

The Relationship between Workers' Attitude towards Safety and Occupational Accidents Experience

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ABSTRACT

Construction is one of the most hazardous workplaces in all around the world. Awareness about workers' attitude towards safety could be helpful in anticipating the workers' behavior. The aims of this study were to determine both the tunneling workers' safety attitude and the relationship between workers' attitude towards safety and occupational accidents. In this cross-sectional study performed in eight tunneling projects in Iran in 2013-2014, overall 689 workers of the tunneling projects were selected. One-hundred fifty had experienced at least one occupational accident. Requisite variables of workers were collected via both standardized questionnaire and checklist. The participants were selected randomly with the stratified random sampling. The data were statistically analyzed using logistics regression, multivariate logistic regression and Spearman correlation coefficient where applicable (with a preset probability of $P < 0.05$). All participants were male with a mean age of 34.87 ± 7.44 yr. 21.8% of participants experienced occupational accidents. 81.7% of them were married, 51.5% workers had job-related to education and 37.4% did exercise routinely. Many of them were in high education level (35.8%), 74.6% had a negative safety attitudes and 25.4% had positive safety attitude. The results showed significant correlation between education level ($P = 0.001$), exercise ($P = 0.014$), accident experience ($P = 0.001$) and occupational safety attitude. Age ($P = 0.108$), marital status ($P = 0.554$), and job-related to last education ($P = 0.307$) did not have any significant correlation with safety attitude ($P > 0.05$). Accident experience, as well as education level, could affect positively on changing workers' safety attitude.

KEYWORDS: Safety, Attitude, Occupational accidents

INTRODUCTION

According to the International Labor Organization (ILO) statistics, 2.3 million people worldwide die annually because of occupational illnesses and accidents at work. In addition, 860000 occupational accidents are approximately happened with human injuries in workplaces activities every day.

The direct or indirect cost of occupational illness and accidents at work is estimated at US\$2.8 trillion worldwide [1].

Accidents in construction sites are very prevalent and in these areas could form many accidents with unpleasant ramifications [2-4]. The statistics of occupational injuries in 2013 all over the United States showed that considerable part of

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this census was devoted to fatality in which occurred in construction sites [5].

In the early half of 20th century, some researchers tried to realize the possible reasons of incidents. In 1960, the studies' results were revealed by the Pennsylvania Department of Labor and shed lights on many unclear aspects of accidents causation. Both unsafe acts and unsafe conditions were recognized as two main contributing factors in more than 98% of the 80000 industrial accidents in which analyzed [4]. These findings endorsed Heinrich's theory [5]. Generally, the major factors are categorized according to hardware, software, human, interfaces, functions, and the environment [6].

The role of human in accidents is undeniable and it is one of the most prominent factors in occurring accidents. Human behavior is very complex and is not fully predictable. Behavior is affected by means of many factors such as environmental condition, task and equipment characteristics, job instructions, psychological and physiological stresses and individual factors [4]. People are different in manner of thinking. Some of them except to accidents occur but others do not. Attitudes are judgments or sentiments that the human's mind thinks about something or someone. People's attitude toward a subject could be inferred from their behavior and manner of thinking in various situations [7]. Therefore, based on safety attitude surveys, it is possible to predict the risk accompanied by every behavior [8-9]. There are individual differences in workers' safety attitude. Some workers pay more attention towards safety principals [10-11]. Safety attitude predicts the safe and unsafe behavior which leads to accidents [12].

The workers with positive safety attitude are less encountered with work-related accidents. According to social and psychological professionals, the knowledge about a topic and concept is effective in creating a positive attitude, and the attitude is considered as the best factor for predicting the individual behavior. The safety culture of a workplace or organization is the product of individual and group values, attitude, perceptions and behavioral models which determine the commitment to health and safety in workplace management [13].

The role of workers in occupational accidents is unmistakable. Although improving factors in workplace like unsafe conditions could be fruitful for the sake of accident prevention, but according to the key role of human behavior in creating accidents, awareness of workers attitude towards safety could be underlying factor in development and implementation of preventive measures. Most of the last surveys examine safety attitude in workplaces such as construction sites, off-shore industries, hospitals, roads [7, 14]. Some researchers were conducted for developing

questionnaires [15] and introducing occupational safety attitude as a performance indicator [16, 17]. A comprehensive review of 22 articles with subject of safety attitude, were found that all of these articles emphasize on the paying enough attention to enhancing of positive safety attitudes in workplaces [13].

In recent years, a lot of efforts have been taken on promotion of safety performance in projects by reducing the number of accidents, but these course of action have no reasonable results [12] because of ignoring workers' attitude and have a poor strategy.

No systematic safety attitude study has been performed between tunneling worker. Therefore, this essay was undertaken to determine tunneling workers' attitude towards safety, and clarify the relationship between tunneling workers' attitude towards safety and experienced occupational accidents.

MATERIALS AND METHODS

Study Population: This cross-sectional study was performed in 8 tunneling projects which were located in Alborz, Tehran, Mazandaran, Lorestan, Kermanshah, Boshahr Province in Iran in 2013-2014.

Workers with occupational accidents experience were defined as those workers had at least one occupational injury that led them to leave their works for more than one day. Others were excluded from the study. In order to prevent any intervention, workers who had only an accident experience not related to their jobs were also excluded.

By means of the stratified random sampling method and due to the ratio of the employees working on each project, all 700 male subjects who employed in eight different tunneling projects were selected and investigated, study questionnaires were distributed among the participants. The response rate was 98.42%.

Present study was approved by Ethical Committee of Tarbiat Modarres Uni-iversity. All of the participants signed informed consents.

Data Gathering Instrument: An attitude survey has many statements about some situations or actions that respondents may agree or disagree with them. For the sake of this formal attitude assessment, a questionnaire that validated previously in some studies were done in Iran, an occupational safety attitude questionnaire with 25 items was selected. The significant Cronbach's alpha coefficient of questionnaire was $\alpha = 0.86$ [18]. The questionnaire scoring was prepared by the Likert 5 degrees scales to measure and quantize the safety attitude. Results provide a picture of individual or group attitudes about situations covered in the survey [4]. In order to obtain the

best view of the worker's safety attitude, workers' demographic variables including age, marital status, level of education, job-related to education, exercise habits and occupational accident experiences were gathered via using a demographic checklist.

To collect reliable data, the investigators referred to the project sites and constituted meetings in groups of 4 or 5 with workers. For each group, investigators clarified the goals of the study and then distributed the questionnaires.

According to safety attitude questionnaire, answers regarding occupational safety attitude are collected. The five possible answers were I totally agree, agree, neutral, disagree, and totally disagree. According to response of participants to each question, the score will be rating 1 to 5, respectively. Negative statements represent negative safety attitude and are considered reversely.

To interpretation of answers, the score of the answered questionnaires was compared with the mean of the total scores. If the score was equal or bigger than the mean, the safety attitude is positive and if not the safety attitude is negative [18].

Statistical Analysis: To perform statistical survey, SPSS ver. 20 software (Chicago, IL, USA) was applied. The data were statistically analyzed using logistics regression (in order to determine the influential parameters on workers' safety attitude), multivariate logistic regression (to eliminate the effects of confounding variables) and Spearman

correlation coefficient (to survey the statistical relation in safety attitudes factors and in demographic data) (with a preset probability of $P < 0.05$). Experimental results are presented as arithmetic Mean \pm SD.

RESULTS

All participants in this study were male with mean age of 34.87 ± 7.44 yr and with maximum and minimum age of 60 and 20 yr. 21.8% of participants had at least one occupational accident experience with one day working lost and more. However, 81.7% of the participants were married, 51.5% workers had job related to their education and 37.4% of them do exercise routinely. Thirty-five point eight percent of participants were in high education level, 33.8% academic level, 20.6% junior high level and 9.7% in primary level. 74.6% of the study participants had a negative occupational safety attitude and only 25.4% of them had positive occupational safety attitude.

Table 1 shows some results of the study about occupational safety attitude and studied variables. In order to assess the factors affecting the safety attitude of workers and to eliminate the effect of confounding parameters, the logistic regression model was used to analyze the data. The variables entered the model with step by step method finally the remaining significant variables in the model were identified (Table 1). The confounding variables were age, number of accidents and job related to major.

Table 1. Comparison study variables among construction workers

Study variables	Attitude's score mean	Safety attitude		P Value
		Negative (%)	Positive (%)	
Age (yr)				
< 30	71.02 \pm 9.64	514 (74.6)	175 (25.4)	0.108
30 - 40	69.79 \pm 9.73			
>40	68.65 \pm 8.91			
Marital status				
Single	70.16 \pm 9.56	98 (77.8)	28 (22.2)	0.554
Married	69.16 \pm 9.70	416 (73.9)	147 (26.1)	
Education level				
Primary	67.14 \pm 9.26	57 (85.1)	10 (14.9)	0.001
Junior high	69.19 \pm 9.48	111 (78.2)	31 (21.8)	
High	69.91 \pm 9.48	185 (74.9)	62 (25.1)	
Academic	71.30 \pm 9.68	161 (69.1)	72 (30.9)	
Job related to education				
Yes	70.21 \pm 9.74	259 (73)	96 (27)	0.307
No	69.71 \pm 9.43	255 (76.3)	79 (23.7)	
Exercise				
Yes	68.80 \pm 9.63	206 (79.8)	52 (20.2)	0.014
No	70.66 \pm 9.50	308 (71.5)	123 (25.8)	
Accident experience				
Yes	77.85 \pm 9.43	65 (43.3)	85 (56.7)	0.001
No	67.77 \pm 8.41	449 (83.3)	90 (16.7)	

According to Table 1, only education level, doing exercise and occupational accident experience has significant effect on dependent variable (safety attitude) ($P < 0.05$) and others variables do not have any significant relation ($P > 0.05$).

Workers with experience of occupational accidents compared to other workers have more positive attitude ($P = 0.001$) (Table 2).

In variable of education level, by increasing the level of education, the workers' safety attitude has been significantly changed towards positive. The positive attitude between workers who graduated from junior high school, high school and university courses in comparison with workers who leaving school early (in primary

school) had respectively more than 1.76, 2.13 and 3.66 times. Workers with higher education levels obtained higher scores in safety attitude survey ($P < 0.05$). The results of correlation between doing exercise routinely and occupational safety attitudes show that workers who have the habit of doing exercise have more negative safety attitudes than other workers $OR = 1.692$ (1.126-2.543). The findings of statically survey on answers of safety attitudes questionnaire show that the most and lowest score between workers with and without occupational accident experience were related to question numbers 1 (4.71 ± 0.7) and 20 (3.55 ± 1.2) and 9 (3.69 ± 1.17) and 21 (2.45 ± 0.99), respectively (Question No.1: Every worker should be informed about their PPEs, and applies them).

Table 2. Results of regression analysis

	Beta	Standard Error	Significances	OR	95% CI for EXP (B)	
					Upper	Lower
Constant	-1.558	0.220	0.000	0.210	-	-
Primary			0.001	1.000	-	-
Junior high	-0.567	0.435	0.010	1.763	0.751	4.135
High	-0.758	0.407	0.062	2.134	0.962	4.737
Academic	-1.299	0.409	0.001	3.666	1.646	8.165
Exercise	0.526	0.208	0.011	1.692	1.126	2.543
Accident experience	2.040	0.213	0.001	7.694	5.067	11.681

DISCUSSION

The main purpose of this study was to assess relationship between workers' safety attitude and occupational accidents experience. Negative attitude between workers in tunneling projects are more common than positive attitude and this finding could be worrying. OSHA (Occupational Safety and Health Administration) incident rate index in these 8 projects were studied and there were high rates of accidents (OSHA IR=67.69). Since safety attitudes could directly effect on safety performance [19], this finding was justified.

According to the purpose of this study, workers with experience of occupational accidents in comparison with others had more positive attitude. People will usually be worried and sensitive after accidents happen [18]. Earlier injury experience sensitized workers to have stronger perceptions of risk associated with unsafe acts [21-22]. Therefore, accident experience can be effective in changing occupational safety attitudes. The highest and lowest score between workers with experience of occupational accidents were related to question numbers 1 (4.71 ± 0.7) and 20 (3.55 ± 1.2).

Investigation of question No.1 with highest score reveals that every worker should be informed about their personal protective equipment and uses them and question No.20 with lowest score shows in some work condition the work cannot be done safely (Question No.20: sometimes work cannot be done safely for the sake of particular

condition).

Worker with positive occupational safety attitude are informed about the importance and the key role of personal protective equipment in prevention of accidents in their workplaces and believe that there is always a proper and safe way to do works. The results of statically survey on answers to questions of safety attitudes questionnaire show the highest and lowest score between workers without experience of occupational accidents were related to question numbers 9 (3.69 ± 1.17) and 21 (2.45 ± 0.99). Question number nine with highest score explains it is not related to me that others neglect safety issues and question number twenty-one with lowest score declare distraction does not have role in occurring accidents. Workers with negative occupational safety attitude do not pay attention to the surroundings and to co-workers unsafe acts. This lack of commitment can be effective in accidents.

According to the findings of this study, there was not any significant correlation between age and occupational safety attitude. The results provide more evidence for the other studies that show accident rates were not related to age [21, 23, 24]. However, in some studies, there were relation between accidents and age before 30 yr old [25-26]. There was no statistical difference in occupational safety attitude between married and unmarried workers. However, this result is in disagreement with study that, was found good housing condition, relieve stress and reduce the

probability of accident proneness and dysfunctional families have negative effects [21]. In addition, some scientific researches were indicated occurrence of occupational accidents in married workers is more common than singles [27-29]. Therefore, marriage had no significant negative effect on private attendance' life by creating stress or plight or maybe they could deal with their problems. There are some problems with single workers led to have the same results compared to married people. Findings the underlying causes of this disagreement need to be more investigated.

In these projects, the other variables had not major role in effect on occupational safety attitude. There was not any significant correlation between job-related to education and occupational safety attitude of workers but the workers who have jobs related to educations have slightly more positive occupational safety attitude. There was not any significant relationship between work experience and different aspect of safety attitude [30].

In process of preparation workforce before entering the workplace, there is no enough attention to occupational health and safety issues.

There was a significant correlation between education level and occupational safety attitude. By increasing the education level, the negative attitude was reduced. The results are in agreement with statistically significant relationships between safety climate and education level [31]. Similar findings were reported [32]. Workers who do exercise routinely have more negative occupational safety attitude compared to others. The frequency of accidents in workers who do exercise routinely is more than the others [33]. There was no sufficient scientific evidence about this finding in other research, but according to some scientific research, athletes are benefited of more self-confidence in comparison with others [34]. Thus, the sense of self-assurance among workers who do exercise routinely would be one of the reasons indifference of their safety attitude. This finding is in need of more investigations.

Because of some restrictions, we only selected some limited variables at present study, hence, more related variables use for the future studies.

CONCLUSION

Either occupational accident experience or the level of education could affect positively on changing safety attitudes. Therefore it could be fruitful for employers when they want hire employees. They should pay enough attention to requirements of every job. In hazardous workplace and in perilous working condition, it is recommended that they employ worker who are in high level of education.

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