

Relationship between Some Personal and Occupational Factors and Accident in Workers of Metal Industry

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Abstract

Background and Purpose: Occupational accidents are usually directly or indirectly related to unsafe behaviors of individuals, and various personal and occupational factors contribute to such behaviors. On the other hand, the personal and occupational characteristics of workers with and without the experience of occupational accidents can be different. **Methods:** The current cross-sectional study was conducted on 355 workers in the metal industry of Kashan, Iran, 2018. Demographic data and information regarding the job, safety, and occupational accidents were collected by a questionnaire. Then, the relationship between different variables was investigated. **Results:** The participants comprised 355 male workers, with a mean age of 35.08 ± 7.31 years, 53.2% of which experienced an accident. Accident rate among illiterate workers, uncompleted high school diploma, high school diploma and bachelor's degree were 75%, 47.3%, 55.3% and 59.6% respectively. There was a significant relationship between work-related education and accident. Workers with monthly income of 77\$ constituted 64.4%, 77–230\$ 51.1%, and above 230\$ constituted 33.3% of the accidents. There was a statistically significant relationship between education and occupational accident ($P < 0.05$). **Conclusion:** The results of the study showed high incidence of accidents in metal workers. Furthermore, individual and economic factors such as level of education and income and occupational factors such as position had a significant relationship with the occurrence of the accident, which should be considered more seriously.

Keywords: Accident, individual factors, metal industries, occupational factors

INTRODUCTION

One of the major social and public health problems of societies is work-related accidents.^[1] There is no accurate estimate of mortality rate in different parts of the world due to access to health-care services and fatality rate due to occupational accidents in record systems.^[2]

Work-related accidents and illnesses have psychological, physical, social, and economic consequences.^[3] The direct and indirect costs of occupational accidents and occupational diseases impose a large economic burden on individuals, families, and even the society.^[4] According to the International Labor Organization, worldwide, over 300 million work-related accidents occur every year.^[5] The US

Census Bureau registered 4405 deaths caused by accidents in 2013.^[6]

In recent years, many studies are conducted to find factors that cause occupational accidents. The results of these studies show that occupational accidents occur due to insecure labor behaviors or unsafe work conditions in the workplace. As the human factor has a higher role in accidents than inappropriate performance of technical equipment (unsafe conditions), most of the occupational accidents are caused by unsafe behaviors of managers, engineers, supervisors, and workers of industries.^[7]

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Researches in this field show that unsafe behaviors directly or indirectly cause 80%–90% of accidents and events in work environments.^[8] On the other hand, it should be remembered that unsafe behaviors of people in work environments are related to various personal, occupational, and environmental factors, and without identifying these factors or studying the causes of occupational accidents, it is impossible to find the causes of the factors such as insecure acts.^[9]

Although information about occupational accidents worldwide is not standardized, the number of reported incidents and their consequences are still used as the basis for industrial safety activities and planning in industrial environments.^[10-12] Identification of the causes and factors of accidents and their severity are major issues in accident analysis and a way to prevent accidental damage. Studies show that physiological and physical conditions of individuals are among the factors that can affect the occurrence of accidents. Furthermore, many of the accidents are caused by unfavorable psychological backgrounds in the staff.^[13]

A group of known human factors that increase the risk of occupational accidents include low age, low educational level, low experience, physical and mental disabilities, personality, and behavior.^[14] The factors of low job satisfaction, personality traits such as precaution, and individual senses play a significant role in causing occupational accidents. Personal and occupational factors have a significant effect on the occurrence of accidents, and on the other hand, the study of occupational accidents can change the attitude of workers toward the safety and prevention of accidents.^[15,16]

On the other hand, the experience of occupational accidents by workers can also change the attitudes of workers toward safety and the causes of accidents. Because human factor plays a significant role in occupational accidents in work environments, various occupational and individual factors can contribute to the occurrence of such accidents. It also seems that, due to changes in the attitudes of workers after the experience of occupational accidents, differences in personal and occupational characteristics, level of knowledge about safety, and safe behavior of workers with occupational accidents also change in comparison with workers without accident incidents.^[17]

Therefore, the current study aimed at investigating the relationship between occupational accidents and various factors of individual and occupational activities of metal industry workers in Kashan, Iran, 2018.

METHODS

The current cross-sectional study was conducted in 2018 on the association of occupational injury with various individual and occupational factors among workers in the metal industry of Kashan. For this purpose, in the first stage, a simple cluster sampling method was employed, and eight factories were randomly selected from the twenty factories of the metal

Table 1: Relationship between accident and some demographic characteristics of metal industry workers in Kashan, Iran, 2018

Demographic characteristics	Accident		P
	Yes (%)	No (%)	
Gender			
Male	189 (53.2)	166 (46.8)	-
Marital status			
Single	30 (50)	30 (50)	0.296
Married	154 (53.3)	135 (46.7)	
Divorced	5 (83.3)	1 (16.7)	
Number of children			
0	53 (48.6)	56 (51.4)	0.332
1	53 (60.9)	34 (39.1)	
2	66 (56.4)	51 (43.6)	
3	13 (44.8)	16 (55.2)	
4	2 (40)	3 (60)	
Level of education			
Illiterate	3 (75)	1 (20)	0.05
Uncompleted high school diploma	48 (52.7)	43 (47.3)	
High school diploma	99 (60)	66 (40)	
Associate degree	20 (41.7)	28 (58.3)	
Bachelor's degree and higher	19 (40.4)	28 (59.6)	
Place of residence			
City	177 (54.5)	148 (45.5)	0.18
Village	12 (40)	18 (60)	

Table 2: Relationship between accident and some socioeconomic characteristics of metal industry workers in Kashan city, 2018

Socioeconomic features	Accident		P
	Yes (%)	No (%)	
Tobacco consumption			
Yes	44 (57.9)	32 (42.1)	0.437
No	143 (52.6)	129 (47.4)	
Drug abuse			
Yes	2 (50)	2 (50)	0.63
No	187 (53.3)	164 (46.7)	
Housing			
Own	134 (55.6)	107 (44.4)	0.156
Mortgage	15 (57.7)	11 (42.3)	
Rented	34 (44.7)	42 (55.3)	
Organizational	0	100 (2)	
Income (\$)			
Below 77	47 (64.4)	26 (35.6)	0.049
Between 77 and 230	138 (51.1)	132 (48.9)	
Above 230	4 (33.3)	8 (66.7)	
Kind of insurance			
Social security	189 (53.5)	164 (46.5)	0.218
National health care	0	2 (100)	

industry in Kashan, Aran o Bidgol, Isfahan, Iran. In the second stage, the sample size of each plant was calculated in the eight selected factories considering the total number of workers in

Table 3: Relationship between accident and some occupational characteristics of workers in metal industry in Kashan, 2018

Occupational features	Accident		P
	Yes (%)	No (%)	
Position			
Repair and maintenance	66 (58.9)	46 (41.1)	0.049
Manufacturing	78 (45.3)	94 (54.7)	
Services	31 (66)	16 (34)	
Quality control	6 (54.5)	5 (45.5)	
Administrative	3 (37.5)	5 (62.5)	
Has a second job			
Yes	36 (52.9)	32 (47.1)	0.517
No	151 (53.5)	131 (46.5)	
Shift working			
No	89 (54.6)	74 (45.4)	0.66
Yes	98 (51.9)	91 (48.1)	

each factory. Selection of workers was randomly performed based on the list of workers in each factory.

The study data were collected using a questionnaire and a survey of workers' records. The questionnaire consisted of 19 items categorized into four different subsections as follows:

1. Demographics of the participants: Marital status, level of education, number of children, and place of residence
2. Socioeconomic information: Smoking, drug abuse, housing status, income, and type of insurance
3. Job characteristics: Job type, second job, and shift working
4. Experience of a work-related accident: The type of accident and type of treatment.

In the current study, a statistical test was used to examine the relationship between demographic variables, socioeconomic status, and occupational characteristics with the experience of occupational accident. To analyze the relationship of demographic variables, socioeconomic status, and occupational features with accidents, one-way ANOVA was used. In the current study, SPSS 16 for windows (Microsoft, Chicago, IL, USA) was used to analyze the collected data.

RESULTS

There were 355 male participants, with a mean age of 35.08 ± 7.31 years. Among them, 289 (81.4%) were married, 60 (16.9%) were single, and six (1.7%) were divorced. Almost half of them ($n = 165$; 46.5%) had high school diploma, 91 (25.6%) had not completed high school diploma, 48 (13.5%) had associate degree, 47 held bachelor's degree and higher (13.2%), and four were illiterate (1/1%); 325 (91.5%) workers lived in the city and all had social security insurance [Table 1].

Nearly 53.2% of the participants had an accident, of which 75% were illiterate workers, 47.3% had uncompleted high school, 55.3% of the ones had high school diploma, and 59.6%

of the participants had bachelor's degree or higher. There was a statistically significant relationship between education and accident in workers ($P = 0.05$). However, there was no statistically significant relationship between accident and marriage, number of children, and place of residence ($P < 0.18$) [Table 2].

In terms of income, among workers who experienced occupational accidents, 64.4% had 77\$ income, 51.1% had 77–230\$, and 33.3% had above 230\$. There was a statistically significant relationship between income and occurrence of accident ($P < 0.05$). In terms of place of residence, majority of the workers who had accidents lived in rented accommodations. There was also no statistically significant relationship between accidents and insurance coverage, smoking, and residential status ($P > 0.05$) [Table 3].

Nearly 41.1% of the participants working in the repair and maintenance sector, 54.7% in manufacturing, 34% in services, 45.5% in quality control, and 62.5% of administrative staff had no accidents; there was a statistically significant correlation between position and accident ($P < 0.05$). No statistically significant relationship was also observed between the accident and the second job and working shift ($P > 0.517$).

Of 355 participants, 219 (61.7%) were injured, all of them referred to the treatment centers; of the participants with accidents, 160 (73.1%) were admitted as outpatients and 59 (26.9%) as inpatients. Electric shock was the most prevalent accident ($n = 187$; 53.4%) followed by falling ($n = 179$; 53%). In addition, the most prevalent occupational injury was bruising ($n = 156$; 55.9%) followed by burning ($n = 161$; 55.3%). There was also a statistically significant relationship between accident and treatment ($P = 0.03$).

There was a statistically significant relationship between accident and treatment ($P = 0.03$). There was no statistically significant relationship between accident and type of treatment ($P < 0.06$).

DISCUSSION

The current study aimed at investigating the relationship between workers' occupational accident and some of their individual and occupational factors.

The results of the current study showed higher rate of accidents in married participants than the single ones, which was in accordance with the results of the study by Mehrabi and Kamalinia.^[18,19] In the current study, there was a statistically significant relationship between the accident and level of education, income, and position, but no relationship was found between marital status, place of residence, the number of children, and incidence of accident. The results of the studies by Vatani *et al.* and Bahrampour *et al.* showed that, with increasing education and income, accident rates significantly decrease, which is consistent with those of the current study.^[20,21]

Workers with one and two children showed a higher rate of accidents. There was also no statistically significant relationship between accidents and the number of children and place of residence ($P > 0.05$). There was a statistically significant correlation between position and accident ($P < 0.05$). No articles were found in this regard.

A significant relationship was observed between the increase in the level of education and reduction of accidents. In a study by Márquez *et al.*, people with the highest levels of education were more likely to experience the application of mobile phones while driving than the ones with lower education.^[22] However, the role of education cannot be ignored in the manifestation of human error. Education, as the source of knowledge and skills strengthening, plays a critical role in accepting the responsibility of high-risk occupations and is also a crucial element in the employment of eligible people with the most desired level of education for high-risk occupations.

The results of the current study showed that most of the participants who had accidents were drug abusers, which was inconsistent with the results of the study by Gowda *et al.*

Furthermore, there was no statistically significant difference between the percentage of single participants with and without accident. The percentage of married participants who had accidents was significantly higher than their counterparts with no accidents, which was similar to the findings of the study by Gowda *et al.*^[23] Higher rates of accidents in married participants can be attributed to their key role as the cornerstone of their families and marital life pressure.

The percentage of married people with accident was higher than their peers without accident, which can be attributed to marital life pressures.

In the current study, shift working and second job had no remarkable effect on the incidence of accident, while the type of work shift and its impact on the risk of accident were among factors affecting the incidence of accidents. The results of the current research were not consistent with those of the study by Kazunobu.^[24]

In the current study, people with more overtime work per week and drug abuse had more accidents that could be attributed to fatigue, reduced focus, and work pressure. The results also showed that, with increase in age, the accident risk also increases, which was consistent with the finding of Winter *et al.*^[25]

The most common type of incident was electric shock and collapse; however, in the study by Vaziri Nejad *et al.*, the most common occupational accidents belonged to collision and falls.^[26]

Gauchard *et al.* examined the role of occupation and individual factors in French railway workers in 2006. They determined that individual and occupational factors can be a predictor of occupational injuries so that the incidence of an accident is related to individual characteristics and occupational factors. Other important and effective factors

include low experienced labor, low age, smoking, and physical disability.^[27]

CONCLUSION

The results of the study showed high incidence of accidents in metal workers. Furthermore, individual and economic factors such as level of education and income and occupational factors such as position had a significant relationship with the occurrence of the accident, which should be considered more cautiously.

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Conflicts of interest

There are no conflicts of interest.

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