



Common Causes Associated With Occupational Injuries in Iranian Health Care Workers: A Systematic Review and Meta-Analysis Study

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Received April 28, 2018; Accepted June 8, 2018; Online Published June 25, 2018

Abstract

Introduction: Occupational injuries are the most important hazards threatening health care workers (HCWs) and cause contact with infectious agents and the transmission of diseases such as AIDS and hepatitis B and C. This study is a meta-analysis of studies on the common causes of occupational injuries in Iran.

Methods: In this meta-analysis, all articles on injuries to HCWs in Iran published on local and international databases during the period 2000-2016 were assessed for eligibility. Using the keywords occupational injury, needle stick injury, healthcare workers, and Iran, searches of local and international databases were conducted. From 60 articles screened, 19 were determined to be relevant and were subsequently analyzed.

Results: The results of this meta-analysis showed that needles and injections were the most common causes of occupational injuries in HCWs. The pooled prevalence of needle stick was estimated to be 52.95% (46.05%-59.84%) based on the reports of 19 studies with a total of 8703 participants. The pooled prevalence rate of injections was estimated to be 33.56% (27.43%-37.90%).

Conclusions: The results showed that routine activities of HCWs most commonly result in occupational injuries. Given the high prevalence of needles and injections as causes of occupational injuries in Iranian HCWs, more attention and the development of effective strategies to reduce these injuries are necessary.

Keywords: Occupational Injuries, Sharp Injuries, Health Care Providers, Iran

Citation: Fereidouni Z, Dehghan A, Najafi Kalyani M. Common causes associated with occupational injuries in Iranian health care workers: a systematic review and meta-analysis study. Int J Med Rev. 2018;5(2):77-81. doi:10.29252/IJMR-050206.

Introduction

Occupational injuries are the most important hazards threatening health care workers (HCWs). Among occupational injuries, needle stick injuries (NSIs) are one of the most common injuries to HCWs during work.¹ HCWs are vulnerable to contact with patients.² NSIs in HCWs significantly increase the risk of transmission of infectious diseases such as AIDS and hepatitis B and C.³⁻⁵ According to the World Health Organization (WHO), there have been 16 000 cases of hepatitis C, 66 000 cases of hepatitis B, and 1000 AIDS cases following occupational exposure.⁶ In addition to the transmission of infectious diseases, these injuries can endanger the mental health of HCWs and impose heavy costs resulting from the treatment of infected personnel.^{5,7} In addition to the risk of illness and death, psychological damage, and long-term disability, occupational exposure to sharp objects is also associated with fear, tension, and

anxiety.^{8,9} Furthermore, it imposes a heavy economic burden on countries.¹⁰ A serious infection with blood-borne viruses can cost \$1 million because of tests, follow-up, disability, and loss of work; the cost of preventing occupational injuries is estimated to be \$3000.^{10,11} Despite the high prevalence of this occupational injuries among HCWs, they can be prevented.¹²⁻¹⁴

Identifying the factors associated with occupational injuries helps health policy-makers minimize and prevent these types of injuries. There are no coherent reports on the common causes of occupational injuries among Iran's HCWs; thus, this meta-analysis aimed to determine precisely the common causes of occupational injuries in Iranian HCWs.

Methods

This is a systematic review and meta-analysis of the research conducted on occupational injuries among HCWs in Iran.

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines (Figure 1) were used to conduct and report the results of this study.

Search Strategy and Eligibility Criteria

The main questions of the researcher in this meta-analysis were, “What are the most common causes of occupational injuries in Iranian HCWs?” and “What is the prevalence rate of common causes of occupational injuries in Iranian HCWs?” To answer these questions, articles on occupational injuries in Iranian HCWs that had been published in local and international databases were searched using the key words “Occupational Injury”, “Needle Stick Injury”, “Risk Factors, Health Care Workers” and “Iran.” The inclusion criteria for articles were the availability of the full text, focus on causes of occupational injuries and needle-stick injuries, publication in Persian or English, and publication occurring in the 16-year study period. Articles in languages other than Persian or English, those lacking clarity of methods, and those lacking the proper reporting of results were excluded.

Data Collection and Extraction

Searches were performed for all articles published in the 16-year period of 2000 to 2016 in Persian or English on local databases (SID, Mag Iran, Iran Medex, Iranian Medical Library) as well as international databases (Google Scholar, ISI Web of Knowledge, Scopus, PubMed, and Science Direct). Data extracted from the relevant studies included author(s) name, publication year, location of research, sample size, and prevalence of common causes (needle as the common object and injections as the common activity).

Data Analysis

The extracted data was analyzed using STATA 11 software. *I*² was used to evaluate the heterogeneity of the data. The random effects model was used because of the heterogeneity of the results of the selected studies.

Results

In the initial search, 60 articles were determined to be relevant

and assessed for eligibility. Of those, 41 were excluded due to not being pertinent to the topic of the study and of low quality. Ultimately, 19 articles that were related to the research questions and met the criteria were selected and analyzed based on the PRISMA statement (Table 1).^{8,11,15-31}

HCWs included nurses, doctors, midwives, operating room technicians, anesthetic technicians, dentists, and students in the fields of medicine, nursing, midwifery, dentistry, and emergency medicine. Most of the studies looked at a combination of HCWs.

A total of 8703 HCWs and students were surveyed in the selected studies. The highest prevalence rates of needle as an associated factor of occupational injuries were reported by Nazmieh (79.9%), Kouhestani (76.92%), and Bijani (70.9%), and the lowest prevalence rates were reported by Mirzaei (33.3%), Gholami (35.71%), and Aghadoost (37.5%). The prevalence of NSI among Iranian HCWs with a sample size of 8703 was estimated to be 52.95% (95% CI: - 46.05-59.84) using the random effect model (Figure 2). The funnel plot to assess publication bias for prevalence of needle as a common object in occupational injuries is presented in Figure 3.

The highest prevalence rates of injection as the cause of occupational injuries were reported by Parsapili (64.9%), Rakhshani (54.6%), and Vahedi (49.94%), and the lowest prevalence rates were reported by Gholami (14.47%), Ehsani (18.91%), and Adib-Hajbagheri (22.2%). The prevalence of injections among Iranian HCWs with a sample size of 8703 was estimated to be 33.56% (confidence interval 95%-27.43-37.90) using the random effect model (Figure 4). The funnel plot to assess publication bias for the prevalence of injections as a common activity in occupational injuries is presented in Figure 5.

Discussion

In this meta-analysis study, the analysis results suggested that needles and injections are the most common causes of occupational injuries in Iranian HCWs. The prevalence of NSIs among Iranian HCWs was estimated to be 52.95% (confidence interval 95%-46.05-59.84) using the random effect model. These results indicate the high prevalence of

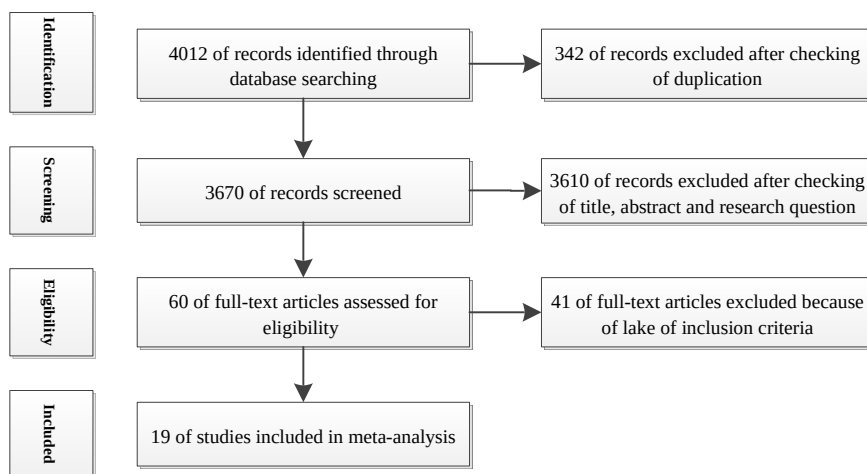


Figure 1. Flow Chart of the Study.

Table 1. Characteristics of Reviewed Studies

First Author	Year	City	Sample Size	Needle	Injections	Reference
Adib-Hajbagheri M	2013	Kashan	298	46.5%	22.2%	8
Mahmoudi N	2015	Tehran	100	45.98%	24.14%	15
Gholami A	2013	Neysabour	384	35.71%	14.47%	16
Shoghli A	2012	Zanjan	593	53.8%	26.4%	17
ParsaPili J	2013	Tehran	515	49.6%	64.9%	18
Mirzaei M	2011	Hamedan	120	33.3%	44.0%	19
Rezaei SH	2013	Tehran	514	40.3%	31.33%	20
Rezaei SH	2012	Tehran	991	55.08%	24.7%	11
Hashemi SH	2012	Hamedan	700	60.7%	29.0%	21
Ehsani SR	2012	Tehran	328	43.91%	18.91%	22
Kouhestani HR	2010	Arak	52	76.92%	40.38%	23
Khalouei A	2009	Kerman	388	62.0%	28.3%	24
Rakhshani F	2009	Zahedan	231	55.4%	54.6%	25
Joneydi Jafari N	2008	Tehran	613	70.6%	24.4%	26
Bijani B	2012	Qazvin	172	70.9%	36.4%	27
Nazmieh H	2005	Yazd	1020	79.9%	47.6%	28
Vahedi M S	2006	Kurdistan	847	43.57%	49.94%	29
Aghadust D	2007	Kashan	678	37.5%	31.6%	30
Afrasiabifar A	2001	Yasuj	159	45.0%	26.4%	31

the needle as the most common device causing injuries. In a study by Kebede et al in Ethiopia, the needle was reported as the most common device among HCWs (47.2%),³² which is consistent with the current findings in Iran. As the needle is the most commonly used device in routine care by HCWs, the high prevalence of injuries caused by this device is reasonable. Martins et al showed that syringe needles were responsible for 45.8% of injuries.³³ The slight difference between the current findings and those of Martins et al can be attributed to different organizational and environmental settings in

different countries. In Japan, a study by Yoshikawa et al on 5463 cases showed that the disposable syringe was the most common device causing injuries in 25.4% of cases.³⁴

Using safety equipment and following standard precautions are very important to decreasing device-related injuries.³⁴

The frequency of NSIs is a major occupational health issue around the world, especially in countries with limited safety equipment resources.³⁵ In the study by Smith et al among Japanese nurses, the needle was the common device in 31.3% of injuries.³⁶ The high prevalence of NSIs in the current findings compared with other studies emphasizes the role of education and the importance of recapping and practicing strict precautionary actions after using devices with needles.³²

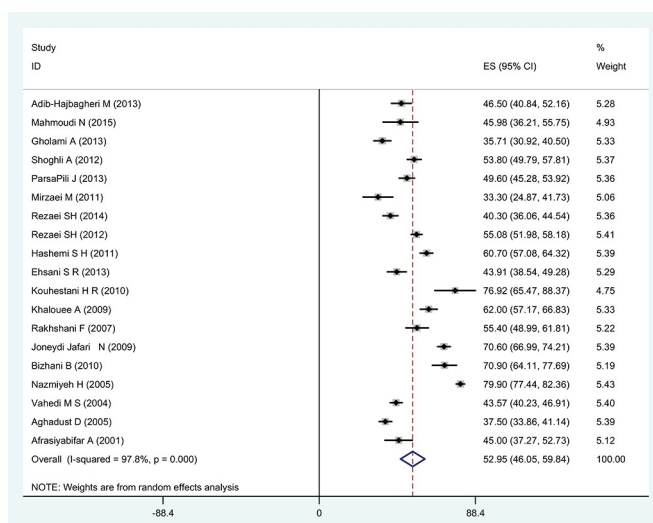


Figure 2. Needle Prevalence Based on the Reviewed Studies. Horizontal lines around the main mean show the confidence interval of 95% for each study. The dotted line in the middle indicates the estimated total prevalence, and the lozenge shows the confidence interval of the total prevalence of needle-related injuries.

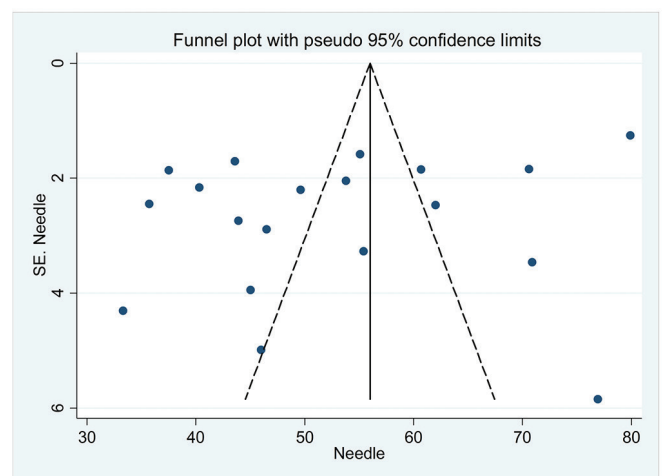


Figure 3. Funnel Plot to Assess Publication Bias for Prevalence of Needle as a Common Object in Occupational Injuries.

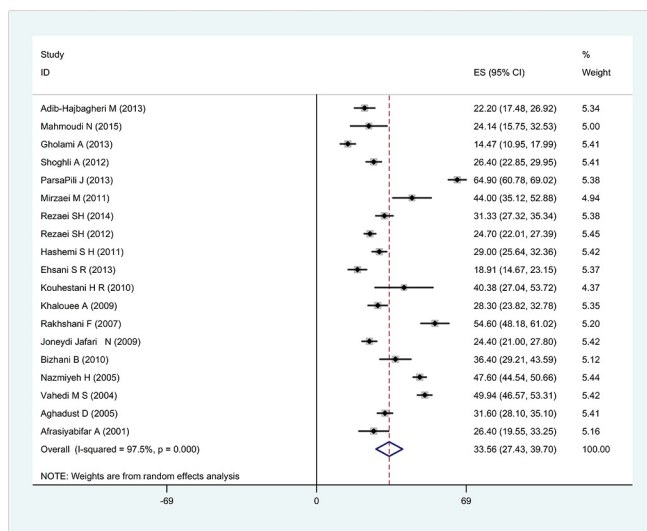


Figure 4. Prevalence of Injections Based on the Reviewed Studies. Horizontal lines around the main mean show the confidence interval of 95% for each study. The dotted line in the middle indicates the estimated total prevalence, and the lozenge shows the confidence interval of the total prevalence of injection-related injuries.

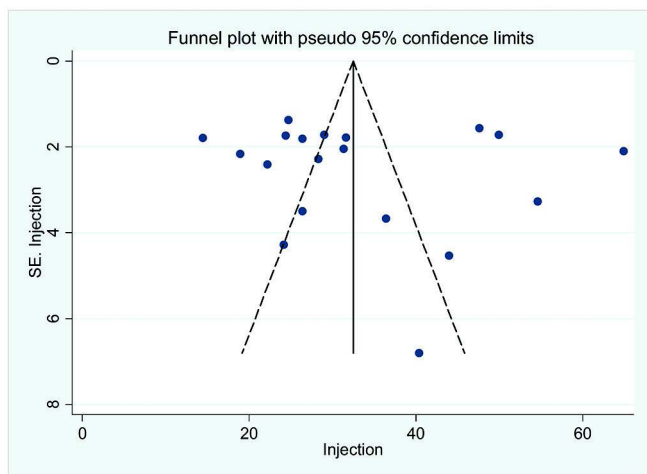


Figure 5. Funnel Plot to Assess Publication Bias for Prevalence of Injections as Common Activity in Occupational Injuries.

The results of the current study showed a wide variation in the prevalence rates of injection-related injuries among HCWs in Iran. The prevalence of injection-related occupational injuries among Iranian HCWs was estimated to be 33.56% (confidence interval 95%-27.43-39.70) using the random effect model. This is higher than the prevalence of injection-related injuries reported by Martin et al.³³ In their study, they showed that injection was the most common cause of activity-related injuries among HCWs.³³ In a study by Afridi et al in Pakistan, 41.9% of HCWs were injured while giving injections or drawing blood samples.³⁷ Injection was the most common cause of activity-related injuries in the findings of the studies of Laishram et al,³⁸ Quien et al,³⁹ Nsubuga et al,⁴⁰ and Kebede et al.³²

Caution must be taken when comparing the current findings with those of the above-mentioned studies. This article is the analysis of 19 studies, while the other mentioned papers were

based on one study. Because of the high prevalence rates of device-related and activity-related injuries in Iranian HCWs, it is necessary to establish effective precautionary standards and safety measures to reduce occupational injuries among HCWs.

This meta-analysis has two limitations. First, because of the heterogeneity of the studies and the fact that this meta-analysis was restricted to studies on Iran, caution must be taken in interpreting and generalizing the findings to other health care settings around the world. Secondly, differences in participant occupation, gender, sample size, location, type of hospital (public or private), and experiences of HCWs require that the current findings be interpreted with caution.

Conclusions

This study found the overall prevalence rates of needle-related and injection-related injuries among HCWs in Iran to be 52.95% and 33.56%, respectively. The impact occupational injuries have on the quality of patient care, the safety of HCWs, and health care costs demand that effective measures be applied to prevent or decrease the frequency of occupational injuries.

Authors' Contributions

ZF was involved in the database search, extracting data, the early drafting of the manuscript and revising the manuscript; AD acted as advisor in all stages of the research as well as statistical analysis; MNK contributed to the conception and design of the study, extracting data and aided in writing and revising the manuscript.

Conflict of Interest Disclosures

The authors declare they have no conflicts of interest.

Funding/Support

Fasa University of Medical Sciences, Fasa, Iran supported this study.

Acknowledgements

This article was extracted from an approved research project by Fasa University of Medical Sciences, Fasa, Iran. We thank the Deputy for Research of Fasa University of Medical Sciences for the support given to this project.

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