



Investigating of Job Stress and Worker's Accidents Relationship in Geotechnical/Construction Projects in Zanjan

Ayda Fathi^{*1}, Mina Taghi Ajami², Sahba Ansari²

¹Department of Education and Psychology, Islamic Azad University, Zanjan Branch, Zanjan, Iran

²Department of Education and Psychology, Abdolrahman Sufi Razi Higher Educational Institute, Zanjan, Iran

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ABSTRACT

The geotechnical and civil projects are very special tasks for different range of workers which is provided wide stress levels in persons. In the meantime, the construction tasks have faced with hard working and accidents during job. The presented study attempted to investigate the empirical relationship related job stress and workers' accident during the constructions. In this regards, 50 individuals with a history of occupational accidents and 120 without accidents experiences on construction are considered in Zanjan. The experiment was conducted based on Belkic occupational stress index (BOSI) and general health (GHQ28) questionnaires and during the study, the types of job stressors were identified and the odds ratio of occupational accidents in the study population in relation to job stress was determined. According to the results, the most important job stressors in construction projects are time pressure, working with machines, interacting with colleagues, and environmental pressure.

1. Introduction

The incidence of occupational accidents in different countries especially in the construction sector is relatively high and increase over time. According to the assessments, that annually about 250 million job accidents are reported were 300,000 occupational accidents lead to death or heavy injuries (Fam et al., 2010). Occurrence of fatal accidents in developing countries is about 3 times higher than in industrialized countries which those accidents are mostly unintentional (Rowlinson et al., 2014). In Iran, about 14,000 job accidents annually occur which are mostly related to industries and construction projects (Swaen et al., 2004). Meanwhile, for geotechnical/construction projects, it can be stated that human errors are the cause of about

80% of occupational accidents and the remaining 20% are due to design, devices and machines errors (Rameezdeen and Elmuallim, 2011). These events are directly related to the mental and working conditions of construction project workers (Huang et al., 2021). High job stress in construction and geotechnical projects has always caused construction workers with heart problems and nervous tensions have been involved (Fam et al., 2010). The relationship between job stress and job accidents in civil and geotechnical projects has been less studied and previous studies have generally focused more on specific jobs such as managers of service and commercial sectors or other industries such as the oil industry, which due to its job benefits in Iran is not known as a stressful job (Leung et al., 2016). The international labour organization (ILO) stated that the job stress is estimates that the expenditures

* Corresponding author.

E-mail address: Aida.f68.3@gmail.com

Assistant Professor, Academic Staff.

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on the countries amount to 1.3 of the total GDP (Santoso, 2020). The job stress can reduce the efficiency of the workers and increase the mental and physical illnesses among workers (Rowlinson et al., 2014). This affects some of the public health indicators of people involved in construction projects such as sleep disorders, smoking, family conflicts, constant nervousness of workers and increases occupational injuries (Hokmabadi et al., 2020).

The presented study attempted to investigate the job stress and worker's accidents relationship for a geotechnical project related to construction site in Zanjan. In this regard, the extensive field survey between 50 workers with a history of occupational accidents and 120 workers without accidents experiences on construction are conducted. The experiment was used the Belkic occupational stress index (BOSI) and general health (GHQ28) questionnaires as investigation principle which is recommended for evaluate the rate of job's stress regarding the health and safety executive unit of civil engineering department in Iran.

2. Material and Methods

This is a descriptive cross-sectional study is performed on 170 workers of a construction company in the field of excavation of a high-tech geotechnical construction project in Zanjan. Of these, 50 have a history of occupational injuries and the rest are inexperienced. Given that correlation studies require a minimum sample size of 50 people to express how the correlation (Dogan et al., 2021), the subjects were randomly selected due to the homogeneity of the population due to the availability of the list of individuals. In order to collect background information, a checklist whose validity was confirmed by occupational health professors was used. The questions in this checklist according to the objectives of the project include questions about age, marriage, education, smoking (smoking and hookah), history of chronic illness, residence in the workshop (accommodated in the project site), height and weight, amount of rest during the day, exercise, job-related activities and work experience. In this study, in order to assess the general health status, the 28-item and 56-item form of the health and the job stress questionnaires related to the GHQ28 and BOSI indexes have been used. Data were analyzed using Excel and SPSS software and chi-square tests were used to determine the difference in job stress in demographic groups. Odds ratio (OR) with 95% confidence limits (CI95%) is used to calculate the percentage of evaluation error. Cronbach's alpha test was also used to determine the internal validity of the relevant units. Findings were standardized based on marriage, education level, age and work experience and Mantel Anzel test was used. All questionnaires were randomly completed among the sample population and validated under the supervision of occupational health professors and HSE officials of the construction project.

3. Results and Discussions

In the subjects, the average age of the workers is estimated about 35.12 ± 3.7 year and 10.7 ± 2.5 year work experience of the year. Demographic information and study population characteristics are presented in Table 1. Statistically significant relationship between job scores, job-related variables, and job experience is obtained at a significant level of 0.05. Table 2 provides the relevant information about relationship between contextual variables and mean stress. As can be seen in this table, the relationship between job stress and effective variables are indicated that the time pressure, working with machines, interacting with colleagues, and environmental pressure is the significant impact of the job stress and related construction worker's accidents.

Table 1. Demographic characteristics of the study population

Parameter	Description	Frequency	Percentage
Age	30 > x year old	20	11.76
	30 - 40 year old	103	60.58
	40 - 50 year old	43	25.29
	x > 50 year old	4	2.35
Marriage status	Single	91	53.52
	Married	79	46.47
Education level	None	69	40.58
	Middle-school degree	65	38.23
	High-school degree	23	13.52
	Bachelor degree	10	5.88
Education related to the work	Master degree	3	1.76
	Have	13	7.64
Work experience	Have not	150	88.23
	Newcomer	7	4.11
Smoking	5 > x year	7	4.11
	5 - 10 year	138	81.17
	x > 10 year	25	14.70
Exercise	Have	117	68.82
	Have not	53	31.17
Time pressure	Have	36	21.17
	Have not	134	78.82
Working with machines	Effective	144	84.70
	Not effective	26	15.29
Environmental pressure	Have	146	85.88
	Have not	17	10.00
	Newcomer	7	4.11
Field work	Have	97	57.05
	Have not	80	47.05
Colleagues interacting	Stay in site	155	91.17
	Not stay in site	15	8.83
Project knowledge	Have	89	52.35
	Have not	81	47.64
Newcomer	Have	133	78.23
	Have not	30	17.64
	Newcomer	7	4.11

Table 2. Main statistical characteristics of the study population

Parameter	Max	Min	Ave.	Variance
Age	53	21	37	42.17
Work experience	13	0	6.5	25.25
Time pressure	30	7	18.5	37.01
Environmental pressure	7	1	4	11.00

Table 3. The OR rate with respect CI95% for study population

Parameter	Occupational accidents		OR (CI95%)	P-value
	With	Without		
Age	52.3	13.2	8.28	< 0.001
Marriage status	50.0	35.4	3.69	< 0.001
Education level	41.3	30.2	4.85	< 0.001
Education related to the work	40.0	17.2	2.20	< 0.001
Work experience	66.3	21.7	2.71	< 0.001
Smoking	20.7	12.0	2.57	< 0.001
Exercise	16.9	12.4	2.36	< 0.001
Time pressure	83.2	71.3	1.65	N.S
Working with machines	71.9	63.6	1.55	N.S
Environmental pressure	59.8	51.5	1.16	N.S
Field work	35.9	29.0	8.52	< 0.001
Colleagues interacting	65.0	55.1	1.25	N.S
Project knowledge	19.7	10.0	4.37	< 0.001

Based on each of the subscales of job stress, individuals were classified into four class of job stress as ‘very unfavorable’, ‘undesirable’, ‘desirable’ and ‘very desirable’. The percentage of frequency of people at different levels according to the subscales of job stress is shown in Fig. 1. Also, the general health status of the subjects according to the cut-off point of the questionnaires is shown in Figs. 2 and 3. In order to investigate the relationship between general health variable and independent qualitative and quantitative variables, chi-square test were used, respectively. Statistically, there is a significant relationship between the variables of general health with the variables of health and job stress, which is presented in Table 4.

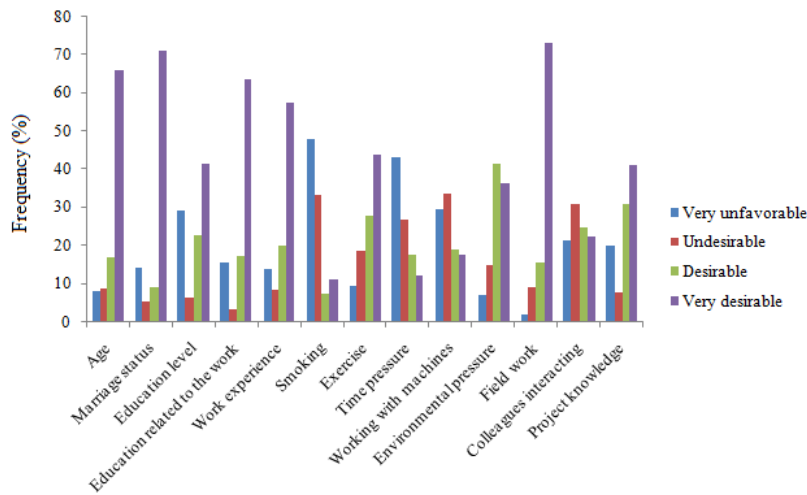


Figure 1. Frequency percentage of the study population based on job stress subscales

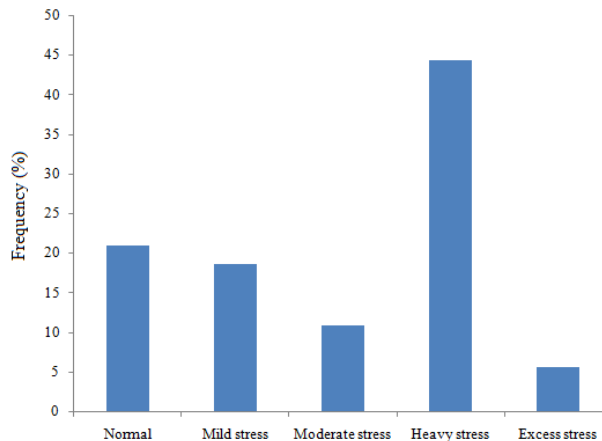


Figure 2. Frequency distribution of individuals in terms of general health

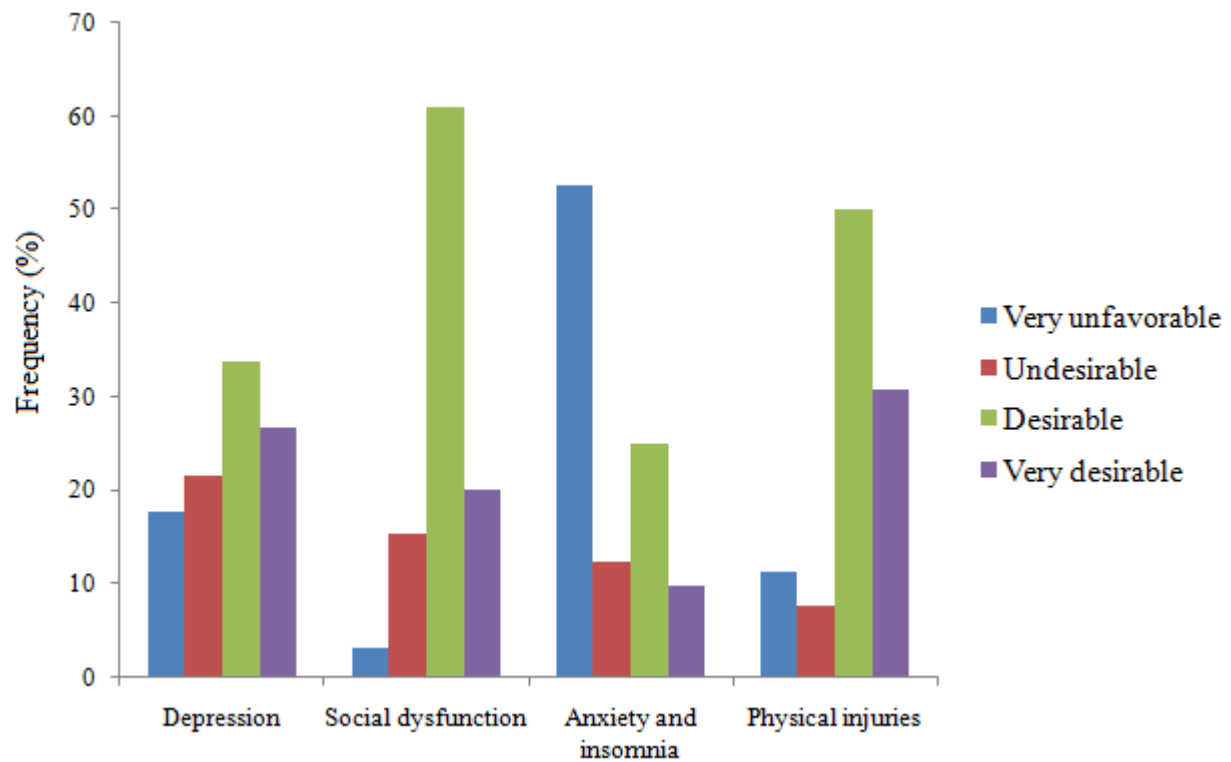


Figure 3. Frequency distribution of individuals in terms of general health level in the job stress's subscales

Table 4. The relationship between general health and quantitative variables

Index	Parameter	Body function	Rest time (hours)	Job stress	Distractions
BOSI	Normal	23.51 ± 1.7	8.25 ± 1.3	2.37 ± 0.3	24.45 ± 2.9
	Abnormal	25.11 ± 2.2	5.11 ± 1.0	3.98 ± 1.5	26.26 ± 3.7
	P-value	< 0.001	< 0.001	0.003	< 0.001
GHQ28	Normal	24.24 ± 2.6	7.53 ± 1.9	1.72 ± 0.7	22.01 ± 1.6
	Abnormal	27.65 ± 2.8	5.09 ± 0.7	2.44 ± 2.6	26.63 ± 4.1
	P-value	0.025	0.003	< 0.001	< 0.001

4. Conclusion

Job stress has been reported in high civil, geotechnical and construction projects. Also, job stress has a negative effect on the general health of workers in construction projects which lead to severe physical and mental injuries to construction workers. Considering such effective issue is lead to occurrence of the worker's accidents during construction projects which required priority attention to the prevalence of job stress. Studying the general health status of employees and job stress in the workplace can provide valuable information about the mental health status of employees and the hidden layers of the workplace. These results can be used effectively in adopting workplace risk control measures. The presented study attempted to provide an assessment for a construction project in Zanjan, regarding to the job stress and worker's accidents. In this regard, the comprehensive study was performed on 50 workers with a history of occupational accidents and 120

workers without accidents experiences. The main study population reaches 170 persons. To implementing the survey, there are several elements concluded age, marriage status, education level, education related to the work, work experience, smoking, exercise, time pressure, working with machines, environmental pressure, field work, colleagues interacting, and project knowledge which used as main assessment criteria. The 28-item and 56-item form GHQ28 and BOSI questionnaires indexes to investigate the health and the job stress have been used. Data analyzed by Excel and SPSS software and statistical approaches. Based on the studied results, the main job stressors are time pressure, working with machines, interacting with colleagues, and environmental pressure in a construction project.

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