2011-2015. Occupational hearing loss, specific respiratory conditions, work-related back pain diseases, and musculoskeletal disorders were most prevalent among the workers. Overall, the incidence of occupational diseases was higher in men compared to women except for inflammatory dermatitis.

Discussion

The results of our study indicated that the relative frequency of exposure to harmful factors in non-home businesses was more than that of home businesses.

Table 1. The Situation of Using Personal Protective Equipment Among the Workers in Kerman, Iran

	Types of Business				
	Home Business	Non-home Business			
		<20	20-49	50-499	≥500
Entire businesses	459	7761	86	49	4
Entire workers	875	15804	2640	6274	5386
Workers who have to use personal protective equipment	728	11299	1774	3808	2935
Workers who do use personal protective equipment (%)	122 (16.7)	3220 (28.5)	582 (32.8)	1497 (39.3)	1335 (45.5)

Table 2. The Number (%) of People Exposed to Harmful Agents Among Workers in Kerman, Iran

Type of Harmful Agents	Home Businesses	Non-home Businesses			
		<20	20-49	50-499	≥500
Voice	45 (5.1)	1116 (7.1)	448 (17)	1414 (22.5)	774 (14.4)
Vibration	18 (2.0)	594 (3.8)	239 (9.1)	659 (10.5)	143 (2.7)
Lighting	32 (3.7)	191 (1.2)	87 (3.3)	364 (5.8)	654 (12.1)
Beam	6 (0.7)	634 (4.0)	205 (7.8)	648 (10.3)	220 (4.1)
Heat & Humidity	31 (3.6)	487 (3.1)	354 (13.4)	674 (10.7)	366 (6.8)
Cold	3 (0.3)	177 (1.1)	163 (6.2)	183 (2.9)	81 (1.5)
Skin contact with chemicals	36 (4.2)	959 (6.1)	287 (10.9)	862 (13.7)	1471 (27.3)
Dust	161 (18.4)	1018 (6.4)	569 (21.6)	1624 (25.9)	1098 (20.4)
Gas & steam	18 (2.1)	659 (4.2)	186 (7.1)	758 (12.1)	1259 (23.4)
Smoke & Fog	6 (0.7)	567 (3.6)	186 (7.0)	844 (13.5)	717 (13.3)
Body position during work	167 (19.1)	1478 (9.4)	863 (32.7)	2218 (35.4)	1052 (19.5)
Work tools	58 (6.6)	352 (2.2)	159 (6.0)	374 (6.0)	360 (6.7)
Transportation of cargo	23 (2.6)	844 (5.3)	364 (13.8)	754 (12)	635 (11.8)
Total (number of workers)	875	15804	2640	6274	5386

Note. A worker was probably exposed to several risk factors.

Table 3. The Prevalence of Work-related Diseases for Men and Women in Kerman, Iran

	Total (N=7846)	Female (n=2826)	Male (n=5020)	P Value
Occupational hearing loss	292 (3.73%)	20 (0.72%)	272 (5.42%)	<0.001
Occupational asthma	21 (0.27%)	3 (0.11%)	19 (0.37%)	0.03
Pneumoconiosis due to asbestosis	4 (0.05%)	0 (0%)	4 (0.08%)	0.30
Specific respiratory conditions	281 (3.58%)	33 (1.19%)	248 (4.93%)	<0.001
Allergic contact dermatitis	4 (0.05%)	1 (0.04%)	3 (0.06%)	0.22
Inflammatory dermatitis	28 (0.36%)	15 (0.55%)	13 (0.26%)	0.05
Musculoskeletal disorders	115 (1.47%)	33 (1.17%)	82 (1.64%)	0.10
Work-related back pain	261 (3.32%)	61 (2.15%)	200 (3.98%)	<0.001
Cataract	7 (0.09%)	0 (0%)	4 (0.09%)	0.30

Furthermore, businesses with more than 50 workers may be equipped with large industrial equipment, resulting in more noise pollution. More than 2 million workers are exposed to potentially hazardous levels of noise in the factories of Iran.¹⁴ In the present study, the occupational hearing loss had the highest prevalence (3.73%) among the occupational diseases, followed by other respiratory diseases with a prevalence of 3.58%. Moreover, exposure to the noise as a widespread problem is an unavoidable part of the workplace around the world.¹⁷ Nearly 600 million workers in the world, in general, and millions of workers in Iran, in particular, are constantly exposed to the occupational noise.¹⁸ Several studies during a 15-year period (1997-2012) were conducted in Iran and reported a high prevalence of hearing loss in noise levels above 85 dB. They further demonstrated a highly significant relation between noise levels and work experience with hearing loss.¹⁹⁻²¹ Additionally, other studies investigated noise effects in the workplace such as hearing loss, stress

and anxiety, arousing the nervous system, and decreased work performance.^{14,22,23}

The prevalence of occupational asthma among the workers in this study was 0.27%. Mehta et al conducted a study to assess the consequences of occupational exposure to dusts, gases, and fumes, along with the incidence of chronic obstructive pulmonary disease in the Swiss Cohort and found that occupational exposures were associated with both asthma and chronic obstructive pulmonary disease.²⁴ In addition, some studies showed that occupational chronic obstructive pulmonary disease (COPD) was more related to dusts and fumes compared to other environmental pollutants and the majority of studies on occupational COPD focused on dusty environments.^{25,26} This disease is highly important due to its high prevalence and the involvement of the active labor force in society.²⁷ In recent years, European, Canadian and other foreign governments have improved and modernized their workplace standards whereas Iran has maintained the

status quo while it needs to improve the existing standards and issue the new ones for its workplaces in order to reduce occupational hazards.^{14,28}

In the present study, exposure to vibration was prevalent in non-home businesses with 50-449 workers and above. This may be due to more exposure to vibrating tools in larger factories. Further, exposure to radiation, heat and humidity, chemicals, gas and steam, smoke and smog, and finally, the transportation of cargo in non-home businesses were more than home businesses. Furthermore, body position during the work and dust were found to be the most common harmful exposure for workers in home and non-home businesses. The workers of home businesses have less exposure to radiation, cold, and smoke and smog. The lack of demographic information (i.e., age, education, and the like) and other occupational exposure information are among the limitations of this study. Moreover, the prevalence of occupational diseases in this study might have been underestimated due to the healthy worker effect. To the best of our knowledge, no report has been published yet about the incidence of work-related diseases or harmful exposures in Kerman and thus this study was the first one to evaluate occupational diseases and exposures in these businesses. The prevalence information is useful for early diagnosis and intervention at the workplace regarding controlling the occupational hazards. Future studies should specify the details of occupational hazards, as well as the activities and the hazards of the work environment. In addition, assessment of occupational hazards and risks and the identification of new hazards are needed to prevent occupational diseases and their burden.¹⁹ Further, control measures for preventing health risks increase the productivity of the employee and thus reduce the long-term costs.

Conclusion

Overall, non-home businesses with more than 50 workers were more exposed to harmful agents in Kerman. Furthermore, occupational hearing loss and specific respiratory conditions were considered as the most prevalent occupational diseases among the workers. As a result, the prevention of occupational diseases requires conservation programs. Finally, several actions are believed to reduce some workplace damages such as periodic clinical assessment, the education and training of the workers about the damage caused by exposure to excessive sound levels, the use of personal protective equipment (i.e., hearing protection equipment), and the maintenance and repair of the machines for sound control.

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Ethical Approval

This study was approved by the University's Ethic Committee.

Conflict of Interest Disclosures

None.

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References

1. World Health Organization (WHO). Occupational health, Occupational and work-related diseases. Recommendation of the second meeting of the WHO Collaborating Centres in Occupational Health. Available from: http://www.who.int/occupational_health/activities/occupational_work_diseases/en/.
2. World Health Organization (WHO). Quantifying environmental health impacts, Preventing disease through a healthier and safer workplace. Available from: http://www.who.int/quantifying_ehimpacts/publications/healthier-workplace/en/.
3. Cullinan P, Munoz X, Suojalehto H, Agius R, Jindal S, Sigsgaard T, et al. Occupational lung diseases: from old and novel exposures to effective preventive strategies. *Lancet Respir Med*. 2017;5(5):445-55. doi: 10.1016/s2213-2600(16)30424-6.
4. International Labour Organization (ILO). ILO List of Occupational Diseases (revised 2010). ILO; 2010. Available from: http://www.wilo.org/safework/info/publications/WCMS_125137/lang--en/index.htm.
5. Golmohammadi R. Noise and vibration engineering. Hamadan: Hamadan Student Pub; 2010:278-557.
6. Halvani GH, Zare M, Barkhordari A. Noise induced hearing loss among textile workers of Taban factories in Yazd. *Journal of Birjand University of Medical Sciences*. 2008;15(14):69-74. [Persian].
7. Attarchi M, Dehghan F, Yazdanparast T, Mohammadi S, Golchin M, Sadeghi Z, et al. Occupational asthma in a cable manufacturing company. *Iran Red Crescent Med J*. 2014;16(10):e9105. doi: 10.5812/ircmj.9105.
8. Khazdair MR, Boskabady MH, Afshari R, Dadpour B, Behforouz A, Javidi M, et al. Respiratory symptoms and pulmonary function testes in lead exposed workers. *Iran Red Crescent Med J*. 2012;14(11):737-42. doi: 10.5812/ircmj.4134.
9. Lytras T, Kogevinas M, Kromhout H, Carsin AE, Anto JM, Bentouhami H, et al. Occupational exposures and 20-year incidence of COPD: the European Community Respiratory Health Survey. *Thorax*. 2018;73(11):1008-15. doi: 10.1136/thoraxjnl-2017-211158.
10. Koeman T, Slottje P, Schouten LJ, Peters S, Huss A, Veldink JH, et al. Occupational exposure and amyotrophic lateral sclerosis in a prospective cohort. *Occup Environ Med*. 2017;74(8):578-85. doi: 10.1136/oemed-2016-103780.
11. Esquirol Y, Niezborala M, Visentin M, Leguevel A, Gonzalez I, Marquie JC. Contribution of occupational factors to the incidence and persistence of chronic low back pain among workers: results from the longitudinal VISAT study. *Occup Environ Med*. 2017;74(4):243-51. doi: 10.1136/oemed-2015-103443.
12. Paris C, Thaon I, Herin F, Clin B, Lacourt A, Luc A, et al. Occupational asbestos exposure and incidence of colon and rectal cancers in French men: the Asbestos-Related Diseases Cohort (ARDCo-Nut). *Environ Health Perspect*.

- 2017;125(3):409-15. doi: 10.1289/ehp153.
13. Barber CM, Wiggans RE, Young C, Fishwick D. UK asbestos imports and mortality due to idiopathic pulmonary fibrosis. *Occup Med (Lond)*. 2016;66(2):106-11. doi: 10.1093/occmed/kqv142.
 14. Jafari MJ, Karimi A, Haghshenas M. Extrapolation of experimental field study to a National Occupational Noise Exposure Standard. *Int J Occup Hyg*. 2010;2(2):63-8. [Persian].
 15. Goncalves SMP, da Silva SA, Lima ML, Melia JL. The impact of work accidents experience on causal attributions and worker behaviour. *Saf Sci*. 2008;46(6):992-1001. doi: 10.1016/j.ssci.2007.11.002.
 16. Shahba S, Nouri J, Barani S, Shahba S, Nourbakhsh SZ. Assessment of Occupational Hazards with Safety Approach In Concentrative Unit of Sirjan Gol-E-Gohar Iron Company Using Job Safety Analysis. *Journal of Environmental Science and Technology*. 2017;19(5):103-10. doi: 10.22034/jest.2017.11221. [Persian].
 17. Dube KJ, Ingale LT, Ingale ST. Hearing impairment among workers exposed to excessive levels of noise in ginning industries. *Noise Health*. 2011;13(54):348-55. doi: 10.4103/1463-1741.85506.
 18. Golmohammadi R, Ziad M, Atari S. Assessment of noise pollution and its effects on stone cut industry workers of Malayer District. *Iran Occupational Health Journal*. 2006;3(1):23-7. [Persian].
 19. Soltanzadeh A, Ebrahimi H, Fallahi M, Kamalinia M, Ghassemi S, Golmohammadi R. Noise Induced Hearing Loss in Iran: (1997-2012): Systematic Review Article. *Iran J Public Health*. 2014;43(12):1605-15. [Persian].
 20. Naderzadeh M, Monazzam MR, Nassiri P, Momen Bellah Fard S. Application of perforated sheets to improve the efficiency of reactive profiled noise barriers. *Appl Acoust*. 2011;72(6):393-8. doi: 10.1016/j.apacoust.2011.01.002.
 21. Monazzam MR, Golmohammadi R, Nourollahi M, Momen Bellah Fard S. Assessment and control design for steam vent noise in an oil refinery. *J Res Health Sci*. 2011;11(1):14-9.
 22. Ahmadi S, Karbord AA, Einanlo E, Aubizadeh H, Zarei M. Occupational noise exposure and hearing loss among car smoothers in Qazvin. *Iranian Journal of Health and Environment*. 2011;4(1):85-92. [Persian].
 23. Mirmohammadi J, Baba Haji Meibodi F, Nourani F. Investigating the hearing tolerance in the workers of the tile factory complex of Meybod. *Journal of Shahid Sadoughi University of Medical Sciences*. 2008;16(1):8-13. [Persian].
 24. Mehta AJ, Miedinger D, Keidel D, Bettschart R, Bircher A, Bridevaux PO, et al. Occupational exposure to dusts, gases, and fumes and incidence of chronic obstructive pulmonary disease in the Swiss Cohort Study on Air Pollution and Lung and Heart Diseases in Adults. *Am J Respir Crit Care Med*. 2012;185(12):1292-300. doi: 10.1164/rccm.201110-1917OC.
 25. Sadhra S, Kurmi OP, Sadhra SS, Lam KB, Ayres JG. Occupational COPD and job exposure matrices: a systematic review and meta-analysis. *Int J Chron Obstruct Pulmon Dis*. 2017;12:725-34. doi: 10.2147/copd.s125980.
 26. Omland O, Wurtz ET, Aasen TB, Blanc P, Brisman JB, Miller MR, et al. Occupational chronic obstructive pulmonary disease: a systematic literature review. *Scand J Work Environ Health*. 2014;40(1):19-35. doi: 10.5271/sjweh.3400.
 27. Mirmohammadi S, Mehrparvar A, Gheravi M, Fathi F. The objective of this study is determination of occupational asthma prevalence in steel factory and classification of cases according to various workshops. *Occupational Medicine Quarterly Journal*. 2011;2(1):20-5. [Persian].
 28. Babisch W. The noise/stress concept, risk assessment and research needs. *Noise Health*. 2002;4(16):1-11.

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