Research Paper:
The Relationship Between Different Dimensions of Occupational Stress and Resilience Levels in the Employees of an Oil Refinery

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ABSTRACT

Background & Aims of the Study: Occupational stress is a psychological condition that occurs due to an imbalance between occupational needs and individual abilities. Resilience is an approach to cope with occupational stress. This study aimed to investigate the relationship between different dimensions of occupational stress and the level of resilience in the employees of an oil refinery.

Materials and Methods: This descriptive-analytical study was performed on 275 operational staff of an oil refinery in southern Iran in 2020. The study participants were selected using a simple random sampling method. Due to the Coronavirus Disease 2019 (COVID-19) pandemic, the tools used included three electronic questionnaires, demographic information, Osipow occupational stress questionnaire, and the Connor- Davidson Resilience Scale. The collected data were analyzed in SPSS v. 22 using descriptive tests, Pearson correlation test, one-way Analysis of Variance (ANOVA), and linear regression analysis.

Results: The Pearson correlation test data indicated that different dimensions of occupational stress, including occupational scope, responsibility, and physical environment, also, the total score of occupational stress, have a significant negative correlation with the resilience score of individuals. The highest correlation concerned the physical environment dimension, with a coefficient of -0.189.

Conclusion: We can increase employees' resilience by improving the working environment and raising people's awareness of occupational responsibility; it can reduce occupational stress among employees.

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1. Introduction

Occupational stress is among the critical risk factors for human health over the past decades [1]. In defining, occupational stress is a harmful and emotional reaction that occurs in the absence of occupational requirements with individual abilities [2]. Based on previous studies, occupational stress is significantly associated with mental illness, musculoskeletal disorders, reduced employee productivity, and blood pressure [3]. The World Health Organization (WHO) has also estimated that mental illnesses, including stress, will be the second cause of disabilities by 2021 [4]. There is occupational stress in many businesses, and numerous individuals have experienced stress. According to the statistics, approximately 30% of the staff of developing countries are exposed to occupational stress [5]. According to these materials, occupational stress was always an essential concern for employers and employees in any industry. It can affect the performance of employees and, while reducing employee performance, minimize the individual's decision-making [6].

A critical industry that employees are exposed to occupational stress is the oil and gas industry. Jin et al. considered occupational stress and occupational satisfaction on 78 managers and 80 engineers in the Indian oil company. They found that high stress leads to reduced occupational satisfaction [7]. Morvati et al. (2018) determined the prevalence of depression, anxiety, and stress among petrochemical workers in Assaluyeh port and reported a stress rate of 29.34% [8]. Furthermore, the rate of depression, anxiety, and stress in one of the Iranian oil industries has been reported as 43% [9]. Literature suggests that the cause of the relatively high prevalence of occupational stress in this industry is fire and explosion, electrical hazards, working in adverse weather conditions, loud noise, long stays alone in the workplace, and conflicts with colleagues.

There are various strategies for preventing and inhibiting occupational stress. One approach to prevent and manage occupational stress is organizational change. Organizational change involves ensuring that workloads conform to workers 'abilities and precisely define workers' duties and responsibilities. Another effective strategy in confronting stress is increased resilience [10]. Resilience is a positive feeling that can increase the ability of employees to cope with adverse conditions such as occupational stress, workload aggravation, and organizational change and lead to the improvement of pathogenic disorders [7, 11]. Resilience is defined as an individual's confidence in their ability to cope with stress and to have the ability to manage emotional instability. It is a parameter that can reduce the adverse consequences of many physical and mental problems and illnesses [10, 11]. In other words, resilience is a dynamic process that adapts to unfavorable and sad conditions [12]. In 2015, Wood et al. addressed an increase in resilience as a factor in coping with stressful situations and increasing individuals' morale and mental and physical health [13]. Moreover, according to Ghandi et al. (2017), resilience has a positive and significant effect on occupational satisfaction, and its impact on occupational stress is harmful and effective [14].

Studies on the relationship between different dimensions of occupational stress and resilience among oil refinery employees are scarce. Numerous employees are working in the Iranian oil industry, i.e., a large share in the country's economy. Maintaining the biopsychological health of its employees as the industry's main assets, especially in the difficult days of dealing with the epidemic of coronary disease and its possible adverse effects such as increased stress, is crucial. Considering the positive role of increasing resilience as a possible solution to manage the condition, the present study investigated the relationship between different dimensions of occupational stress and resilience in an oil refinery in southern Iran.

2. Materials and Methods

This descriptive cross-sectional study was conducted in 2020 in one oil refinery located in southern Iran. The study participants were selected using a simple random sampling method based on the study's inclusion criteria. The inclusion criteria of the study were having more than one year of experience in the oil refinery, not having chronic diseases, such as cancer, diabetes, AIDS, cardiovascular disease, and MS, not having mental disorders, such as depression, schizophrenia, not taking psychiatric drugs and no substance use disorders. The exclusion criteria included unwillingness to participate in the study, not cooperating to complete the questionnaires, and completing the questionnaires randomly and inappropriately. Initially, a list of employed persons was prepared; 400 subjects were randomly selected. Then, the medical records of these groups were studied. Subsequently, those who did not meet the inclusion criteria were excluded from the study. Eventually, 350 subjects remained in the study. Due to the prevalence of Covid-19 disease and to comply with health protocols and maintain the health of participants and the research team to collect data.

The study's steps and objectives were explained to them invited them to participate. The questionnaires were provided electronically via email and social media to those who agreed, along with a guide to completing them and study objectives. A telephone number was also provided for participants to contact the research team to guide them about possible problems when completing the questionnaires. Individuals were given 15 days to complete the questionnaires and submit them electronically to the research team. After two weeks, those who did not complete the questionnaires were contacted, and those who did not want to continue participating in the study were excluded. The questionnaire response rate was 78%, with 275 people completing and submitting the questionnaire. In this study, three questionnaires were used to collect information, including demographic information questionnaire, occupational stress questionnaire, and resilience questionnaire mentioned below:

Demographic Data Questionnaire: The questionnaire included general information such as age, work experience, occupational status, place of work, level of education, shift status, and history of being infected with coronavirus by themselves or those around them, which individuals were requested to answer.

Osipow Occupational Stress Questionnaire: The Osipow Occupational Stress Questionnaire consists of 60 questions that assess the 6 dimensions of role workload, role incompetence, role duality, role scope, responsibility, and physical environment by ten questions. The Osipow Occupational Stress Questionnaire score is based on a 5-point Likert-type scale. The scores range between 60 and 300, and higher scores indicate higher stress levels. The extent of general stress is divided into 4 categories, as follows: low stress (50-99 points), low to medium stress (100-149), moderate to severe stress (150-199), and extreme stress (200-250) [15]. Sharifian et al. evaluated the validity and reliability of the Persian version of this questionnaire and calculated and reported Cronbach's alpha coefficient of 0.83 [16].

CD-RSC Resilience Questionnaire: The Connor-Davidson Resilience Questionnaire consists of 25 items. Scoring in this questionnaire is based on the Likert-type scale (completely incorrect 0 scores, rarely 1 score, sometimes correct 2 scores, often accurate 3 scores, always correct 4 scores). The minimum score is 0, and the maximum is 100. A score above 50 will indicate resilience, and the higher the score, the higher the individual's resilience. The reliability of this questionnaire has been reported to be 0.89 [17]. Samani et al. In 2007, did the reliability of the Persian version of this questionnaire [18].

First, the obtained data were entered into SPSS v.22 for analysis. Then, the normality of the variables was investigated using skewness and curvature curves. Moreover, the results revealed that the model variables have a normal distribution. Therefore, a one-way Analysis of Variance (ANOVA) was used to compare the mean score of occupational stress and resilience between different groups. The Pearson test was used to examine the correlation between the studied variables. Linear regression modeling was also used to predict resilience scores based on occupational stress dimensions (Figure 1).

3. Results

The Mean±SD age of the study participants was calculated as 43.26±9.44 years. Table 1 demonstrates the statistical distribution of other demographic characteristics of the participants. According to the collected results, most study participants were over 40 years of age. They had more than 20 years of work experience, diploma and undergraduate education level, and shift work.

Table 2 lists the Mean±SD values of occupational stress and its different dimensions and resilience. The relevant results indicated that the Mean±SD total occupational stress and resilience scores were measured as 47.86±107.4 and 20.95±78.56, respectively.

The one-way ANOVA data revealed that the mean of occupational stress in office workers and day workers was significantly lower than the group of operational and shifted workers ($P<0.05$). However, no significant relationship was observed between occupational stress and age, refinery employment history, and education level variables ($P<0.05$). Furthermore, the results of this test suggested that in the occupational group of day workers, with increasing age and employment history in the refinery, the mean score of resilience score is significantly higher than the occupational group of shift workers, low age and employment history in the refinery ($P<0.05$). However, the mean resilience score in different education level groups and work shift variables did not show a significant relationship ($P<0.05$). Table 3 lists the correlation matrix of the studied variables. The results of the Pearson correlation demonstrated that different dimensions of occupational stress, including occupational scope, responsibility, and physical environment, and the total score of occupational stress with the resilience score of individuals have a negative correlation. Thus, the highest correlation was related to the physical environment with a coefficient of -0.189.

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Table 1. Statistical distribution of demographic and occupational characteristics of the study participants

Variables		Frequency	Relative Frequency
Age (y)	<30	31	11.3
	30-40	53	19.3
	40-50	100	36.4
	>50	91	33.1
Employment history in oil refinery by year	<10	31	11.3
	10-20	53	19.3
	20- 30	100	36.4
	>30	91	33.1
Level of education	Diploma	104	37.8
	Associate diploma	94	34.2
	Bachelor's degree & higher	77	28.0
Shift work	Shift work	154	56.0
	Day work	121	44.0
Type of occupation	Operational	142	51.63
	Official	133	48.36

To predict the resilience score based on the dimensions of occupational stress, linear regression modeling was used (Table 4). The regression coefficient (R^2) and adjusted regression coefficient (Adjusted R^2) were calculated to be 0.066 and 0.045, indicating that working stress dimensions can predict 4.5% resiliency changes.

However, there are various influential variables on resilience, one of which is occupational stress, and therefore the results are logical. The results showed that resilience could be significantly predicted by the variables of workload, occupational scope, and responsibility, which is negatively related to workload and occupational capac-

Table 2. Mean±SD scores of resilience variable and occupational stress variable and its different dimensions

Variables		Mean±SD
Occupational stress	Role workload	16.98±9.71
	Role incompetence	16.02±9.19
	Role duality	15.65±9.55
	Role constraints	15.51±8.66
	Responsibility	19.48±11.94
	The physical environment	23.09±13.02
	Total stress	107.40±47.86
Resilience		95.20±56.78

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Table 3. Correlation matrix of the studied variables

	Variables	1	2	3	4	5	6	7
1	Role workload	-						
2	Role incompetence	0.512**	-					
3	Role duality	0.567**	0.552**	-				
4	Role constraints	0.471**	0.429**	0.569**	-			
5	Responsibility	0.426**	0.394**	0.422**	0.534**	-		
6	The physical environment	0.509**	0.394**	0.389**	0.544**	0.727**	-	
7	Total stress	0.747**	0.676**	0.720**	0.748**	0.791**	0.808**	-
8	Resilience	-0.027	-0.031	-0.043	-0.159**	-0.122*	-0.189*	-0.121*

* $P<0.05$; ** $P<0.01$.

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Table 4. Results of linear regression modeling to predict resilience score based on occupational stress dimensions

Predicted Variables	B	SE	Beta Coefficient	t	P
Constant	83.509	3.076	-	27.145	<0.001
Role workload	-0.366	0.172	-0.169	-2.127	0.034
Role incompetence	-0.025	0.171	-0.011	-0.147	0.884
Role duality	-0.056	0.182	-0.026	-0.301	0.757
Role constraints	-0.373	0.195	-0.154	-1.912	0.057
Responsibility	-0.370	0.157	-0.211	-2.351	0.019
Physical environment	-0.024	0.148	-0.015	-0.160	0.873

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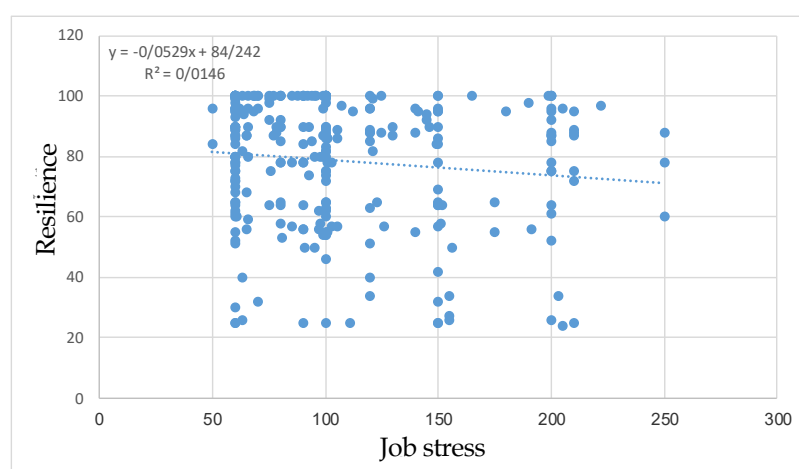Qom University of Medical Sciences

Figure 1. Linear regression curve between the total occupational stress score and resilience

The results show a regression coefficient of 0.0146 between occupational stress and resilience.

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ity and accountability. Based on these results, the following equation can predict resilience (Equation 1).

1. *Resilience=83.509-0.336 X1-0.373 X2-0.370 X3*

In this equation, X1 is workload, X2 is the occupational scope, and X3 is responsibility.

4. Discussion

This study aimed to investigate the relationship between occupational stress and the resilience of operating staff of an oil refinery located in southern Iran. To determine demographic characteristics, occupational stress, and employee resilience, the demographic questionnaire, the Osipow, and the Connor resilience questionnaire were used, respectively. Findings showed that the mean of occupational stress in different occupational types and work shift variables was significantly different. However, no significant relationship was observed between occupational stress and age, work experience in the oil refinery, and education level.

A study conducted by Shatti et al. In 2017 argued that occupational stress in operational staff is significantly higher than in-office staff [19]. Ma et al. And Cho et al. reported similar results in their studies [20, 21]. This significant difference can be stated that shift workers are exposed to adverse effects due to prolonged and irregular working hours such as decreased sleep quality, increased anxiety levels, and increased fatigue and circadian rhythm disturbances. Therefore, occupational and workload needs in these groups are increased compared to day workers and are exposed to higher levels of occupational stress. Other findings of the present study revealed no significant relationship between the mean stress score and the age of participants in the study. This is consistent with the results of Lambert et al. [22]. There was also no significant relationship between the mean score of occupational stress with the variable of employment experience in the refinery, i.e., consistent with the study results of Faraji et al. [23]. Other findings related to occupational stress score in this study indicated no significant relationship between occupational stress and education level, i.e., consistent with the results of previous studies but not with the findings of Godin et al. [24]. This difference could be due to the difference in the target population between the two studies.

Other results outlined that the mean resilience scores in different variables were significantly different in age, refinery employment history, and occupation type. A 2010 study by Margaret Wells of 277 subjects aged 65

and over found that as people got older, their resilience increased [25]. This finding is consistent with the present study results, which were performed in the context of the COVID-19 pandemic. Furthermore, in a 2013 study by Shaul and Yohanan that focused on social and national resilience backgrounds. [26], the results demonstrated a positive correlation between age and resilience.

Explaining this finding, it can be argued that older people with more work experience working in oil refineries often work in supervisory positions and as supervisors. In addition, older people with higher work and social understanding can help them cope with everyday stressful situations. However, in the present study, the mean resilience score in different education level groups and work shift variables did not show a significant relationship. In the study of Ang et al., i.e., reported in 2018, there was a significant relationship between age and education with resilience. Individuals with higher education had more resilience, which contradicts the results of the present study [27]. The discrepancy between the study results and the present study could be due to the heterogeneity of the statistical population, their place of work, and the absence of an epidemic of Covid-19 disease at the time of the Ang study. The correlation test results showed a negative correlation between the two variables of occupational stress and resilience, which is consistent with the survey results of Mousavi et al. [28]. The research findings also showed that different dimensions of occupational stress affect the resilience of oil refinery employees, and the most impact is related to physical and personal factors. Employees working in the oil refinery are exposed to occupational stress due to loud noise, chemical agents, and a shift system.

Moreover, the prevalence of COVID-19 as an aggravating factor seems to increase the role of the physical environment in the workplace in increasing the risk of occupational stress among oil refinery employees [29]. This study was performed only on male refinery employees, so gender on occupational stress and resilience was not considered. Therefore, for future studies, it is suggested that this study be repeated with larger sample size, taking into account gender and its results compared with the present study.

5. Conclusion

The collected results indicated that employees working in oil refineries experience different levels of occupational stress. Therefore, increasing the resilience of employees working in the refinery is recommended as a control measure to prevent occupational stress and

reduce the negative consequences. The most crucial factor in increasing employees' resilience is the individual's amount of knowledge and awareness about his occupational responsibility. Having enough time to perform tasks and manage time can also be effective. Furthermore, if positive social interactions with colleagues strengthen them to control occupational stress, resilience can be achieved. One of the most important social factors is group participation and mutual understanding of employees, which manages occupational stress through behaviors, such as helping a colleague in the event of a problem, creating psychological security in the workplace, and finally bears the pressures of the workplace.

Ethical Considerations

Compliance with ethical guidelines

This study was approved by the Ethics Committee of the Ahvaz Jundishapur University of Medical Sciences (Code: IR.AJUMS.REC.1399.64).

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Authors' contributions

All authors equally contributed to preparing this article.

Conflict of interest

The authors declared no conflicts of interest.

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