

ASSESSING STRESS AMONG THE WHITE AND BLUE COLLAR WORKERS AT THE ESFAHAN STEEL COMPANY, IRAN.

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Abstract- This study estimate the work place stress among the white and blue color workers at Esfahan Steel Company (ESCO), Iran. A cross-sectional study conducted at among workers at ESCO, Iran. The data about the stress level was collected using structured face to face interviews based on questionnaires using DASS21. A total 600workers were interviewed among the stratified randomly selected employees at ESCO. This study found that 93.2% of employees claimed that they have various level of stress.It was found that the economic problems were the most common reason for their stress (58.9 %), followed by task type (33.2 %), and work environment and Colleagues (29.8%) and (29%) in the research population. Remaining two factors Children's problems and Relatives account for (8.6%) stress. We have found that most of the participants in this study had different level of stress and main source of stress was economic problem followed by task type.

Key words: Occupational Stress, ESCO, white color, blue white color, Iran,

1. INTRODUCTION

Family and work are the two most important component of life, and same time these are the common sources of stress in one's life [1]. Stress is an unavoidable consequence of living, and is defined as a condition of strain that has a direct bearing on emotions, thought process and physical conditions of a person [2]. Workplace is stands out main source of stress due to amount of time is spent in the workplace setting [3], and can be defined as "the perception of a discrepancy between environmental demands (stressors) and individual capacities to fulfill these demands"[4]. Therefore occupational stress can be regarded as the inability to cope with the pressures on the job, because of a poor fit between someone's abilities and his/her work requirements and conditions [5]. There is considerable evidence that the occupational stress is widespread and can be the major cause of ill health among the workers at workplace. Stress at the workplace is associated with both mental and physical health in employees [6,7]. It is also linked to low job satisfaction, reduced productivity [8] and an increase in occupational accidents [9]. These negative consequences for employees affect the success of organizations and their competitive edge in the marketplace. In literature work force is divided into two distinct occupational groups, namely; white collar and Blue

Collar workers [10] White collar workers are the office workers, working mainly at management positions, whereas the blue collar workers work at the production line. Work-related stress was once thought of as occurring only in those who work in senior positions; it is now acknowledged that occupational stress can be experienced by employees at every level [11]. This study estimate the work place stress among the white and blue color workers at Esfahan Steel Company (ESCO), one of the biggest industrial installations in the Islamic Republic of Iran is located 45 km south-west of Esfahan at the Shahrekord road. This is a government-run factory and was established in 1965 and has produced steel since 1971, its range of productions was expanded in 2002, and now it is known as the most important complex of steel production in Iran. Total workforce at ESCO is about 6000, about 4000 are blue collar (mainly deals with operations and the manual job of steel production) and the rest of 2,000 are the white-collar workers (non-operational employees, who do the office work including managers)

II. MATERIALS AND METHODS

Study design and data collection process

A cross-sectional study was conducted among blue and white color workers at Esfahan Steel Company (ESCO), Iran.

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We utilized random sampling to account for a true representation of the whole population in terms of operational and non-operational unit employees. The data about the stress level was collected using structured face to face interviews based on questionnaires using The Depression, Anxiety, Stress Scale (DASS21). The study samples were chosen from the list of employees of each part of the company as follows: regarding the number of research sample, 400 employees of the operational unit and around 200 employees from non-operational unit were selected randomly. In other words, our sample is composed of 10% of each unit of this company. Before employees started to answer the questionnaire, the researcher explained about the project, the importance as well as the benefits of it for the community, and the significance of their cooperation and honesty in answering the question carefully. No financial incentives were offered to the participants, each interview took about 20 to 30 minutes to be completed. The interview carried by researchers.

Sample size

The sample size was determined on the basis of population proportion, using single proportion formula with 95% confidence coefficient [12]. In this formula, the prevalence of stress among operational employees (P_1) is estimated to be 49.5% [13]. And the prevalence of stress among non-operational employees was estimated 31.5% [14]. Thus, because of the 90% confidence coefficient, the z value is 1.96 and the sample size would be estimated to be composed of 428~430 respondents (from non-operational and operational unit). More specifically, we calculate the sample size by using *Epi Info* software (version 3.5.1, 2008) the sample size would be 551(171 employees from non-operational and 380 respondents from operational employees). However, if we increased the confidence level up to 95%, the desired population should be around 600 (In this study 664 questionnaire were distributed to ESCO's employees to find 600 complete questionnaire). In other words, our samples are equal to 10% of each unit (operational and non-operational) of this company. For selection, the first sample was chosen by using a random number (for example five) and then by continuing with 10 numbers (that is, 15) after the previous one (five). So by using this method, 400 samples from the operational unit and 200 samples from non-operational one were chosen. If any of the participants (for instance number 25) were unavailable for long term leave, an alternative neighboring number (for example 26) was used. Since the number of female workers was not noticeable (about 167 employees), the male candidates study were chosen for the study.

Study questionnaire

The Depression, Anxiety, Stress Scale (DASS21) questionnaire was used. The questionnaires originally in English then it was translated into Persian by using the back to back method by a group of professors in public health field at Shahr-E-Kord Medical University, Iran.

After that, in order to account for the accuracy of translation, the Persian version obtained from the first group was presented to a second group of professors for translating it back to English. Third, the Persian language version was reviewed and revised by the researcher on the basis of a deep literature review and his professional experience in the field. Finally, the Persian language version was used in the pilot study on a sample group of employees similar to those in the main studies. The results of pilot study were analyzed by using SPSS version 16 for determining the reliability of each variable by using alpha cronbach test.

Study location

This study was conducted at ESCO that is located somewhere near Esfahan (405km from Tehran) and has six units and approximately 6000 employees working in these units. Employees are mainly divided into two big categories: operational and non-operational. Operational employees are blue-collar workers who do the manual job of producing steel while non-operational employees are the white-collar workers who do the office work including managers. The main products of the factory are various models of steel, which supplies the need of Iran for steel. This government-run factory was established in 1965 and has produced steel since 1971, its range of productions was expanded in 2002, and now it is known as the most important complex of steel production in Iran.

Cut point

We used the Depression, Anxiety, Stress Scale (DASS21) questionnaire which is a shortened version of the full DASS consisting of 21 items querying the participant's feelings over the past week. All items are rated on a four-point scale, where 0 = did not apply to me and 3 = applied to me very much or most of the time. Scores are summed and the higher scores indicate severe levels of stress. For this publication we are presenting the results of the Stress component here and a cut-off point of 12 was used for categorization of stress in the subjects.

Ethical consideration

We have obtained ethical approval for this study proposal by the National University of Malaysia Medical Research and Ethics Committee, and this study was also approved and supervised by the head of the Research and Development Department of ESCO. Prior to data collection, all the participants were given information on the study and assured that all data is confidential and will only be analyzed as aggregates. All respondents signed the informed consent form before participation.

III. RESULTS

Table 1 shows the socio-demographic profile of the research population and the work related data collected from the research population.

TABLE 1. THE SOCIO-DEMOGRAPHIC PROFILE OF PARTICIPANTS (N=600)

Socio-demographic factors	N	%
Age group(years)		
<35 Young adult	265	44.2
35-45 Early middle age	272	45.3
>45 Late middle age	63	10.5
Mean age(years) \pm SD	36.47 \pm 7.39	
Marital status		
Single	82	13.7
Married (widow & divorced)	518	86.3
Education level		
Primary & Junior High school	76	12.7
High school	45	7.5
Diploma & associated degree	384	64
Bachelor and higher degree	95	15.8
Monthly income (USD)		
<600	223	37.2
\geq 600	377	62.8
Number of children		
0	142	23.7
01-Feb	335	55.8
\geq 3	123	20.5
Work Characteristics		
Non operational	200	33.3
Operational	400	66.7
Shift work		
Yes	285	47.5
No	315	52.5
Total years of work experience		
<5	129	21.5
05-Oct	116	19.3
>10	355	59.2
Mean years of work experience	13.02 \pm 7.6	
Range of experiences	Min	Max
	1	28

Majority (89.5%) of participant's age below 45 years old, more than 86 % were married with 1-2 children. About 64 % has diploma level education and more than 63 % earn more than 600 US\$ per month. Furthermore the table 1 also shows that almost 60 % of the workforce at ESCO interviewed has more than 10 years of experience with mean experience equals to 13.02 years. It should also be noted that 47.5 % of the employees were working in shifts.

Before using the DASS21 for estimating the stress level in the research population, we used Global Rating of stress to estimate the self-reported stress among the subjects. The self-reported assessment of stress is done by asking employees "If you do an assessment of yourself do you think you are stressful? If they answer yes, their conception or feeling had been categorized on a scale of 1 to 4 (Mild to Extreme).

TABLE 2. GLOBAL RATING OF STRESS AMONG WHITE AND BLUE COLOR WORKERS (N=600)

	Number	%
No stress	41	6.8
Mild stress	177	29.6
Moderate stress	276	46.0
Severe stress	86	14.3
Extreme stress	20	3.3

With the Global Rating of 41 employees (6.8%) reported that they do not have or did not experience stress. Whereas 93.2% of employees claimed that they have various levels of stress, 177 (29.6%) mentioned that they feel mild level of stress; 276

(46%) cited the moderate level of stress; 86 (14.3%) reported severe stress and 20 employees (3.3%) stated that they are extremely stressful.

We explore further the reasons for stress among the research subjects, and found that the economic problems were the most common reason for their stress (58.9 %), followed by task type (33.2 %), and work environment and Colleagues(29.8 %) and (29 %) in the research population. Remaining two factors Children’s problems and Relatives account for (8.6 %) stress.

Table 3 shows that the prevalence of stress was significantly higher among employees who earn less than six hundred US\$ per month (60.1%) as compare to those who make more than six hundred US\$ per month (50.7%) (p<0.02), the result has shown no statistical association between stress and other socio-demographic variables (p>0.05).

TABLE 3. PREVALENCE OF STRESS AMONG WHITE AND BLUE COLOR WORKERS (N=600)

	No stress N (%)	Stress N (%)	χ^2	p-value
Age groups (years)				
<35 Young adult	119(44.9)	146(55.1)		
35-45 Early middle age	132(48.5)	140(51.5)		
>45 Late middle age	24(38.1)	39(61.9)	2.4	0.3
Marital status				
Single	42(51.2)	40(48.8)		
Married	235(45.4)	283(54.6)	0.33	0.5
Educational level				
Primary& Junior high school	38(50.0)	38(50.0)		
High school	24(53.3)	21(46.7)		
Diploma & Associate degree	211(54.9)	173(45.1)		
Bachelor and higher graduates	52(54.7)	43(45.3)	0.65	0.8
Number of children				
No children	65(45.8)	77(54.2)		
1-2 children	152(45.4)	183(54.6)		
≥3 children	58(47.2)	65(52.8)	0.11	0.9
Income per month (US \$)				
<600	89(39.9)	134(60.1)		
≥600	186(49.3)	191(50.7)	5.0	0.02

Multivariate logistic regression was used to determine associated factors that were significantly contributing to stress. In order to explore which of the independents variables were important as predictors of occupational stress, standard regression analyses were undertaken with stress variables as the dependent variable and socio-demographic factors, job contents, coping and stress causes as the independent variables.

As it is shown in table 5, multivariate logistic regression analyses, employees with low income less than US\$ 600 per month (OR 0.428, 95% CI 0.284-0.644), behavior

Disengagement (OR 0.757, 95% CI 0.651–0.880), self-blame (OR 0.771, 95% CI 0.669-0.888), work environment (OR 0.424, 95% CI 0.257-0.700), emotional use (OR 0.796, 95% CI 0.687-0.922) and acceptance (OR 1.194, 95% CI 1.002-1.424), was significantly predicted stress. With the most important predictors according to Wald estimate, income (16.51), behavior disengagement (13.07), self-blame (12.93), work environment (11.23), emotional use (9.24) and acceptance (3.92) the total model was significant (p<0.0001) and accounted for 24% (Cox and Snell) to 33% (Nagelkerke) of the variance.

TABLE 4 REASONS OF STRESS AMONG THE WHITE AND BLUE COLOR WORKERS (N=600)

Reason of stress	No stress N (%)	Stress N (%)	χ^2	p-value
Task type				
Sometimes	156(40.4)	232(59.8)	19.9	0.001
Always	115(59.6)	78(40.2)		
Economical problem				
Sometimes	86(36.0)	153(64.0)	19.1	0.001
Always	156(45.6)	186(54.4)		
Colleagues				
Sometimes	185(44.9)	227(55.1)	2.08	0.14
Always	87(51.5)	82(48.5)		
Work environment				
Sometimes	155(38.0)	253(62.0)	42.8	0.001
Always	56(32.4)	117(67.6)		
Children's problem				
Sometimes	239(45.0)	292(55.0)	8.08	0.001
Always	33(66.0)	17(34.0)		
Relatives				
Sometimes	239(45.0)	292(55.0)	8.08	0.001
Always	33(66.0)	17(34.0)		

TABLE 5 MULTIVARIATE LOGISTIC REGRESSION ANALYSES

	β	S.E	Wald	Exp(β)	95.0% C.I.	P-value
Economy					0.284-0.644	0.001
Behavior disengagement	0.278	0.077	13.074	0.757	0.651-0.880	0.001
Self-blame	0.260	0.072	12.936	0.771	0.669-0.888	0.001
Work environment	0.858	0.256	11.234	0.424	0.257-0.700	0.001
Emotional use	0.228	0.075	9.243	0.796	0.687-0.922	0.002
Acceptance	0.178	0.090	3.927	1.194	1.002-1.424	0.048
Denial	0.129	0.078	2.740	0.879	0.754-1.024	0.098
Children problems	0.616	0.381	2.607	0.540	0.256-1.141	0.106
Positive	0.104	0.083	1.589	1.110	0.944-1.305	0.207
Job psychological	0.051	0.041	1.572	0.950	0.877-1.029	0.210
Self-distraction	0.047	0.071	0.448	0.954	0.831-1.095	0.503
Substance use	0.085	0.139	0.377	1.089	0.830-1.429	0.539
Venting	0.043	0.077	0.310	0.958	0.824-1.114	0.578
Humor	0.030	0.071	0.176	0.971	0.846-1.115	0.675
Task type	0.100	0.242	0.172	0.904	0.563-1.454	0.678
Religion	0.032	0.093	0.114	0.969	0.807-1.163	0.735
Constant	4.544	1.007	20.351	94.080		0.001

IV. DISCUSSION

The main aim of the study was to assess the prevalence of stress, and investigated the main causes of workplace stress within the industry. The participants were selected to participate based on their membership in the Steel Company, Iran (ESCO). The survey had a response rate of 90.4%. Participants had to consider themselves to be performing the job duties of ESCO's full-time at during the survey. In comparison with other studies [15,16] the response rate was higher. The entire sample was male; the distribution shows that the age of the respondents ranged between 20 to 58 and mean age of employees was 36.5 ± 7.4 years. This survey was carried out in order to enable the ESCO to understand the issue of occupational stress within the ESCO's employees more efficiently. A study by Marzabadi and Salimi [17] conducted among 252 Iran Air Force indicated that 67% of military personnel had severe stress. This study also observed participant self-image of stress and results show 99.6% of the participants have stress according to their own perception, in comparison to our study, which reports 93.2% it is higher, but it must be noted although the working environment in ESCO is hard and there are many reasons for stress, the stress level among workers in a steel manufacturing company should not be at the same level of a military base. This indicates that other factors are involved in stress among ESCO workers, factors which should be seen clearly in the qualitative section of our study. Apart from the hard work conditions in the factory issues like inflation, rise in food and basic need prices and uncertainty for the future of their children and also serious accommodation problems are factors which cause a dramatic stress increase. ESCO workers also expect a minimum payment to meet basic requirements and not cause additional stress. Nevertheless, the workers expect salaries in accordance to the hardship of their responsibilities and economical state of the society and less consideration about the future of their children. In fact, high stress levels in the society we observed is not only due to the working environment, but also due to other factors. The difference between our study and other studies conducted in Iran is clear. As an example, Raeissi [14] performed a study among 104 managers and matrons, 31.4% reported to have stress, which is in harmony with other countries. The results of this study state that among the socio-demographic factors for stress in the study only income counts as the most significant factor ($P < 0.02$), the results from this study is accordance with results from other studies like: [18,19,20] and their finding supports our results. Also the results from the study [21] which is a comparative study among American and Iranian managers shows that there is no significant relationship among socio-demographic factors such as age, college degree and marital status with stress. However, this result revealed significant relationship between stress and marital status of managers, in a way that married managers reported less stress compared to single managers. Furthermore, recently a study conducted by Crawford [22] using DASS in the UK shows that there is not a meaningful relation between socio-demographic factors and stress and states that the influence of these factors can be regarded as negligible.

It should be mentioned that studies conducted in Iran imply different results, as an example Kalagary et al [23]

which was performed in Gorgan region of Iran (among 104 of hospital employees), concludes that age and stress do have a significant relationship, but no significant relationship could be concluded for factors such as education level and marital status. Also Yazdi et al [24] which was performed across sectional study among 155 workers of Tehran firefighters reveals a significant relationship between stress levels and age and as the fire fighters got older stress levels show a decline. Moreover, Halvaey et al [25] conducted a study among Iran Iron Ore workers, which conclude a significant relationship between age and depression, which is in compliance to results obtained from this study like other studies. However, results from Halvaey et al [25] regarding a significant relationship between salaries and depression levels of Iran Iron Ore Company are negative, whereas in our studied have come up with an extremely significant and relationship between stress and salary. Furthermore, findings from our study show an extremely significant relationship of stress with task type, economical problems, work environment problems, children's problems and relative's problems and the only factor not having meaningful relation with stress is colleagues, this results similar with earlier study stress among the white color workers in the factory [26]. Results from our study regarding the influence and effect of financial factors and their effect on stress are also in accordance with finding from previous studies by Roohafza et al [27] Salehi et al [28] which were both conducted in Esfahan, and covers the same geographical location as ESCO. These similarities will cover for similar environmental, social, economic and cultural factors as well.

In addition, results from the study by Salehi and his colleagues [29] regarding worries for occupational outlook are supporting results of our study and his study young people expressed their worries for their occupational outlook whereas in our study this worry was expressed by parents regarding their children. In his conclusion, he stated that among the young people studied within Esfahan region the most important stressor is their worries about their occupational outlook. Furthermore, Roohafza et al [27] mentioned the following factors as main stressor. Rise in living costs (financial), financial debt and insufficient income, worries and feeling of insecurity regarding the future, social insecurity, feeling lonesome, lagging in comparison to friends and family and worries about the future of their job. By counting these factors as the main stressors, he concludes that, the most prevalent stressor included economical, social and job related issues and the most severe were death, family related and economical events. This classification for stressors and their results are in complete compliance with our study and these two studies support each other. Moreover, findings from Maslach and Schaufeli [29] and also Dollard [30] with respect to work environment factors and environmental factors which support findings from this study are to be considered. Additionally, the interconnection between family affairs with working affairs also family expectations are one of the main reason for stress. The family affairs has a significant role in raising stress among the studied population ($p < 0.04$) these result is supported by the Crouter and Bumpus result [31], besides, the researches like Crouter and Bumpus reveals an obvious interconnection between family affairs and stress and status

the negative impact of stress on increasing the family problems.

V. CONCLUSION

The study illustrated that there is an association between the outcomes of various work-related, Socio-demographic characteristics and the level of work-related stress among ESCO employees. The analytic showed that economic problems and work characteristics (work environment and task type) play the essential role in employees' stress. The relationship of specific outcomes of the logistic regression and other analysis provided useful insights into the issue of the stress in ESCO. These considerations support the probability that different factors at the work affect the stress. To manage stress the management should review the current detailed assessment of the significant stressors and a strategy should be devised to reduce the negative impact of the majority significant stressors. In addition, a stress prevention plan should be improved and made available for all employees. An external consultant with skills and expertise could be used to develop and implement this programme at ESCO.

VI. ACKNOWLEDGMENT

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