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Predicting preventive behaviors of cardiovascular disease among oil industry workers based on health belief model

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Abstract:

BACKGROUND: Working conditions play a significant role in the process that causes cardiovascular disease. In this regard, it is required to monitor the health conditions of workers to design proper interventions to encourage healthy behaviors. This investigation was performed to determine preventive behaviors against cardiovascular disease based on the health belief model (HBM).

MATERIALS AND METHODS: This research was a cross-sectional and descriptive study with 228 subjects of oil industry workers under shift work schedules in the oil regions of Khuzestan, Iran. The HBM questionnaire provided the theoretical framework for this study. Participants completed the questionnaires in person at work. Data were analyzed using SPSS 24.0. Descriptive statistics including frequencies, percentages, and means, and linear regression analysis were calculated for variables.

RESULTS: Findings of the study showed that most workers were of a weak level of knowledge (55.3%), self-efficacy (82.5%), perceived severity (83.8%), perceived susceptibility (75.4%), perceived benefit (57.5%), and behavior (82.5%). Furthermore, results showed that most of the workers considered smoking (3.51 out of 5) and proper diet for good heart function (2.54 out of 5). In this study, the item of exercise was the lowest among all the preventive behaviors (1.39 out of 5). Self-efficacy was the strongest predictor of health belief about cardiovascular disease.

CONCLUSION: To decrease the increasing burden of cardiovascular disease in our population, and fight against this rank-one killer, multiple useful prevention strategies must be adopted. Educational theory-based interventions and applying designed programs to improve the adoption of preventive behaviors are a necessity.

Keywords:

Cardiovascular disease, health belief model, oil industry workers

Introduction

Cardiovascular diseases (CVDs) are the leading reason for worldwide death, and more people die from CVDs than from other diseases.^[1,2] Behavioral risk factors of CVDs (modifiable factors) such as physical inactivity, tobacco exposure, stress, unhealthy diets, high cholesterol, and high blood pressure are responsible for more than 90% CVDs.^[3]

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Working conditions play a significant role in the process that causes CVDs.^[4] In Iran, a significant part of the manpower of the national Iranian oil company are shift workers (who often work 14 days in a row, 12 h daily, and then 14 days off) in remote areas, and more than half of them reported working longer than the usual 84 h per week. Investigations carried out within the oil industries acknowledge that the socialization and behavioral patterns used by workers together with physical stressors such as

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extreme temperatures, poor air quality, noise, hazardous chemicals, and heavy work tasks can affect workers' health and can act as CVDs' risk factors.^[5] Some researches showed how the majority of individuals working in the petroleum industries have an increased CVD risk and this subject modifies workers' life quality.^[5] In this regard, it is required to monitor the health conditions of workers to design proper interventions to encourage healthy behaviors.

Affecting agents on the preventive behaviors against the disease should be recognized to control disease and find preventive actions.^[6] Moreover, evidence indicates that recognizing protective determinants needs the usage of theories and designs of behavior change.^[6,7] Several theories have been suggested to recognize factors affecting changes in behaviors. The health belief model (HBM) is one of the preventive models applied to investigate problems of public health.^[6] The widespread acceptance of HBM is because of its great power of predictive.^[7] HBM contributes to multiple health promotion behaviors such as nutritional education, stopping smoking, breast self-examination, and CVD prevention occurrence.^[7,8] The main sense of the HBM is that health behaviors are assessed by personal perception and belief about diseases and the strategies to decrease their occurrence.^[9] Perceived benefits, perceived barriers, perceived susceptibility, perceived severity, and self-efficacy are the main constructs of HBM.^[10]

To our knowledge, unfortunately, in the field of recognizing CVDs among onshore workers under shift work schedules in oil areas, no significant study has been done. This research aimed to determine the preventive behaviors against CVDs based on HBM among onshore oil industry workers.

Materials and Methods

Study design and setting

This cross-sectional study was conducted on 228 onshore workers under shift work schedule (14 days in a row, 12 h daily, and then 14 days off) in the oil fields of southern Iran.

Study participants and sampling

In total, 228 workers were chosen via simple random sampling by using the list of workers. The criteria for entering the study included not being diagnosed with CVDs and affirming consent to take part in the study. Exclusion criteria contained the participation reluctance in research and incomplete questionnaire answers.

Data collection tool and technique

Demographics

Information was collected regarding age, marital status, level of education (Diploma, Associate degree, Bachelor science, Master science), and years of working.

HBM scale

HBM questionnaire provided the theoretical framework for this study whose validity was affirmed by Sharifzadeh *et al.*^[11] Examination of the test-retest reliability of the scale showed that it was stable over a 2-week period in 30 workers. The range of the coefficient of Cronbach alpha for the constructs was 0.65–0.86. HBM subscales included self-efficacy: six items (e.g., "I can do physical activity at least 30 min three times a week"); perceived benefits, seven items (e.g., "I believe that attention to the CVDs principles prevention is helpful in protecting health"); perceived barriers: six items (e.g., "I cannot provide fruits and vegetables because of their high prices"); perceived susceptibility: four items (e.g., "I am at risk of CVDs"); and perceived severity: six items (e.g., "If I get CVDs, I will die"). A 5-point Likert scale from strongly disagree (1 point) to strongly agree (5 points) was used to score the items. Scores less than 50% of the total score were assumed weak, between 50% and 75% were assumed moderate, and greater than 75% were assumed good. Moreover, a 38-item questionnaire of heart disease knowledge was used; its items were assessed by "I do not know," "Yes," and "No" templates.^[11] The questions of preventive behaviors were about appropriate diet (low calorie, low fat, low salt, and consumption daily of fruits and vegetables), exercise three times a week for 30 min, blood pressure control, smoking refrainment, and regular tests of blood cholesterol and sugar.^[11] The answers included "never," "rarely," "sometimes," "often," and "always."

Analysis

Data analyses were done using SPSS 24.0. Kolmogorov–Smirnov test was used to evaluate the normality of the knowledge data as well as the constructs of HBM. Descriptive statistics, including frequencies, percentages, and means, were calculated for variables. Linear regression was calculated with knowledge and HBM scores. An alpha level of 0.05 was set to assess the statistical significance levels.

Ethical consideration

After getting ethical approval from Mashhad University of medical sciences (Number: IR.MUMS.REC.1400.110), the research purpose and methods were explained, and written consent from workers was taken.

Results

The mean age of workers was 40.60 ± 5.37 years. While 128 (56.1%) workers were married, 100 (43.9%) were single. In terms of education, 22 (9.6%) were diploma holders, 52 (22.8%) were associate degree holders, 103 (45.2%) were bachelors of Science, and 51 (22.4%) were masters of science. The mean working experience was 10.81 ± 3.85 years.

Table 1 shows the quality levels of the scores of knowledge and HBM constructs. Mean scores of knowledge were 15.77, perceived susceptibility: 6.56 ± 2.98 , perceived severity: 9.48, perceived benefits: 17.12, perceived barrier: 22.23, perceived self-efficacy: 13.17, and behaviors: 10.93.

The mean and standard deviation of scores of preventive behaviors are shown in Table 2. These data revealed that most of the workers considered smoking (3.51 ± 0.92) as a CVD risk factor and appropriate diet for good function of the heart (low-fat, low-salt, low-calorie, fruits and vegetables, 3–5 servings per day) (2.54 ± 0.73), respectively. The mean score for appropriate exercise (3 times a week, 30 min a session) was the lowest among all the preventive behaviors (1.39 ± 0.52).

Linear regression analysis showed that self-efficacy (β standard: 0.39) and perceived barrier (β standard: 0.28) had the greatest effect on behaviors, respectively ($P \leq 0.001$) [Table 3]. Perceived susceptibility and perceived severity did not show the significant associations with behavior.

Discussion

Most of the risk factors of CVDs are related to lifestyle behaviors and can be prevented.^[12] The HBM has been detected to be most beneficial because it illustrated the individuals' belief importance of health and the advantages and costs of practices to improve healthy behaviors.^[13] This study was performed to determine the preventive behaviors against CVDs based on HBM.

In this study, the self-efficacy mean score was 13.17, and most of the workers were of a weak level (82.5%). Numerous previous investigations such as Babaei *et al.*^[14] and Idyan *et al.*^[15] confirmed that individuals usually do not attempt to carry out new things unless they believe that they are capable of performing them.^[16] In addition, in relation to CVD prevention, the results of the different studies demonstrated that there is a positive relationship between self-efficacy and utilization of preventive behaviors.^[17,17]

Based on the findings of the study, while the perceived benefits mean score (17.12) was the highest among all

the subscales after perceived barriers, almost more than half of the workers were of a weak level of perceived benefits (57.5%). Studies have shown that the probability of healthy behavior performing increases if individuals believe that the recommended actions available to them would be effective in decreasing their vulnerability to the condition.^[18,19] Therefore, health behaviors adoption can be increased by increasing awareness about preventive behavioral benefits of CVDs.

Moderate scores were obtained by workers in the perceived barriers construct (57.5% were of a moderate level). In this research, changes in dietary patterns in shift work, lack of healthy foods, especially vegetables and fruits at the workplace, and insufficient time and facilities to exercise were found to be the major barriers. Most of the previous investigations found that if individuals believe that the costs of carry out the recommended behavior are prevailed over by their benefits, they will adopt that health behavior.^[14,15] In association with cardiac-related healthy behaviors, results of previous studies showed that people adopted healthy behaviors when they believed there were benefits to these behaviors.^[20] Therefore, there is a critical need to reduce the obstacles to this population in order to increase health behaviors performance.

The level of workers' perceived susceptibility was low (75.4% were of a weak level), which means that oil industry workers of this study did not feel susceptible to CVDs. An investigation in the USA concluded the low perceived susceptibility as a cause for patients not attending to their health.^[21] Glanz *et al.*^[19] found that individuals generally adopt the recommended healthy behaviors if they assume themselves vulnerable to a condition (CVDs). Hence, considering these results, the belief of perceived susceptibility is essential to make these workers get involved in health promotion behaviors.

Weak scores were obtained by workers in the severity construct (83.8% were of a weak level). Awareness increasing can help workers accurately realize the risks of CVDs; most of these workers do not assume CVDs as life-threatening diseases and carry on to engage in

Table 1: Mean scores and frequency of HBM constructs and knowledge

Variable	Weak Frequency (Percentage)	Moderate Frequency (Percentage)	Good Frequency (Percentage)	Mean and Standard Deviation
Knowledge	126 (55.3)	83 (36.4)	19 (8.3)	15.77±6.83
Self-efficacy	188 (82.5)	37 (16.2)	3 (1.3)	13.17±2.49
Perceived severity	191 (83.8)	36 (15.8)	1 (0.4)	9.84±3.63
Perceived susceptibility	172 (75.4)	50 (21.9)	6 (2.6)	6.56±3.08
Perceived benefit	131 (57.5)	90 (39.5)	7 (3.1)	17.12±3.50
Perceived barrier	97 (42.5)	131 (57.5)	0	22.23±1.59
Behavior	188 (82.5)	38 (16.7)	2 (0.9)	10.93±2.09

Table 2: Mean scores of preventive behaviors against CVDs among the workers

Preventive behaviors	Mean±Standard Deviation	Range
Smoking	3.51±0.92	1-5
Blood pressure control in the normal range	1.87±0.54	1-5
Periodic blood test	1.61±0.61	1-5
Appropriate exercise	1.39±0.52	1-5
Appropriate diet	2.54±0.73	1-5

Table 3: Rates of analyses regression for constructs of HBM (behavior as the dependent variable)

Independent Variables	β standard	P	R ²	Dependent variable
Perceived severity	0.01	0.67		
Perceived susceptibility	0.03	0.21		
Perceived benefit	0.08	0.05		
Perceived barrier	-0.28	0.001	0.91	Behavior
Self-efficacy	0.39	0.001		
Knowledge	0.24	0.001		

unhealthy behaviors. Due to these findings, there is an important need to enhance awareness about beliefs of perceived severity among oil industry workers. Previous research indicated that people will adopt a new healthy behavior or product if they think it will lead to potentially serious consequences (CVDs and their complications).^[18,22]

Results of this study showed that most workers were of a weak level of knowledge (55.3%), which corresponds with the study by Jalali *et al.*,^[23] who reported that 65.3% of people in Babol city had a low awareness of CVDs and their associated risk factors. Studies affirmed that the greater the awareness of CVD risk factors, the more people will take actions for preventive behaviors.^[24] Moreover, researchers indicated that early CVD prevention partially relates to knowledge and personal risk perception.^[14]

Findings showed the level of behaviors was low (82.5% were of a weak level). Results showed that most of the workers considered smoking as a CVD risk factor and appropriate diet for good function of heart, respectively. In this study, the item of exercise was the lowest among all CVD preventive behaviors (1.39 out of 5), which is another warning sign for the increase in the prevalence of CVDs. Probably, appropriate planning to increase knowledge of cardiac-related healthy eating, low-fat, low-salt, low-calorie, and fruit and vegetable consumption (3–5 servings per day) along with physical activity, exercise 30 min daily for 5 days a week would help workers decrease the vulnerability to CVDs. Based on these results, educational interventions can be useful to improve people’s ability to recognize barriers and possible solutions and can be successful in attaining and maintaining objectives.

Based on the linear regression test, self-efficacy and perceived barriers were identified as the most predictive variables for the adoption of CVD preventive behaviors. Self-efficacy has been found to be a significant requisite for behavior change self-management toward health promotion.^[18,25] Linear regression test in Sharifzadeh *et al.*'s^[11] study showed that self-efficacy had the most impact on behaviors against CVDs. Garza *et al.*^[26] showed that self-efficacy as a stronger predictor of the HBM constructs could affect behaviors of CVDs prevention.

Limitation and recommendation

Some limitations of this study need to be mentioned. First, this investigation relied on the self-reporting HBM questionnaire, which introduces the probability of biased results such as recall bias. The usage of convenience sample was another limitation of this study; however, a sample size of 228 was sufficient for the population investigated. Given that no significant study has been done in the field of recognizing CVDs among onshore workers under shift work schedules in oil areas, the findings of this study can be used to develop CVD prevention for future studies and within different workplaces. The result of this study would also help design intervention programs for CVDs utilizing different constructs of the HBM. Because this study is theory-based, and it tested the constructs of HBM regarding CVDs along with knowledge, it will add new information to the literature and to health educators about workers’ knowledge and health beliefs about CVDs. Furthermore, this study can be replicated in different work settings among different populations. Moreover, some recommendations need to be suggested. Knowledge regarding CVDs was low among workers; hence, effective educational intervention and long-term follow-up would help workers for adopting healthy behaviors regarding cardiovascular health. Future research can be done by applying other theoretical models utilized in health promotion and education to discover various aspects of the CVD issue among oil industry workers. Finally, considering the measures of exercise, stress, blood glucose, blood lipid, blood pressure profile, and pattern of dietary along with behavioral factors, a better concept of CVD risk factors and preventive behaviors can be prepared.

Conclusion

Findings of the study showed that most workers were of a weak level of knowledge, self-efficacy, perceived severity, perceived susceptibility, perceived benefit, and behavior. Therefore, educational theory-based interventions must be designed to prevent the risk of CVDs and promote preventive behaviors. Considering the oil workers’ vulnerability under shift work schedules with insufficient knowledge regarding CVDs and high

exposure to CVD risk factors, the necessity to prepare an appropriate planning and basic solution for CVD prevention with attention to decreasing unhealthy lifestyle is essential. Furthermore, given that self-efficacy had the strongest correlation with behavior, attention to this construct in educational interventions makes a better level of CVD preventive behaviors in the population at risk. To decrease the increasing burden of CVDs in our population and fight against this rank-one killer, multiple useful prevention strategies must be adopted.

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Conflicts of interest

There are no conflicts of interest.

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