An Epidemiological Investigation of Occupational Accidents to Workers Covered by Iranian Social Security Organization (ISSO) from 2001 to 2011

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ABSTRACT

It has been shown that occupational accidents happen more frequently in developing countries than in developed countries. The present study was carried to examine epidemiological factors of occupational accidents among workers covered by Iranian Social Security Organization (ISSO) from 2001 to 2011. This descriptive study was done in 2013 and based on the information on job-related accidents recorded by ISSO (between 2001 and 2011). The target population was all individuals who were insured by ISSO and had the history of occupational accidents within this period and their documented report had been recorded in ISSO. The data were analyzed using descriptive statistics and SPSS 11.5 software. The highest frequency of accidents has been observed in age group of 25-29 years old. 216922 accidents (98.4%) occurred for men and the rest did for women. The trend of accidents occurrence from 2001 to 2007 was ascending and since then it was descending; as such the highest number of the accidents was registered 24075 in 2007. The most prevalent time of incident occurrence was summer, within the morning shift and the least within night shift. Of limbs, hands with 26.7% had the highest rate of accidents. During this period, 1.73% of all accident-related accidents recorded by ISSO had general disability. In this study of the data of a 10-year period, the most important reasons for occupational accidents in Iran were human mistakes (inadvertency and failure to use appropriate protective equipment), which indicates workers’ unawareness of potential accidents consequences. Therefore, the most important practice is development of culture and implantation of a strong, stable safe environment in industries.

INTRODUCTION

In light of scientific and industrial development of mankind in recent decades, he has achieved increasing welfare and prosperity; however, the dangers he has also been confronted with were not less or more. Manpower as the most important factor behind production and services has constantly been threatened by a variety of reasons including illnesses and occupational accidents. In fact, unemployment and revenue drops due to work-related accident cause an increase in false jobs and social harms and not only it is a financial and social burden on injured persons but also it imposes a variety of costs on the society[1]. In developing countries, workers consist around 60 percent of total workers in the world from whom 80 percent is working in occupations which are inherently difficult and dangerous[2]. Annually, millions of occupational accidents happen in the world, which cause injuries to individuals or economic losses[3]. Occupational accidents are referred to as the accidents which happen while doing a job in the work place and lead to fatal or non-fatal injuries [4]. These accidents are currently considered as the third reason for mortality in the world and they have also been introduced as one of the most important health, social and economic risk factors in industrial and developing countries [5]. World Health Organization (WHO) has categorized occupational accidents into public health area like an epidemic [6]. Most occupational accidents are preventive and not only they can eventuate in disability, income reduction, and change in life quality of workers and their family but also they have noticeable impact upon productivity and economy of countries [7]. Ten millions of workers are victims of those accidents which
lead to death or disability of a majority of them [8]. According to the reports of ILO, around 33 percent of related-work mortality rate happens by means of accidents; that is, about 270 million persons are injured and 2 million die due to their work in the world annually [9]. Furthermore, on the average, each case causes at least a 4-day absence from work [10,11]. Because such accidents are potentially avoidable, their occurrence can be described by carelessness, injustice and non-compliance with laws [12]. Additionally, the organization has estimated that almost 4 percent of Gross Domestic Product (GDP) in countries is being spent for losses due to injuries, mortality, illnesses because of workers’ absence from workplace, treatment, disability benefits, and survivors [13, 14]. According to Bureau of Labor Statistics, 5703 death cases due to work and 4.3 million of non-fatal injuries and illnesses have been reported in private industries in 2004 [15]. European Agency for Safety and Health estimates that in Europe 6.4 million work-related accident occur annually which result in losses of 146 million working hours [16]. In a global study done in 2005, mortality rate due to work has been estimated as many cases as almost 312000. In the study, the rate of occupational accidents in the Middle East has also been reported as many cases as 9 per one thousand [17]. Accidents, in any form or at any degree, socially and economically impose many problems on the society because financial and life losses are imposed on individuals and society which are irreparable including traumas due to incidence, hospitalizing and medical expenses, rehabilitation costs, costs of artificial limbs, care costs for the disabled in sanatorium or homes, costs for conflicting with laws, courts and etc [18, 19]. It is more than 100 years that in many countries, work-related accidents have been remarkable. Most industrial countries not only have identified different rules and obligations to avoid accident and illnesses due to work but also are tracking the number of these accident. In recent years, countries and big companies are increasingly paying attention to the matter at least to some extent due to accident expenses. However, lack of information published on work-related accident is seen in many developed countries [20]. In many developed as well as developing countries, accidents have been recognized as one of the most important factors causing disability and mortality [21,22]. In developed countries, a tendency toward occupational safety area have had the responsibility of safety management and deals with dangers; whereas, in developing countries there are many companies which do not have any familiarity with occupational health and safety and do not appreciate safety levels[22]. Occupational safety is still a big concern and researchers of occupational safety are still seeking for related-work accident and accidents to develop appropriate interventions [23].

Analyzing the accident rates in industries can be a big contribution to determining administrative ways related like training the staff, methods and selecting proper work-related equipments [24]. This analysis can be used; a) to identify factors involved in accident, b) to develop preventive plans for Accident and c) to make decisions about them [25]. Although nowadays many efforts are being done to reduce occupational accidents, accident statistics are catastrophic to the extent that WHO has considered the matter as an important health, social and economic risk factor [26]. In two recent decades, our country has stepped toward development and has had a rapid industrial growth, which leads to social and economic changes following good and bad results. In our country annually large sums are spending for wage compensations during illnesses or injuries caused by the variety of occupational accidents and losses are also imposing on active manpower in society [3]. In Iran, unintentional accident and incidents are the second main reason for mortality [25]. The present study was carried out upon workers under the aegis of Iranian Social Security Organization (ISSO) from 2001 to 2011 aiming to investigate epidemiological factors behind occupational accidents including age, gender, accident place time; that is, the hour and month of occurring the accident, marital status, the cause of accident, type, and injured members. By identifying these factors, disaster process can be managed better. In other words, disaster management process including investigating the reasons for accidents while doing the work and taking preventive measures can be done to the extent that through correct management of accident, approaches can be presented to minimize economic expenses imposed on society and active power as much as possible. It is hoped that findings of the present study which deal with investigating the accidents over a decade, enable health planners throughout the country to distribute resources in a proper way and to evaluate the amount of progress in plans avoiding from occupational accidents effectively and scientifically.

**MATERIALS AND METHODS**

The current study is a descriptive study done in 2013 based on information recorded by ISSO, which are related to 80s Shamsi (from 2001 to 2011). The population was all individuals who were insured by ISSO and had the experience of occupational accidents over the years and their confirmed report has been recorded in ISSO.

Work-related accidents are not usually recorded immediately after the accidents and frequently they will be recorded after going through legal procedures and delivering the reports of accident investigation in branches related. To record the information, the investigators of ISSO go to the place of accident and collect information related to the injured person in special forms related to occupational accidents of the organization by interviewing the person or their colleagues. Recording the work-related accident in country is done by different
organizations including hospitals, Ministry of Labor and Social Affair, and ISSO. However, each organization aforementioned has its restrictions for collecting data on work-related accident due to its particular policies. For instance, information recorded upon occupational accidents in hospitals of the country inspires researchers to use other resources for doing their studies due to special reception policies of every hospital or improper record of information. In this study due to more proper record of information in ISSO as well as existing restrictions upon collecting data from hospitals throughout the country, data needed was collected from annual reports of Bureau of Statistics as well as Economic and Social Computing of ISSO which was obliged to insuring all the workers given state regulation of employers from 2001 to 2011. Accidents reported to the organization cause the injured persons benefit from supports predicted in the law; therefore, all accidents recorded in the organization necessarily are confirmed and the results of the study have high validity. Data were analyzed using SPSS V.11.5 software, and to investigate and describe the data, descriptive statistics including frequency, mean, standard deviation and frequency distribution tables were used.

Results:

In the present study, totally the information of 220400 workers under the aegis of ISSO from 2001 to 2011 was studied. The results obtained from checklists of completed files of injured persons showed that the youngest workers injured in the study were under 15 years old (0.05 %) and the oldest were above 70 (0.17 %). Age distribution of the persons injured from 2001 to 2011 has been displayed in Table 1. As it can be seen, the most frequent of accident occurrence has been related to age groups from 25 to 29. Analyzing the data from 2001 to 2011 showed that 216922 accidents happened to men (98.4%) and 3478 accidents happened to women (1.6%) and 170228 accidents happened to married persons (77%) and 50172 accidents happened to single persons (23%).

Table 1: Age distribution of the persons injured from 2001 to 2011

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<tbody>
<tr>
<td>Age distribution</td>
<td>Less than 15</td>
<td>415</td>
<td>386</td>
<td>377</td>
<td>343</td>
<td>376</td>
<td>378</td>
<td>399</td>
<td>413</td>
<td>346</td>
<td>381</td>
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The process of accident occurrences from 2001 to 2011 has been displayed in chart 1. According to the findings of the present study the process of occurring the accidents from 2001 to 2011 has been absolutely ascending. However, in 2008 it had a 1.2 percent reduction in comparison with 2007 but in other years it has been almost ascending. The most numbers of accidents have occurred in 2007 with 24075 cases (chart 1).

Investigating the month in which accidents have occurred during these 10 years showed that happening the accidents to persons insured during different months had a random pattern under the influence of a variety of specified and unspecified factors. The most common time of occurring the accidents was morning shift from 7 to 11 am. Investigating the accident happened to workers in a variety of seasons (spring, summer, autumn, and winter) during these 10 years showed that most accident cases has occurred in the summer.
The results showed that occupational groups of basic metal, electric and non-electric machines have allocated the most statistics of accidents to themselves. By comparing the information obtained, it was noticed that the most type of accidents were related to first falling and slip, cracking, and member cutting respectively in the second, third and fourth places. (Table 2)

<table>
<thead>
<tr>
<th>Accident type</th>
<th>percent</th>
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<tr>
<td>Falling</td>
<td>8.7</td>
<td>Stuck in or between objects</td>
<td>7.5</td>
<td>Accident due to the load displacement</td>
<td>4.7</td>
<td>Explosions and fires</td>
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<tr>
<td>Falling and Slip</td>
<td>18</td>
<td>Damage to eyes</td>
<td>1.1</td>
<td>Burn</td>
<td>2.8</td>
<td>Failing and stay under the debris</td>
</tr>
<tr>
<td>Cracking</td>
<td>14</td>
<td>Objects inside the body</td>
<td>0.8</td>
<td>Accident caused by burning substance</td>
<td>0.5</td>
<td>Vehicle accident</td>
</tr>
<tr>
<td>other</td>
<td>3.8</td>
<td>Accident with different objects</td>
<td>2.5</td>
<td>Accidents Hand Tools</td>
<td>10.6</td>
<td>Fracture</td>
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<td>Accidents machine tool</td>
<td>5.5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Electric shock</td>
</tr>
</tbody>
</table>

Moreover, analyzing the data during 10 years showed that from among injured members in occupational accident, most damages were related to hand with 26.7 %, fingers with 25.8%, and feet with 23.3 %.

Findings also showed that more than 50 percent of the statistics recorded for injured workers while doing their job was due to their carelessness.

About 94 percent of accident has occurred due to working inside workshops and the rest of the accident due to working outside the workshop or while commuting to work place. Based on arbitrary classification of ISSO if according to a physician’s diagnosis the rate of working power of the person insured due to accident was identified as 33 to 66 percent it would be partial disability, if it was identified as 66 percent it would be total disability and if it was identified as less than 33 percent it would be included in fixed compensation. Data obtained from this study showed that fortunately most accident have followed complete recovery (91.3%) and fixed compensation was allocated to just 5.3 percent of the persons injured. Moreover, 1.73 percent has been placed into partial disability group and persons with total disability have constituted 1.14 percent of total persons.

**Discussion and Conclusion:**

Accident and illnesses related to work are still a big problem throughout the world [20]. The present study aiming to investigate the epidemiological factors behind work-related accident was done upon workers under the aegis of ISSO from 2001 to 2011 and showed that work-related accidents have occurred to 220400 persons from among workers insured. The most age distribution of workers insured in work-related accident during the decade in Iran was from 25 to 29. High rate of accident among young people has a variety of reasons. One of the main reasons is the existence of direct relationship between age and work experience. In other words, young people are less experienced, less trained, more adventurous and more risk taker [27, 28]. In most of workplaces,
young people are also employed for difficult jobs which are risky due to their more favorable physical conditions [29]. Additionally, the number of persons at this age group working in factories is more than other age groups [29]. Bylund and Wadsworth in their studies have concluded that accident happen to young groups more than adults [30, 31]. The results of other studies are in line with these findings [32]. Based on gender distribution, the accidents occurred to almost 1.6 percent of women and 98.4 percent of men. Low percentage of accident occurrence in women can be due to carefulness and more compliance with safety matters on their side as well as not employing them for high risky occupations [33, 34]. Given this matter that accidents have higher frequency in men than in women, it can be found out that difficult risky occupations are being done by men in Iran and developing countries. As a result, Odds Ratio (OR) of accidents in women is 30 percent more than equal chance in men. It is due to this matter that women are more vulnerable and sensitive to accidents [35].

In the most studies as well as the present study, the statistics of work-related accident are more related to the married ones than the single ones, which might be due to stresses out of family problems, economic problems, having more than one job and the rest [36]. The most number of accidents has happened in January in 2002 and the least cases have occurred in May in 2004. Whereas, according to the report of Planning Department of Labor Ministry the most accidents have occurred in January and the least accidents in April [18].

Totally, accident occurrences among workers insured during different months like other studies had a random pattern [36]. Given this matter that accident occurrences in different months relies on activity kind of a factory, regional climate and other conditions, it cannot be expected that majority or minority of accident in regions or factories happen in an especial season.

In the present study like other studies, the majority of accident have occurred in morning shift from 7 to 11 am and the majority of the accidents has occurred in night shift [36, 37]. It can be justified due to this matter that most factories had more activity in the morning shift or some workers remained awake successively from previous night to morning for their work shift so drowsiness was also another reason for increasing accident occurrences. In Iran among a variety of industries, the most work-related accident occurred in the section of basic metal production as well as electric and non-electric machines. A study done by Unsar in 2007 in turkey shows that work-related accident have mostly occurred in the section of producing metal products, building, textile industry, coal mines and constructing vehicles [38]. It must be mentioned that occupational classification done by ISSO is an arbitrary classification and is not based on world standards. Hence, it can be claimed that some occupational classifications are lost or their information are not recorded correctly [36]. During this decade, majority of accident kinds is falling and sliding with 18 percent at the first place and contusion with about 13 percent at the second place, which is in line with many studies [39, 40]. In a study done by Alamgr et all in Colombia, the most mechanism for occurring the accident is related to working with machines and falling [41]. Furthermore, in a study upon the distribution of dangers of occupational harms in constructing industry by Larsson, the most harm mechanism in the industry was related to falling [42]. From among injured members in the accident, hands and feet underwent the most damages. The results of the current study are similar to the findings of a study done by Halvani [43]. Because hands and feet more than any other parts of the body are at the danger of machines and more activities are done by theses body parts, the probability of any damages to these parts increases. Therefore, agronomy and security of hands need to be noticed. Carelessness while working and wearing improper clothes are the most important reasons for work-related accident during the decade in Iran. In a study done by Colak, carelessness and then lack of suitable protection have also been mentioned as the most important reasons for accident [44]. There is no doubt that on the one hand many work-related accident are not recorded in any places due to a variety of reasons like absence of an observer while occurring the accident, and not reporting small accident on the side of the workers. On the other hand, due to arbitrary occupational classification done by ISSO and its non-compliance with international classifications and world standards, the probability of losing information has been turned into an important matter. Moreover, lack of enough certainty of recording whole accident occurred can lead to low numbers. Although in developing countries there are some limits in data quality, their analysis can contribute to providing useful information to determine priorities and to present preventive strategies in systems related [36]. It seems necessary that at the first step organizing the record system of accident be done according to world standards and after identifying the weak and strong points of the record system of work-related accident, preventive plans for accident be started by professional security and health experts.

Increasing the accident can be due to increasing the working population or it might be due to low security, low training needed and lack of knowledge in the field [29]. Workers that enter small industries, generally have low educational level; as a result, they have improper knowledge from safety and consequently the rate of accident in them is high [45]. Hence, the most important measures are culture building and creating a suitable atmosphere for safety. It is also noteworthy that success of preventive plans for accident relies on a process of consistency. The current study put effort into showing the status of work-related accident in a decade consistently, so it is hoped that its results inspire the authorities related to maintain the integrity of the most important country investment namely working power.
REFERENCES


