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**Original Article**

# Predictive Power of Incidents Reporting Rate and Its Dimensions by Job Stress among Workers' Isfahan Steel Company

*F Kiani[1], H Samavatyan[1], S Pourabdian[2], E Jafari[3]

[1]Dept. of Psychology, School of Education Science & Psychology, University of Isfahan, Isfahan, Iran
[2]Dept. of Occupational Health, School of Health, Isfahan University of Medical Sciences, Isfahan, Iran
[3]Dept. of Education Sciences, School of Education Sciences & Psychology, University of Isfahan, Isfahan, Iran

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## Abstract

**Background:** There is long-term interest in the effects of stress on health, due to the strain that it places on individuals which can lead to an increased risk of disease. The present study examined degree of perceived job stress related to incidents reporting rate and its dimensions among workers' Isfahan Steel Company.

**Methods:** A self-administered anonymous was distributed to 189 workers. The survey included demographic factors, incidents reporting rate and its components (physical symptoms, psychological symptoms and accidents) and the Job Stress Questionnaire. The data were analyzed by multivariate (MANOVA) and correlation techniques.

**Results:** 1) there was internal significant correlation between perceived job stress with incident reporting rate as well as with its two components namely physical symptoms and psychological symptoms; 2) there was not a significant relationship between perceived job stress and accident; 2) In multivariate analysis, perceived job stress respectively about 12%, 18% and 19% of the variance of variables of incidents reporting rate, physical and psychological symptoms significantly predicted ($P< 0.05$).

**Conclusion:** Perceived job stress influences to physical and psychological symptoms. Therefore, decreasing job stress can be important to prevent the development of stress-related diseases and to promote workers health.

**Keywords:** *Perceived job stress, Incident reporting rate, Physical symptoms, Psychological symptoms, Accident*

## Introduction

The steel industry has one of the highest incidents of fatal and non-fatal accidents/injuries every year. As a high risk industry, there is a need to investigate factors that affect the occurrence of these accidents to be able to protect workers. At first it seems that the definition of occupational accident is necessary. Occupational accident is an unwanted event and unplanned that is associated with the work and caused by unsafe acts, unsafe conditions, or both and might lead to immediate unpleasant effect or delay it as well as caused a worker or a large number of workers are suffering illness or death (1-2). Occupational accidents are considered as one of the most important factors for disable and absenteeism workers. Since 1970 until now, the world's increasing efforts to prevent occupational accidents have performed, but yet rate of occupational accidents is high. Each year, almost 250 million occupational accidents are reported that are causing to injuring 160 million workers (3). Traditional methods to secure employees' safety have concentrated on the physical and biomechanical prospects of work by improving ma-

*Corresponding Author: Tel: +989368421990-+989132870656, E-mail: Fariba.Kiani64@google.com

chines, equipment and task completion manners (4). However, it is believed that Dimensions of psychosocial work environment such as stress as experienced by workers are related to depressive symptoms and poor health (5). There are many studies that show job stress is considered as strong predictor to control the occupational accidents. It is related to many problems such as occupational disease, musculoskeletal disorders and other health outcomes in work environment (6, 7). Many researchers observed significant relationship between the incident and employees stress levels (8, 9).

Stress, is a known expression, with multiple usages and referents, which is defined as "the nonspecific response of organism to any pressure or demand" by Selye (10, 11); a cognitive and physiological response to challenges and changes in life, which occurs when people feel that special circumstances have exceeded their existing coping resources or skills (12). When a job is stressful that its necessary requirements, such as a secure workplace or the correct equipment is not provided for arousing worker, and skills of the worker to meet the job requirements placed out of the job demands (13). A lot of work demands of the workers put a negative effect on the following level of safety procedures and cause that the workers deviate from considering safety standards (14). Studying relationship between job stress, occupational accidents and unsafe acts indicated that one percent increase in unsafe acts due to increase a score of job stress had increasing effect on incidents. So, changing job stress can be predicted risk of accidents in the workplace (15).

However, the association between job stress and reporting of occupational incidents has not been studied adequately. Previous studies have been mainly focused on particular jobs (16-20), and no attempt has been made to describe the association between job stress and occupational incidents among Steel industry workers. Also, less research has simultaneously focused on dimensions of occupational incidents namely physical symptoms, psychological symptoms and accidents. Therefore, we examined degrees of perceived job stress is associated with incidents reporting rate and its dimensions by distributing a self-administered questionnaire to workers in various departments of Isfahan Steel Company.

## Materials and Methods

### *Participants*

In the current study is used of a descriptive-correlation design. Workers (n=200) in Isfahan Steel company during January 2010, who were selected by stratified random sampling method as research sample, provided written informed consent to completion of a self-administered anonymous questionnaire. A total 189 (92%) workers returned the questionnaire.

### *Measurements*

After translation of questionnaires of job stress and incident reporting rate, the original English along with Persian versions were presented to three cases of faculty members of psychology department and 4 individuals of Safety and mental health professionals; thus, about 22 versions of each scale were represented to sample of workers and they were asked to opine about their questions and their reliability. After studying preliminary opinion, the final scales were developed and were individually presented to workers. The following questionnaire was used**:**

### *Demographic factors*

Five demographic factors, namely age, gender, marital status, education, and years of working experience, were included. Marital status was classified as married or not married (including divorced and widowed).

### *The perceived job stress (PSS)*

was measured by Perceived Job Stress Scale (PSS) of Cohen, Karmark, & Mcrmelstein (21), translated and validated in the Persian language. PSS is the most widely used psychological instrument for measuring the perceived stress. It

measures the degree to which situations in one's life are judged stressful. The items asked respondents how often find their lives unpredictable, uncontrollable, and overloaded (22). All the items we used modified to ensure that they were appropriate for the industrial context and were included a number of direct questions about the current levels of experienced job stress. A sample item is ''in the last month in work place, how often have you been angered because of things that were outside of your control.'' The PSS was designed for use in community samples with at least a junior high school education. The items grasp easily, and the response alternatives understand simply. Further, the queries are of a public nature and thus are relatively free of content specific to any subpopulation group. The questions in the PSS ask about feelings and thoughts during the last month. In each case, respondents are asked how often they felt a certain way. Scoring is based on a Likert scale of four degrees from 0 (never) to 4 (very often). This scale is having validity (reliability= .84, .85, .86 in three cases), high internal reliability (0.79= Cronbach's Alpha) and acceptable validity (23). Also, Demir and Orucu (24), in their study, mentioned the Cronbach's Alpha 0 .84 and its correlation with the questionnaire "Public Health" 0.61. In the current study, Cronbach's Alpha for the PSS was calculated 0.83.

### *Incident reporting rate*

This questionnaire is a tool for collecting data about reporting incidents rate of Barling, Loughlin, Kelloway (25) and it includes three components namely physical symptoms, psychological symptoms and accident. This questionnaire has high internal reliability (α Cronbach = 80% to 70%) and also a good validity (26). In the current research, internal reliability coefficients (α Cronbach) for the questionnaire and its components (physical symptoms, psychological symptoms and accident) were respectively calculated 0.83, 0.74, 0.72 and 0.80.

The questionnaires of perceived job stress and incidents reporting rate are represented in Table 1:

**Table 1:** Questionnaire (Adapted from references (21, 25)

| Incident Reporting Rate | In the last months, how frequently have you experienced these on the job? |
|---|---|
| **Physical Symptoms** | |
| Headache or dizziness | |
| Persistent fatigue | |
| Skin rash/burn | |
| Strain or sprain (e.g. back pain) | |
| Cut or puncture (open wound) | |
| Temporary Loss of hearing | |
| Eye injury | |
| Electrical shock | |
| Respiratory injuries (e.g. difficulty breathing) | |
| Dislocated/fracture bone | |
| Hernia | |
| **Psychological Symptoms** | |
| Loss much sleeps due to work related worries. | |
| Been unable to concentrate on work related tasks. | |
| Felt constantly under strain | |
| Felt incapable of making decisions. | |
| Been losing confidence in myself | |
| Been unable to enjoy my normal day-to-day activities. | |
| **Accident** | |
| Was exposed to chemicals such as gases and fumes. | |

**Table 1:** Continued…

| | |
|---|---|
| Over exerted myself while handing, lifting or carrying. | |
| Slipped, tripped or fell on the same level. | |
| Fell from height | |
| Was struck by a moving vehicle | |
| Was struck by flying/falling object(s) | |
| Struck against something fixed or stationary | |
| Was trapped by something collapsing, caving in or overturning | |
| Contacted moving machinery | |
| Other (Please specify) | |
| **Job Stress** | The questions in this scale ask you about your feelings and thoughts **during the last month**. |
| In the last month in work place, how often have you been upset because of something that happened unexpectedly? | |
| In the last month in workplace, how often have you felt that you were unable to control the important things in your life? | |
| In the last month in workplace, how often have you felt nervous and "stressed"? | |
| In the last month in workplace, how often have you felt confident about your ability to handle your personal problems? | |
| In the last month in workplace, how often have you felt that things were going your way? | |
| In the last month in workplace, how often have you found that you could not cope with all the things that you had to do? | |
| In the last month in workplace, how often have you been able to control irritations in your life? | |
| In the last month in workplace, how often have you felt that you were on top of things? | |
| In the last month in workplace, how often have you been angered because of things that were outside of your control? | |
| In the last month in workplace, how often have you felt difficulties were piling up so high that you could not overcome them? | |

All analyses were conducted using the SPSS program Version 15 and level of significances was set at %5.

## Results

### *Part I: Demographic characteristics of participants*

Almost the majority of participants were male because the main occupational groups were at production line in this study. Ages ranged from 18 to 53; the mean age of the participants was 39 yr (SD= 5.58 yr). Sixty two percent of the participants were high school graduates, 38% were university graduates. Eighty eight percent were married and 12% were unmarried. Almost half of the participants (42%) had been employed for more than 16 years, 28 Per cent were employed between 6 to 15 yr and 30 percent were employed for less than 6 years.

### *Part II: Descriptive statistics*

Mean, standard deviation and internal correlations of variables under study are presented in Table 2.

As can be seen the relationship between job stress with incident reporting rate and with whose two dimensions namely physical symptoms and psychological symptoms was significant ($P< 0.05$). There was not a significant relationship between perceived job stress and accidents.

### *Part III: Multivariate Analysis*

To assess predictive power incidents reporting rate and its dimensions by occupational stress were used of the canonical correlation method that is performed with multivariate analysis. The results are presented in Table 3.

As in Table 3 is observed, job stress variable predict almost %21 of variance of incidents reporting rate and its dimensions ($P< 0.01$). Univariate analysis of variance on the criterion variables considering predictor variable of occupational stress is presented in Table 4.

As can be seen job stress variable respectively about 12%, 18% and 19% of the variance of variables of incidents reporting rate, physical symptoms and psychological symptoms significantly predicted ($P< 0.5$). Also, job stress about %5 of the variance of accident predicted but these effects was not statistically significant. Relations between variables of this study are shown in Fig. 1.

**Table 2:** Mean, standard deviation variable and internal correlations under study

| | N | $\bar{X}$ | SD | Correlations | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | 1 | 2 | 3 | 4 | 5 |
| job stress | 189 | 26.73 | 5 .58 | 1 | | | | |
| Incident reporting rate | 189 | 43.26 | 11.07 | 0/31** | 1 | | | |
| Physical symptoms | 189 | 16.93 | 5 .02 | 0/23* | 0/88** | 1 | | |
| Psychological symptoms | 189 | 11. 1 | 4. 33 | 0/45** | 0/77** | 0/55** | 1 | |
| accident | 189 | 15.22 | 4. 31 | 0/08 | 0/76** | 0/50** | 0/32** | 1 |

∗*P*< 0/05, ∗∗*P*< 0/01

**Table 3:** Multivariate analysis (MANVOA) of the predictor variable of job stress based on the criterion variables of incidents reporting rate, physical symptoms, psychological symptoms and accident

| | Effect | value | F | df | Error df | Sig | Partial Eta Squared | Noncent. Parameter | Obseved Power |
|---|---|---|---|---|---|---|---|---|---|
| Stress | Pillai's Trace | 0.21 | 6.91 | 3 | 185 | .000 | 0.22 | 20.73 | 0.98 |
| | Wilk's Lambda | 0.78 | 6.91 | 3 | 185 | .000 | 0.22 | 20.73 | 0.98 |
| | Hotelling's Trace | 0.27 | 6.91 | 3 | 185 | .000 | 0.22 | 20.73 | 0.98 |
| | Roy's Largest Root | 0.27 | 6.91 | 3 | 185 | .000 | 0.22 | 20.73 | 0.98 |

**Table 4:** Univariate analysis of variance on scores of incidents reporting rates, physical and psychological symptoms according to predictive variable of job stress

| Dependent Variable | Sum of Squares | df | Mean Square | F | Sig. | Partial Eta Squared | Obseved Power |
|---|---|---|---|---|---|---|---|
| Physical symptoms | 226.88 | 1 | 226.88 | 9.99 | .002 | 0.12 | 0.88 |
| Psychological symptoms | 275.34 | 1 | 275.34 | 17.75 | .000 | 0.18 | 0.99 |
| accident | 125.93 | 1 | 125.93 | 7.30 | .068 | 0.054 | 0.68 |
| Incidents reporting rate | 1838.50 | 1 | 1838.50 | 18.26 | .000 | 0.19 | 0.99 |

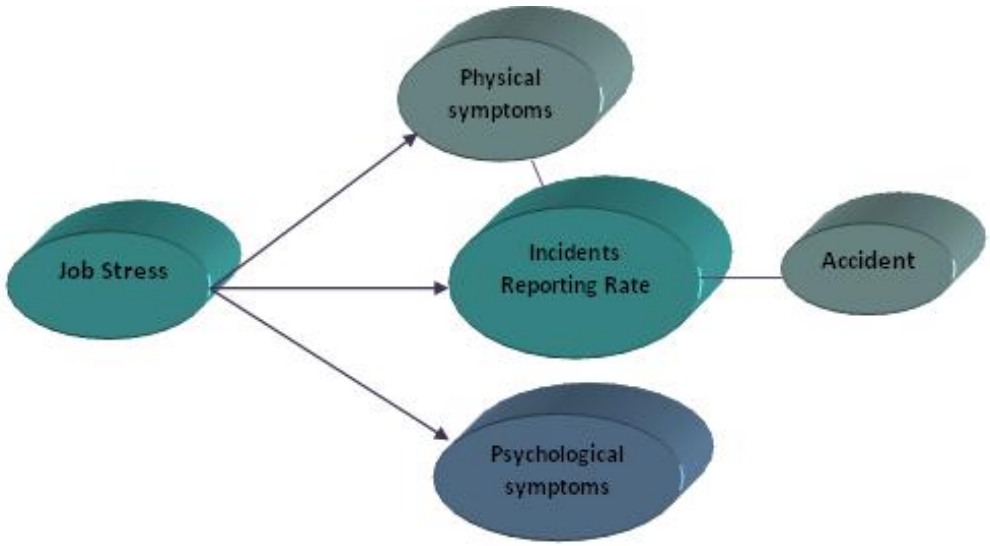


**Fig. 1:** Relationships between research variables

## Discussion

This study clarified associations of perceived job stress with incidents reporting rated and its dimensions among workers' Isfahan Steel Company whereas previous studies have mostly focused on other industries and services. Also, the current study assessed incidents reporting dimensions namely physical symptoms, psychological symptoms and accident in addition to incidents reporting generally. Our results indicated that incidents reporting rate and its two dimensions that are physical and psychological symptoms increased with job stress. In addition, no significant association was observed between job stress and accidents. Perceived job stress about 12%, 18% and 19% of the variance of variables of incidents reporting rate, physical and psychological symptoms significantly predicted. These results agree with previous studies. Nomura and et al. (27) concluded that reporting of physical and psychological increased with job stress. They noted that reporting somatic symptoms can be a powerful indicator of occupational stress. Kawano (28) indicated that in order to improve the physical and psychological health of nurse, occupational stress factors must be eliminated. Therefore, it will probably be useful in decreasing stress and associated outcomes by designing Interventions that address stressors and improve effective coping approaches (29).

About the existence of week relationship between job stress and accident can be said that in order to establish this relationship also should be other conditions Such as high-risk environments, unsafe equipment and machines, weak organizational support, risk taking, etc.

The strengths of this study included, first, that there is a great need for the accumulation of scientific research on the association between job stress and incidents, and our study provides evidence that job stress is of important in the etiology of physical and psychological symptoms. Indeed previous studies (30) indicated that physical symptoms such as Headache or dizziness, Persistent fatigue, Temporary Loss of hearing, and psychological symptoms such as depression and anxiety were significant risk factors for poor health at the workplace, and therefore, the results of the present study suggests that the reporting of physical and psychological symptoms by individuals workers might be a simple indicator of poor health. Albeit the discontents of physical and psychological symptoms are constantly recorded in check-ups, they have not been adequately studies for health care of workers in work environments (27).

Furthermore, this research has potential implications for design of coping strategies in work environments. Health intervention in additions to accidents should also to bring to account physical and psychological symptoms. With attention to these symptoms can get a deeper knowledge of current health state employees and can design interventions to cope with these symptoms.

In generalizing the analyses, we should consider several limitations of the results. First, the cross-sectional study design means the current results should be carefully interpreted. The causal relations between job stress and incidents reporting and its dimensions should be clarified by longitudinal study design. Second, this study was limited by the work environment. Future studies would be useful in determining if the association job stress and incidents reporting rate has applicability to other industries and countries. A large sample size would include a greater variety of industries would help answer this question. Third, both exposure to stress and the reporting of accident, physical and psychological symptoms were self-reported and more object measurements are need in futures studies. However, limitation is usually accepted due to the self report surveys are considered the most practical way to collect data and to reflect individual attitudes and behaviors. Also, It is suggested that

be used the ASSET questionnaire (31) for future research. The measure of stress is fairly new and uses much more recently than the current study scale.

In summary, our finding suggest that the reporting of incidents such as physical and psychological symptoms are simple indicators of job stress, and coping strategies can be used to alleviate this symptoms due to job stress. Also, we can say that in situations with high job stress, workers are suffered physical and mental illnesses and leads to their burnout during time; but because the job stress lead to accident, also should be other conditions such as risk conditions, low job control, high job pressure, and work overload, etc. In other words, job stress for the incident is a necessary condition but not enough. Therefore, job stress should be minimized to optimize the physical and mental health of workers.

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## Ethical Considerations

Ethical issues including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc. have been completely observed by the authors.

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