

Pattern of Work-Related Injuries in Kashan, Iran, 2005-2010

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ABSTRACT

Worked-related injury has been considered one of the most important health problems in developing countries; however, it is often disregarded as an important health issue. The purpose of this study was to investigate the epidemiology of work-related extremity injuries in Kashan during a five-year period. In this cross-sectional study, the data of the work-related injury cases were collected from the data bank of Trauma Research Center at Kashan University of Medical Sciences from 2005 to 2010. The variables included sex, age, injured organs, injury mechanisms, and educational levels and data were analyzed using descriptive statistics, using SPSS software version 20. In total, 2122 (97.9% male, 2.1% female) patients comprised the study sample. The mean age of patients was 30.9 ± 11.9 years. Most (11.9%) were between 21 and 30 years of age; most were young men. The most common cause of injury was related to contact with industrial machinery in 1170 cases (55.2%). The most frequently injured body organs were the hand or wrist in 1253 cases (59%) in upper limbs. There was a significant correlation between sex and injury mechanism among the patients ($p = 0.00$), as well as between the occupation and injury mechanism ($p \leq 0.05$). Based on the obtained results, accidents are the most common cause of injury to workers as a result of contact with industrial machinery; therefore, prevention programs and regular safety assessments by the technical committee can be significantly effective in identifying hazards and guidelines, particularly in terms of personal factors.

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Introduction

Trauma is the most important cause of death in the first three decades of life, with high risk in the age group of 15 to 35 years. In recent years, it has been considered one of the three main causes of public death [1, 2]. Work-related and industrial accidents are the second leading cause of trauma after traffic accidents [3]. Occupational events represent a severe problem affecting the health of workers. Although such injuries have been identified as a well-known problem in developed countries; however, in developing countries, no significant consideration has been paid to emergent public health problems [4, 5].

According to reports from the International Labor Organization (ILO), work-related illnesses and injuries (OIs) kill 1.1 million people worldwide annually [6, 7].

Generally, approximately 4,609 fatal work injuries were recorded in the United States in 2011, according to results from the Census of Fatal Occupational Injuries (CFOI) program by the U.S. Bureau of Labor Statistics. The rate of fatal work event for U.S. workers in 2011 was 3.5 per 100,000 full-time equivalent (FTE) workers [8].

According to assessments from the Survey of Occupational Injuries and Illnesses (SOII), nearly three million workers in the U.S. in 2011 suffered nonfatal work-related injuries or illnesses [9]. Data from the National Institute for Occupational Safety and Health (NIOSH) and the Bureau of Labor Statistics illustrated that, in the United States, 15 workers die as a result of traumatic injuries daily, of a total of 200 workers hospitalized [10].

The results of another study conducted in Kashan on the trauma caused by accidents confirmed that the highest incidence of injury occurred in the 21 to 30 year age group [11]. The organs most often injured in work-related injuries include the spine, hands, head, lungs, eyes, bones, and skin [10]. The most commonly-injured organ in traumatic patients (all fields) in Kermanshah City was the chest, at 56.3%. In this study, falling from a height accounted for 4% of trauma causes [12]. Trauma occurrence rates are 62.5% and 37.5% in urban and rural areas, respectively [10]. This study aimed to examine the pattern of extremity fractures as a result of work accidents according to demographic variables. The aim of this study was to investigate the epidemiology of work-related extremity injuries in trauma patients

referred to Kashan hospitals during a five-year period.

Materials and Methods

In this cross-sectional study, data from work-related injury cases were collected from data banks of Matini, Shahid-Beheshti and Naghavi Hospitals in Kashan City, Iran, during a five-year period (2005 to 2010). This study was approved by the Research Ethics Committee of Kashan University of Medical Sciences. Patients with pathology other than work-related injuries were excluded.

Case Identification

Work-related injuries were defined as injuries that occurred during work and that were related to work or the work environment.

Data Analysis

Data were analyzed using SPSS software version 20. The chi-square test was performed to compare differences between demographic variables, and $p < 0.05$ was considered statistically significant.

Results

Demographic Characteristics

The population of Kashan City was approximately 500 000 people. Over a five-year period, of a total of 59452 cases, 2122 cases were identified as work-related injuries, including 2078 male (97.2%) and 44 females (2.1%). The results revealed that the mean age of the injured cases was 30.9 ± 11.9 years. The age group of 21 to 30 years showed the most work-related injuries, accounting for 11.9% of injured patients. 13.2% of patients were workers age younger than 30 years. The result of the chi-square test revealed a statistically significant correlation between occupation and age of injured people ($p < 0.05$). Moreover, there was a statistically significant correlation between educational level and age ($p < 0.05$). In total, 51% ($n = 1083$) of cases had primary or secondary school education and 3.1% ($n = 66$) were collegiate. The majority of the injured people (87.5%) lived in an urban area (see Table 1). Furthermore, the results of the Friedman test showed that there was no significant difference between males and females regarding the injury mechanism ($p \geq 0.05$). The median time from trauma to hospital admission was 1.1 hours (range from three minutes to

12 hours). 61% of patients were transferred to the hospital by personal vehicle; only 8.6% were transported by ambulance (Table 2). Occupational injuries occurred more frequently between 10:00 and 12:00 A.M.

Mechanisms of Injury

Industrial machine injuries were identified as the most common injury mechanism (55.1%), followed by building crumble injuries (16.6%). In addition, 8.2% (n = 174) of fall injuries were related to falling off the building, and 3.2% (n = 69) to falling off owing to unclear reasons (Table 2). There was a statistically significant correlation between the occupation and injury mechanism of the injured people ($p \leq 0.05$). Moreover, a statistically significant correlation was found between sex and mechanism of injury ($p = 0.032$).

Body Region Injury:

In this study, a high number of injuries was attributed to hand or wrist (n = 1253, 59%), elbows and forearms (n = 322, 15.2%), and knee and shin (n = 260, 12.3%) (see Table 3).

Outcome of the Patients:

The result showed that 65.3% of injured patient made a complete recovery, 16.8% required long-term follow-up, and 6.8% made a partial recovery. The maximum and minimum length of hospital stay were 12 and 1, respectively. The average length of stay in hospital was 1.7 days. The cost of one day for people admission was 907170 Rial and the mean of hospitalization cost was 1542189 Rial.

Table 1. People Frequency Distribution Affected by Occupational Traumas Referred To Kashan Hospitals Based on Demographic Characteristics

variables		Frequency	Percentage
Residence status	Urban	1857	87.5
	Village	265	12.5
Gender	Female	44	2.8
	Male	2078	97.2
Educational level	Collegiate	66	3.1
	High school diploma	832	39.2
	Primary and Junior Illiterate	1083	51
		141	6.7

Table 2. People Frequency Distribution Affected by Occupational Traumas Referred to Kashan Hospitals Based on Causes of the Damage and Manner of transfer to hospital

Causes of Damage	Frequency	Percentage
Industrial machine	1170	55.1
Building crumble	352	16.6
Fall from height>1m	298	13.8
Fall from level<1m	37	1.8
sharp tools (knife and bottle)	168	7.9
Conflict	37	1.8
Others	60	3
Methods of Transmission		
Personal vehicle	1311	61.7
Ambulance	182	8.6
Taxi	330	15.6
unknown	299	14.1

Table 3. Frequency of Body Region Injury

Body region injury	Frequency	Percentage
Ankle and foot	156	7.4
Knee and shin	260	12.3
Hip and thigh	52	2.5
Wrist and hand	1253	59
Elbows and forearms	322	15.1
Shoulder and arm	79	3.7

Discussion

According to the current findings, 97.2% of patients were hospitalized in Kashan hospitals between 2005 and 2010. Men were at high risk in the age group of 20 to 30 years; it seems that the younger age groups, especially under 30 years of age are susceptible to more damage. These results were consistent with other studies [13-15]. It is plausible that there is a greater presence of men than of women in activities that expose them to accidents. Another possible explanation may be that more young males travel to this city to work. Generally, young age groups are active both in the household and at work and this may expose them to unsafe conditions. The frequency of occupational accidents are increased in younger age groups that may be related to lack of experience, skill, not paying sufficient attention to safety issues and the audacity of the youth. Also, younger age groups of workers experience higher levels of job stress; therefore, they are more prone to injury. Results showed that the industrial machine accident was the most frequent type of work-related accident [16-17].

In this study, the most vulnerable body parts at work were the hand and wrist ($n = 1253$, 59%) in the upper limb, and the leading external reason was contact with unspecified machinery (55.1%), which implies the usual requirements for the use of effective personal protective equipment (PPE), subsequently confirming that items of PPE were available across the factory, and that perhaps individual or organizational factors might influence workers' use of PPE [16-18]. This merits further study.

51% of people with work-related injuries had low educational levels; almost all the people had only a primary or junior-middle school education, consistent with previous findings [19-21]. The low education level might decrease awareness of self-protection and, as a result, danger at work has increased.

In this study, most of patients (61.7%) were transferred to hospital by private vehicles; only 8.6% were transferred by ambulance, also consistent with Roudsari et al. [21]. Owing to the lack in the emergency department in the manufacturing and industries, the majority of people use private vehicles to transport patients to the hospital.

In the current study, most trauma cases (67%) were workers with industrial insurance coverage, similar to the study by Fatemi et al. [22], it was justified since that mandatory insurance of the workers according to work laws. Roudsari et al. [21] reported that most of the workers were seasonal workers, the self-employed, and had no insurance; only 40% of them were construction and industry workers. Occupational injuries frequently occurred during 10:00 and 12:00 A.M and the least occupational injuries occurred during the night and it was justified correspond on activity of more companies in the morning shift. The current findings are consistent with previous studies [23], which suggest that the dangerous times are the beginning of the work shift, when operation starts for the day, and towards the end of the shift, owing to lack of attention. The lack of sufficient detailed information about type and years of work are limitations of this study. The study can only provide limited information for preventive measures at work.

The average hospitalization time in the present study was 1.7 days in 2000, consistent with Peng et al. [19] for victims with hand injuries (1.33 days). The mean cost of hospitalization in this study was \$154, while in other report [24] the cost was \$1,800 for fractures in lower limbs. Based on statistics, the cost of healthcare in Canada was ten times greater than in the current study; however, the minimum monthly income of laborers was \$1,200 in Canada and a minimum monthly income of unskilled workers in Iran in year 2000 was approximately \$270. Thus, the costs of hospital treatment in both studies appear similar.

Conclusion

According to the results of the present study, training of safety issues in the workplace, using older and more experienced persons to work with dangerous machines, increasing the safety of machines and automating the production lines, improving the light conditions and air circulation, reducing noise, and generally improving the work environment can be effective in reducing accidents. Proper reporting of accidents is an important factor in management, which can significantly reduce accidents.

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