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Table of Contents

1

Original Article(S)

Case Report(S)

Chronic Diseases Journal

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The relationship between self-efficacy and self-esteem with spiritual health in patients with diabetes mellitus

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Original Article

Abstract

BACKGROUND: Diabetes mellitus is one of the most common diseases in Iran and the world. It is chronic, progressive, and expensive, and creates many complications. The present study aimed to determine the relationship between self-efficacy and self-esteem with spiritual health in patients with diabetes mellitus.

METHODS: The study was based on a descriptive correlational method. Statistical population consisted of all patients with type 2 diabetes mellitus in Ardabil City, Iran, in 2016. 108 patients with diabetes mellitus were selected as the statistical sample using the convenience sampling method. For data collection, self-efficacy, self-esteem, and spiritual health scales were used. Data analysis was made using Pearson correlation coefficient, and multiple regression tests.

RESULTS: There was a significant relationship between the self-efficacy and self-esteem with spiritual health in patients with diabetes mellitus. In addition, the results of multiple regression showed that self-efficacy and self-esteem could significantly predict spiritual health among these patients (P = 0.001 for both).

CONCLUSION: It can be concluded that self-efficacy and self-esteem are considered among the predicting variables related to spiritual health.

KEYWORDS: Self-Efficacy, Self-Esteem, Health, Diabetes Mellitus

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Introduction

Diabetes mellitus, like other chronic illnesses, causes problems which as a result, affect all aspects of the individual's life. The number of patients suffer from diabetes mellitus is more than 250 million, and it is estimated to rise up to 350 million in 2020, and up to 438 million in 2030.[1] In Iran, the Isfahan Endocrine Research Center has estimated the prevalence of diabetes about 2 to 3 percent in the general population, and up to the 7 percent in individuals over the age of 30 years.[2]

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The intellectual spirit health is defined as the sense of communicating with others, having goal and purpose in life, as well as having a belief and connection with a transcendental power.[3] Patients with high spiritual health can be more adapted to their own personal problems.[4] On the other hand, when a spiritual health is in danger, a person may experience mental disorders such as anxiety, loneliness, and losing the goal of life.[5]

One of the factors that can affect the spiritual health of patients with diabetes mellitus is self-efficacy.[6] Self-efficacy is a reassurance that a person feels about doing something special. This concept affects the

level of efforts and the level of performance of the individual, both in terms of assessment of the individual's self about his/her abilities to perform an action, and enable the person to adopt health promoting behaviors and prevent harmful behaviors for his/her health.[7] The results of various studies have shown that self-efficacy plays a role in health promotion behaviors,[7] self-care behaviors,[8] endurance in dealing with problems,[9] patient,s and physical and mental health[10].

Another factor that can affect the spiritual health of patients with diabetes mellitus is self-esteem.[11] Self-esteem is a confidence in your ability to think, to withstand the initial challenges of life, to trust in your rights to succeed, to be happy, to feel worthy, to be worthy, and to enjoy the fruits of your own efforts. Self-esteem has a close relationship with the individual's mental image as well as adaptivity.[11] The results of studies have shown that self-esteem plays a role in quality of life,[12] mental health,[13] and emotional and social health[14] as well.

Considering the fact that the statistics of patients with diabetes mellitus in the world are increasing especially in the developing countries and Iran, and because self-efficacy and self-esteem play important roles in patient's mental health[10,13] assessment of the relationship between these variables and the spiritual health of patients with diabetes mellitus is also seems to be necessary. This study was conducted to determine the relationship between self-efficacy and self-esteem with spiritual health among patients with diabetes mellitus.

Materials and Methods

In this descriptive and correlational study, patients with diabetes mellitus referred to medical centers in Ardabil City, Iran, during the year 2016 were enrolled using available sampling method. The sample size of the study was 108, based on the number of variables from G*Power software[15] (Heinrich-Heine-Universität Düsseldorf, Germany) with a mean size of 0.10, alpha coefficient of 0.05, and test power of 0.90. The inclusion criteria for the study were identification of the problem by expert physicians, not having other chronic and inflammatory diseases like cancer, or heart or lung diseases, having a least literacy to respond the diagnosis, and patient's intentional satisfaction.

The research tools used in this study were as bellow.

General self-efficacy scale: This scale is made by Schwarzer and Jerusalem and has 10 grades.[16] On this scale, for each phrase, the score between 1 (completely opposite to me) and 4 (quite similar to me) belongs to each respondent. The minimum score for each individual is 10 and the maximum is 40. The reliability coefficient of the scale has been reported by its creators to be above 0.70.[16] In Iran, the reliability coefficient of the tool was 0.84. In addition, the validity coefficient was 0.30 coincided with the Rosenberg self-esteem scale.[17]

Self-esteem scale: This scale is made by Coopersmith and has 58 articles, 8 of which are polygraph, and questions are answered altogether (Yes or No).[18] In this test, the minimum score of the individual is zero and the maximum is 50. In the calculation of the total score, the scores of 8 materials of the polygraph are not considered. The reliability of the test using the Cronbach method is 0.89.[18] In Iran, the reliability coefficient of this tool was 0.84, and Cronbach's alpha was reported as 0.88.[19]

Spiritual well-being scale: This tool is designed by Paloutzian and Ellison to measure the spiritual health of individuals and includes 20 questions.[20] 10 religious health questions and 10 other health questions are evaluated and ultimately their total spiritual health score is obtained. The answers to the questions like 6-choices Likert scale are as follows. In

questions that are positive in nature, I totally disagree with the score of 1, and I totally agree with the score of 6; and for questions that are negative, I completely disagree with the score of 6, and I totally agree with the score of 1. Therefore, the range of scores is between 20 and 120. Paloutzian and Ellison has considered the tool valid and the Cronbach's alpha coefficient reported for religious, existential, and total health scores to be 0.91, 0.91, and 0.93, respectively.[20] In Iran, the scale validity after translation into Persian language was confirmed through content validity and its reliability was calculated to be 0.82 using Cronbach's alpha coefficient.[21]

In this study, data were analyzed using Pearson correlation coefficient and multiple regression analysis via SPSS software (version 23, IBM Corporation, Armonk, NY, USA) at the significance level of $P < 0.050$.

Results

The total number of subjects was 108, from which 46 (42.6%) were men and 62 (57.4%) were women. The mean and standard deviation of self-efficacy, self-esteem, and spiritual health in patients with diabetes mellitus were as 28.39 ± 5.57, 30.33 ± 6.87, and 81.54 ± 15.32, respectively.

Pearson correlation coefficient test was used to determine the relationship between research variables. There were significant relationships between self-efficacy (Pearson coefficient: 0.51, P = 0.001) and self-esteem (Pearson coefficient: 0.60, P = 0.001) with spiritual health of studied patients.

In addition, multiple regression test was used to predict the spiritual health of patients with diabetes mellitus based on self-efficacy and self-esteem (Table 1).

Table 1. Results of Multiple regression to predict spiritual health

Variable	β	T	P	R	R^2
Self-efficacy	0.28	2.9	0.004	0.64	0.42
Self-esteem	0.45	4.8	0.001		

In this regard, spiritual health of patients could be explained by predecessor variables at the level of 0.42. In addition, self-efficacy (β = 0.28) and self-esteem (β = 0.45) both had significant effect on the spiritual health of patients with diabetes mellitus.

Discussion

The results of this study indicated is a relationship between self-efficacy and self-esteem with spiritual health of patients with diabetes mellitus. Since one of the objectives of this study was to draw up a regression model based on predictive variables to explain the spirituality of patients, the results of regression showed that the mentioned variables had the potential for predicting spiritual health in patients with diabetes mellitus.

The first part of the study showed that there was a significant relationship between self-efficacy and spiritual health of patients. The results were consistent with the findings of other studies.[7-10] In explaining the result, we can say that self-efficacy affects health-related behaviors directly. Self-efficacy, due to strong beliefs about individual's ability, directly and indirectly increases self-management, leads to a sense of goodness and relaxation, and as a result increases psychological health. Individuals with high self-efficacy do not feel problems and tasks as threats, and try to overcome problems and achieve their goals. In addition, self-efficacy enhancement of patients plays an important role in patient compliance with the diet and control of diabetes mellitus, and could improve the spiritual health of patients.[9,10]

The results also showed a significant relationship between self-esteem and spiritual health of patients with diabetes mellitus. This result was consistent with the findings of other studies.[11-14] In explaining the result, people with self-esteem are usually pleased and happy in different events of life; their ability to feel good is high; and they are confident that

their efforts will result in something, and they will see most good aspects of the problem. Finally, they try their best to deal with various problems in a good way.[13,14]

Using an accessible and limited sampling method for patients with diabetes mellitus in Ardabil City, is one of the main limitations of this research. It is recommended to use random sampling method in other studies, and to conduct such researches in other cities in order to maximize the probability of reliable results.

Conclusion

It can be concluded that self-efficacy and self-esteem are among the variables that are related to the spiritual health of patients with diabetes mellitus, and have the ability to predict it.

Conflict of Interests

Authors have no conflict of interests.

Acknowledgments

Authors would like to thank all the patients who sincerely cooperated in this research.

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The role of fatigue and depression in illness perception of patients with Multiple Sclerosis

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Original Article

Abstract

BACKGROUND: Fatigue and depression affect the illness perception of patients with multiple sclerosis (MS). The purpose of the present study was to investigate the role of fatigue and depression in illness perception of patients with MS.

METHODS: The present study was a descriptive correlational research. The target population was all patients with MS who referred to the Iranian MS Society. The sample consisted of 138 patients who were selected using convenience sampling. Data were gathered using the Fatigue Severity Scale (FSS), Beck Depression Inventory (BDI), and Brief Illness Perception Questionnaire (Brief IPQ) and were analyzed via stepwise regression analysis and Pearson's correlation coefficient.

RESULTS: Based on study findings, fatigue and depression had a statistically significant relationship with all subscales of illness perception. The results of stepwise regression analysis indicated that fatigue and depression predict disease outcome, personal control, therapeutic control, identity, concern, illness recognition, and emotion regulation among patients with MS.

CONCLUSION: The findings of this research showed that illness perception, as an effective indicator in patient's quality of life (QOL), appears to be predicted by fatigue and depression.

KEYWORDS: Fatigue, Depression, Perception, Multiple Sclerosis

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Introduction

Multiple sclerosis (MS) is a chronic,[1] demyelinating,[2] autoimmune,[3] and progressive disease in the central nervous system (CNS).[4] The disease affects the brain and spinal cord, and affects with a range of potential disabling symptoms, including changes in feelings, vision problems, muscle weakness, depression, and problem in coordination and speaking, severe fatigue, cognitive impairment, balance problems, and pain.[5,6] MS often affects the young population of societies and causes disability among these patients;[1] thus, it has received a great deal of scientific attention. The goal of most scientific and practical developments in this area is to provide conditions that do not decrease the quality of life (QOL) of patients to the extent possible and cause the least harm to the patient's family and society.[7]

Therefore, the determination of factors related to QOL in patients with MS seems to be

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necessary. Various studies of variables such as personality traits,[8] disability,[9] cognitive impairment,[10] and perception of the disease had great impact on the QOL of these patients.[11] Considering the existing gap in the research and the significance of the perception of disease, the present study addressed the factors associated with the perception of disease in patients with MS. The importance of this topic is due to the fact that the perception of disease as a threatening factor can lead to adverse outcomes and reduce the QOL of these patients.[12] In fact, this structure affects social psychological and family structures, and the implications of research on QOL-related issues, which are closely related to anxiety, depression, and physical functioning, and psychology of the relationship.[11] In patients with MS, the lack of effective control, complications, and clear efficacy results can affect their perceptions of their disease.[13]

Considering that the perception of the illness in the members of the community is affected by the problems affecting the whole community, tools with high consistency should be use and the effectiveness of their implementation, that can be customized and improved, should be assessed. The examination of this structure is an important requirement in patients with MS.[14] The most widely applied model for explaining the relationship between illness perceptions and emotional and behavioral responses is the self-regulatory model.[15]

The theoretical basis of the present study was the Leventhal self-regulation theory, which focuses specifically on the role of disease perception and experiences of symptoms, and is based on the nature of the patient, duration of illness, and therapeutic control. Based on this model, the evaluation of illness is based on the assessment of the impact and effective deployment of a comprehensive set of related behaviors, followed by monitoring activities.[13] Moreover, this model emphasizes that some stimuli, including physical symptoms and existing health beliefs, provide emotional and cognitive representations of disease.[16]

In general, the Leventhal self-regulation model as an appropriate model examines the role of disease perception and emotional responses in chronic diseases.[17] In this regard, research evidence suggests that the subscales of this structure, i.e., the nature and timing of responses, are the major predictors of positive recognition in the residents. In contrast, cognitive knowledge and personal control are very important in psychological disorders.[18] Some research findings suggest that the workforce needs to be integrated into the implementation of a global approach and work to reduce anxiety.[19] In fact, the perception of disease is correlated with anxiety.[20]

On the other hand, the perception of disease adversely reduces the therapeutic follow-up in individuals with chronic illness and increases depression in these patients.[14] The literature shows that mood disorders are common in patients with MS and depression is the most common of these disorders. In explaining this relationship, it can be stated that the development of chronic diseases, such as MS, affects the ability to move and work and health of patients due to various symptoms,[1] and increases the risk of the development of psychiatric disorders, such as depression.[21] The incidence of major depression in these patients has been estimated at 50% in several studies, which is significantly higher than the general population and other neurological disorders. In addition, suicidal tendencies in these patients are largely linked to the presence of major depression.[22]

Costa et al. showed that symptoms of depression are related to the perception of disease. In this study, the subscales of outcome, nature of illness, disease recognition, and anxiety were found to have significant relationships with depression in patients with

chronic pain.[23] Shallcross et al., in a study on patients suffering from epilepsy, showed that the high prevalence of depression is associated with a negative perception and low QOL.[24] Steca et al., in their study on cardiovascular disease (CVD), showed that perception of disease was associated with depression in these patients.[25] In their study, price et al. showed that subscales of perceived disease such as outcome, nature of illness, concern, personal control, and emotional response were associated with depression in chronic diseases.[16] Philip et al. in a study on patients suffering from lupus, found a significant relationship between depression and the subscales of outcome, disease control, and disease duration.[17]

Additionally, perceptions of illness are tied to tangible fatigue, as those who are more likely to experience fatigue, are expected to experience longer disease duration, and negative beliefs have many harmful outcomes. Moreover, high prevalence of fatigue is associated with a disability in personal control and a lack of confidence in the therapeutic outcome.[26] Grayson et al., in a research study, showed that the perception of disease has a causal role in the survival of patients with vasculitis.[27] In fact, the most frustrating,[28] and the most debilitating symptom of MS is fatigue, which affects about 75-90% of patients.[29] Fatigue is often defined as a lack of energy, a feeling of exhaustion and general weakness. In this regard, the International Society for Multiple Sclerosis has defined fatigue as a mental or physical lack of energy perceived by a person or caretaker that interferes with the person's usual activities. Fatigue significantly affects QOL and has major socioeconomic outcomes such as frequent absence from work and subsequent loss of employment. It also interferes with the daily lives of patients with MS, including their private life. Despite the many studies and extensive researches, the nature and cause of fatigue in these patients have not been understood.[30] However, some sources suggest that this syndrome is caused by demyelination.[31]

Verified treatments for MS have limited effects on fatigue. The reason for this problem has not been clearly defined, although various pathophysiological mechanisms have been considered.[30] Therefore, fatigue is one of the main causes of disability in patients MS, and there is currently no specific treatment for this symptom of MS. Depression symptoms such as loss of motivation or lack of pleasure can be confused with fatigue. Fatigue may be one of the symptoms of depression. However, some of the causes of fatigue in patients with MS may be treatable (for example, depression) and finding and recognizing them among these people is a challenge since the relationship between fatigue and mood disorder in patients with MS is unclear.[32] Therefore, fatigue and depression in the majority of patients with MS are known to be the most debilitating symptoms. Several studies have shown that these symptoms can affect chronic illnesses in patients.[16] As mentioned above, the present study was designed to predict the perception of patients with MS suffering from fatigue and depression.

Materials and Methods

This research was a descriptive and correlational study that examined the correlation between predictor variables and the criterion variable, and the predictive power of this correlation. The purpose of this study was to investigate the variables of perceived disease of patients with MS as criterion variables based on the predictors of depression and fatigue. The statistical population of this study consisted of all patients suffering from MS in Iran in 2017, whose were diagnosed by a neurologist and had a medical file in this regard in Iranian MS Society. Convenience sampling method was used; therefore,

138 individuals participated in the study. The inclusion criteria were good reading and writing skills and sufficient physical and mental fitness to complete the research tools, and the exclusion criteria were disease duration of less than 1 year, severe cognitive impairment, or other chronic diseases.

In order to observe ethical considerations, the participants were entered into the research after obtaining informed consent from the patients or their relatives and assuring them that their personal information would remain confidential. Finally, the patients completed the research tools under the supervision of one of the authors of the study who was present at the site of the study.

Data were analyzed using descriptive statistics (mean and standard deviation), and non-inferential statistics (Pearson correlation coefficient and stepwise regression) in SPSS software (version 21, IBM Corporation, Armonk, NY, USA).

Measurement tools

Fatigue Severity Scale: A fatigue measurement tool was developed in 1988 by a neurologist named Krupp to measure fatigue in patients suffering from MS. This tool is one of the most reliable scales for measuring the severity of fatigue in patients with MS. This scale consists of 9 questions, that 5 question assess the quality of fatigue, 3 questions quantify physical and mental fatigue that determine the social status of a person, and 1 question quantifies the severity of fatigue with other MS symptoms. The score of each question ranges from 1 to 7; a score of 1 means that the person strongly opposes the situation and the score of 7 means the person fully agrees. A score of 7 shows the highest level of fatigue and a score of 1 indicates a lack of fatigue. Shahvarughi Farahani et al. studied the validity and reliability of the Persian version of the Fatigue Severity Scale (FSS) among patients with MS in Iran.[33] The internal consistency of the questionnaire items was calculated using Cronbach's alpha coefficient and was equal to 0.96, which indicates internal consistency of all items.

Beck Depression Inventory: The Beck Depression Inventory (BDI), compiled in 1961, is one of the most widely used instruments for measuring mental disorders. This questionnaire contains 21 questions regarding depression symptoms, each of which consists of 4 or 5 sections. The items are scored on scale ranging from 0 to 3 (0 is the absence of symptoms of depression and 3 indicates the high severity of the disorder in that aspect). In this scale, 2 parts are subjective and 11 are cognitive, 2 are attributed to noticeable behaviors, 5 to physical symptoms, and 1 to internal symptoms, all of which are related to the symptoms of major depression. A large number of studies have been conducted to verify the validity and reliability of the BDI, all of which have approved the reliability of this test and reported the internal consistency of this scale between 0.73 and 0.92. The reliability of this questionnaire was reported between 0.48 and 0.86 according to the type of statistical population.[34]

Brief Illness Perception Questionnaire: The Brief Illness Perception Questionnaire (Brief IPQ) consists of 9 questions designed to evaluate the emotional and cognitive visualization of the disease. The questions determine the consequences, duration, personal control, therapeutic control, nature of illness, concern, and disease recognition along with emotional response, and cause of the disease. The range of total scores of the first 8 questions consists of 1 to 10. Question 9 is an open-ended question regarding the 3 major causes of the disease. In the final analysis, it is recommended that each of the subscales be analyzed separately. The Brief IPQ consists of 5 subscales of cognitive responses to the disease, including perceived consequences (Article 1), duration of illness (Article 2), personal control (Article 3), control through treatment (Article 4), and recognition of

symptoms (Article 5). It also has the 2 subscales of concern about illness (Article 6) and emotions (Article 8) which measure emotional responses, and 1 subscale measuring the ability to understand and perceive the disease (Article 7). The final item is an open-ended question (Article 9), which asks the patient to list the most important factors that caused their illness. The reliability of each subscale of this questionnaire ranged from 0.48 to 0.70. The validity of the personal control subscale was approved among patients with diabetes. Bagherian et al. provided the Persian version of this questionnaire.[35] The Cronbach's alpha of the Persian version of this scale was 0.84 and its correlation coefficient was 0.71. In general, the results derived from the evaluation of the Persian version of this scale showed a good and satisfactory validity among other patients.

Results

Of the 138 patients with MS participating in this study, 94 (68%) were women and 44 (32%) men and in the age range of 24-58 years (mean: 60.35 years). The majority of participants (82 patients, 59.4%) were married. In terms of education, the majority of people (71 individuals, 51.4%) had a diploma; among the remaining 51 individuals (37%) 12% had a B.A., 7.8% were under diploma, and 4 individuals (2.9%) had an M.A.

The disease history was also studied, which showed that 77.5% of the people had a history of hospitalization and 81.2% had used medication. The incidence of the disease varied between the ages of 1 to 15 (mean: 26.5 years), and in most of the patients, 1 to 5 had passed years after diagnosis. Furthermore, 34% of the patients were employed and 66% were unemployed; however, most patients were active between 1 and 4 hours per day.

The Pearson correlation coefficient and stepwise regression analysis were used to determine the role of fatigue and depression in explaining and predicting the perceptual representation of patients with MS. The tests have assumptions that were considered before the inferential analysis. One of the foregoing is the normal distribution of research variables; the Shapiro-Wilk test was used to measure the fitting of predictive and criterion variables. The results of the Shapiro-Wilk test showed that the scores of fatigue variables ($P < 0.001$; $\alpha = 0.050$), depression ($P = 0.227$; $\alpha = 0.050$), and perception of disease ($P < 0.001$; $\alpha = 0.050$) do not differ significantly from the normal curve, which indicates the normal distribution of the research variables.

The second is the linearity of the relationship between the criterion variable and a predictive variable when all other predictor variables are kept constant. The results of the data analysis show that, except for the disease duration variable, the relationship between predictor variables and other criterion variables follows this assumption ($P < 0.050$).

Another predictor of regression analysis is the lack of correlation between predictive variables (linear multiplicity), which was used to evaluate the validity or tolerance of the variables and the variance inflation factor (VIF). The results showed that the degree of tolerance was close to 1 and the VIF was less than 2. Therefore, by fulfilling the assumptions of the Pearson correlation coefficient and stepwise regression analysis, it is possible to use these tests to investigate the research hypotheses.

Table 1 shows the central indices and the variability of the research variables. The skewness and elongation of all variables were between 1+ and 1, which indicates the normal distribution of the variables of the research.

The correlation matrix of the research variables along with their correlation coefficients and their significance levels are provided in table 2. As shown in this table, the predictor variables of depression and fatigue had a significant relationship with the outcome

Table 1. Descriptive statistics related to research variables

Variable	Minimum	Maximum	Mean	SD	Kurtosis	Skewness
Disease outcome	1	8	4.20	1.66	-0.36	0.11
Disease duration	1	9	4.70	1.75	-0.13	0.14
Self-control	1	8	4.59	1.86	-0.58	0.14
Therapeutic control	1	8	4.55	1.90	-0.61	-0.03
Nature of disease	1	8	4.62	1.95	-0.76	0.40
Concern	1	9	4.96	1.86	-0.53	0.60
Recognizing the disease	1	9	4.64	2.03	-0.71	0.16
Emotional response	1	9	4.54	1.91	-0.65	0.25
Depression	15	49	31.53	6.68	-0.30	-0.18
Fatigue	14	58	37.99	9.24	-0.37	-0.12

variables of personal control, therapeutic control, and nature of illness, concern, disease recognition, and emotional response. This relationship was negative in the variables of personal control, therapeutic control, and disease recognition.

The correlation matrix also shows that there is no significant relationship between predictive variables and disease duration; a summary of the step-by-step regression model is presented in table 3. The results of stepwise regression analysis in predicting the outcomes of the disease showed that in the first step, fatigue explained the significant (0.04%) variance of the outcomes of the disease. Moreover, the results of stepwise regression analysis showed that in the second step, depression and fatigue totally explained 20%, 11%, and 12% of the variance of the variables of self-control, therapeutic control, and recognizing the disease, respectively. In addition, 0.051%, 0.056%, and 0.096% of the variance of the variables of personal control, nature of illness, concern, and emotional responses in the first step were explained only by fatigue, respectively.

Discussion

Considering the fact that the perception of disease has a significant role in the QOL of individuals with MS and based on the available theoretical and empirical literature on the role of fatigue and depression as important correlates of perception of disease, these subjects were emphasized in the present study. The purpose of this study was to investigate the role of fatigue and depression in MS. Our results showed that there was a positive correlation between depression and some of the subscales of perceived disease such as disease outcomes, nature of illness, concern, and emotional response.

Table 2. Correlation matrix of research variables

Variables	1	2	3	4	5	6	7	8	9	10
1.Disease outcome	1									
2.Disease duration	0.19*	1								
3.Self-control	0.15	0.05	1							
4.Therapeutic control	0.15	0.02	0.42**	1						
5.Nature of disease	0.33**	0.21*	0.22*	0.17*	1					
6.Concern	0.35**	0.23**	0.14	0.13	0.37**	1				
7.Recognizing the disease	0.19*	0.07	0.37**	0.32**	0.14	0.17	1			
8.Emotional response	0.43**	0.37**	0.30**	0.12	0.43**	0.45**	0.19	1		
9.Depression	0.19*	0.07	-0.29**	-0.23**	0.21*	0.22*	-0.27**	0.23**	1	
10.Fatigue	0.20*	0.04	-0.24**	-0.20*	0.22**	0.23**	-0.23**	0.26**	0.13*	1

* P < 0/050; ** P < 0/010

Table 3. Stepwise regression model and subscales of perception of disease in terms of fatigue and depression

Criterion Variable	Step	Predictor Variable	F	P	R	R^2	β	t	P
Disease outcome	1	Fatigue	6.05	0.015	0.206	0.043	0.206	2.46	0.015
Self-control	2	Depression	16.84	< 0.001	0.447	0.200	2.740	4.84	< 0.001
		Fatigue					2.470	4.36	< 0.001
Therapeutic control	2	Depression	8.67	< 0.001	0.338	0.114	1.990	3.33	0.001
		Fatigue					1.770	2.96	0.004
Nature of disease	1	Fatigue	7.36	0.007	0.227	0.051	0.227	2.71	0.007
Concern	1	Fatigue	8.00	0.005	0.236	0.056	0.236	2.82	0.005
Recognizing the disease	2	Depression	9.59	< 0.001	0.353	0.124	1.920	3.24	< 0.001
		Fatigue					1.670	2.81	0.006
Emotional response	2	Depression	7.20	0.001	0.310	0.096	1.470	2.44	0.016
		Fatigue					1.220	2.03	0.044

Depression was also correlated with some other subscales of illness such as personal control, therapeutic control, and recognition of the disease. However, there was no significant relationship between depression and disease duration. In the next step, regression analysis was applied step-by-step to determine the contribution of each variable of fatigue and depression in the explanation of the subscale of perception of disease. The results of regression analysis showed that depression significantly predicted the changes in personal control, therapeutic control, and recognition of the disease in changes in emotional responses. In explaining these results, it can be said that decrease in depression and fatigue increased personal control, and cognitive and therapeutic control. Therefore, lower degrees of depression and fatigue in individuals with MS result in stronger beliefs in patients about their own knowledge and control of the disease, and more promising treatment outcomes. On the other hand, increase in the degree of depression and fatigue will strengthen patients' belief that disease affects their overall QOL (the outcome of the disease), resulting in greater concern and negative emotional responses.

These findings are in line with the researches by Costa et al.,[23] Steca .et al,[25] Price et al.,[16] and Philip et al.[17] In the literature, quantitative studies have systematically examined the role of fatigue in perception of the disease in people with MS. In accordance with the findings of Grayson et al.,[27] in a study on patients suffering from vasculitis, and the research by Alsen and Eriksson,[26] on patients who had suffered an infarction, the results of this study showed a positive correlation between fatigue and the outcomes of the disease, nature of illness, concern, and emotional response.

In addition, fatigue had a significant negative relationship with personal control, therapeutic control, and recognition of the disease. The results of regression analysis showed that fatigue alone predicts the variance in disease outcome, nature of illness, and concern. In explanation, it can be stated that with increasing fatigue in patients with MS, their QOL is affected and their experience of symptoms increases their concern. Considering the findings of this study, it can be concluded that fatigue and depression are two important factors in the perception of disease in people with MS. Moreover, in the manifestation of most of the behaviors associated with the disease in these patients, these two constructs are affected.

Conclusion

The results of this research can be considered at two theoretical and practical levels. At the

theoretical level, the findings of the present study confirmed the Leventhal self-regulatory model for the perception of disease. At the applied level, the results of this study can be a suitable empirical basis for developing comprehensive educational, interventional, and therapeutic programs for these patients, which should be emphasized psychological factors along with physical factors. Pencil-paper assessment of disease perception, fatigue, and depression, and small sample volume, and convenience sampling method are among the important limitations of this research which have reduced the generalizability of the results. Moreover, correlational research method was used that does not have credibility and certainty as far as experimental research is concerned. Therefore, studying the variables of the research through self-report and other methods of measuring, and performing longitudinal and cross-sectional studies with other variables related to perception of disease can lead to achievable findings.

Conflict of Interests

Authors have no conflict of interests.

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Risk assessment of occupational exposure to BTEX in the National Oil Distribution Company in Iran

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Original Article

Abstract

BACKGROUND: This study evaluated the quantitative, carcinogenic and non-carcinogenic risk of exposure to BTEX using lifetime cancer risk (LCR) and hazard quotient (HQ) in the National Company for Distribution of Petroleum Products in Iran.

METHODS: In this risk assessment method, the data were collected in different parts of the company. In order to determine the concentration of BTEX, sampling was carried out in different parts using activated carbon. A Gas Chromatography–Flame Ionization Detector (GC-FID) was used for analysis. Analysis and sampling was conducted according to the NIOSH 1500 method. For carcinogenic risk assessment, LCR was calculated. For non-carcinogenic risk assessment, HQ was calculated.

RESULTS: The carcinogenetic risk of benzene was definite for loading and deep handling units, and safety officer, and was probable for sealing, inspection gate, security, and loading 1 and deep handling units. The carcinogenic risk of ethylbenzene was definite for quality control and loading 1 units, was probable for deep handling and loading 2 units, and safety officer, and was possible for sealing, inspection gates, and security units. The non-carcinogenic risk of toluene was acceptable for deep handling, sealing, inspection gates, and sealing units, but was unacceptable for safety officer, quality control, and loading 1 and loading 2 units. The non-carcinogenic risk of xylene was acceptable for the inspection gate unit, but was unacceptable for security, sealing, safety officer, quality control, and deep handling, loading 1, and loading 2 units.

CONCLUSION: This risk assessment method used was a comprehensive and quantitative method, so it determined the risk accurately. Commensurate with the risk level of each part of the company, the appropriate corrective actions must be carried out.

KEYWORDS: Risk Assessment, Hydrocarbons, Petroleum Industry, Occupational Exposure

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Introduction

Exposure to volatile organic compounds (VOCs) has been a serious concern of the scientific community in the past decades.[1-3] The chemical diversity of the VOCs has adverse impact on human health ranging from carcinogenic to non-carcinogenic effect.[4-7]

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Benzene, toluene, ethylbenzene, and xylene (BTEX) are VOCs. Benzene and ethylbenzene are well known carcinogens.[8,9] Benzene can also affect the hematopoietic system, the central nervous system (CNS), and the reproductive system.[10-12] Toluene can also affect the reproductive system and CNS.[13] Neurotoxicity studies showed that benzene exposure is mostly associated with headache.[14,15]

In oil products distribution companies, due to leakage of petroleum products in different parts of the site, operators and workers in different parts are exposed to BTEX compounds and concentration exposure to benzene in quality control and loading sections are considerable. To estimate the health impact of variation in levels of VOCs, indicators of risk assessment used included the lifetime cancer risk (LCR) and hazard quotient (HQ).[16-19]

In study of Tunsaringkarn et al., in order to assess carcinogenic risk of workers exposed to benzene in diesel stations, the Environmental Protection Agency (EPA) risk assessment method by calculation of LCR and HQ was implemented.[13] Finally, they concluded that exposure to BTEX compounds increased carcinogenic risk among the workers.[13] Guo et al. conducted a study for risk assessment of exposure to VOCs using the United States Environmental Protection Agency (US-EPA) method.[16] Tunsaringkarn et al. recommended the US-EPA method for risk assessment of VOCs in the weather conditions of Bangkok.[13] They used a Gas Chromatography–Flame Ionization Detector (GC-FID) at gas stations and reported that the risks of benzene were definitive.[13] The results of the study by Ramirez et al. in petro-chemical residential areas showed that the risk of ethylbenzene was present in all three investigated sites.[7] The results of Ramirez et al.[7] showed that the risk of toluene was less than the amount recommended by the World Health Organization (WHO).[1] The study by Lee et al.[20] in photocopy centers in Taiwan showed that the risk of toluene was lower than that reported by Andersson et al.[1] The findings of Ramirez et al.[7] showed that the risk of xylene was lower than that reported by Andresson et al.[1] Colman Lerner et al. evaluated the risks of exposure to VOCs in urban air and used the US-EPA method in order to carry out risk assessment in Argentina.[4] They found that benzene in repairing and the laboratory had a definite and possible risk, respectively.[4] According to previous studies, LCR values of more than 10^{-4}, between 10^{-4} and 10^{-5}, and between 10^{-5} and 10^{-6} were, respectively, classified as the risk of outages, probable risk, and possible risk.[4]

In chemical industries dependent on petroleum, BTEX is released because of high vapor pressure of these compounds; and many people are exposed to these compounds in industrial and non-industrial environments. In this regard, respiratory exposure is the most important contact point of humans with this group of chemical compounds. In general, the adverse health effects caused by chronic exposure to VOCs can be divided into two categories of carcinogenic and non-carcinogenic. From among the adverse non-carcinogenic effects allergy effects, stimulating, liver and kidney disorders, and neurological and respiratory disorders can be noted. Cancers of the lungs, blood, liver, kidney, and biliary tract are cancers that can be caused by human exposure to VOCs. The International Agency for Research on Cancer (IARC) classified benzene as a definite carcinogen (Group 1), ethylbenzene as possibly carcinogenic (Group 2B), and toluene and xylene as not classifiable as to their carcinogenicity to humans (Group 3).

Today, many international organizations, including the World Health Organization (WHO), US-EPA, the United States Food and Drug Administration (US FDA), consider the use of quantitative risk assessment as the basis

for legislation on chemical compounds. In order to estimate the cancer risk of carcinogenic hydrocarbons, LCR is used and defined as a possible indicator in the increasing risk of cancer caused by specific exposure. In addition, in order to estimate the risks of exposure to non-carcinogenic hydrocarbons the HQ is used. HQ expresses the level of exposure to a substance at which that substance does not have any harmful effects. From this statement it can be concluded that quantitative risk assessment is very important for VOCs such as BTEX. Moreover, according to the legal requirements of labor protection, a quantitative risk assessment should be conducted in the chemical industries dependent on the type of petroleum and oil broadcasting companies.

This study was conducted to determine occupational exposure to BTEX compounds, estimate the LCR, and perform non-carcinogenic assessment of these chemical compounds using the HQ in the some Oil Distribution Companies in Iran.

Materials and Methods

This cross-sectional study was conducted on individuals in charge in different parts of a company, and the data were collected through measurement. Sampling was conducted according to the NIOSH 1501 method. According to this method, samples were collected using activated charcoal and a low flow rate pump.

The activated charcoal tubes were prepared for sampling and sampling pump was calibrated through a rotameter. After preparing the absorbent and sampling pump, samples were collected from the breathing zone of workers for 8 hours. In this study, an adsorbent was used every 4 hours, the pump flow was adjusted at 200 ml per minute, and the control specimens were used. Preparation of collected samples was performed using chemical recovery extraction method. Sample perpetration was performed using carbon disulfide solution and 5, 1, and 30 micrograms per ml concentration of working standard solutions were used.

Using a 5 microliter syringe, the working standard solution was injected into a GC-FID. In the next step, the main sample was injected into the GC-FID, after that, the amount of samples was determined through the calibration curve. One of the HQ factors was estimated by determining the amount of the sample through the calibration curve; and another factor was inhalation reference concentrations (RfCs), which was determined using IRIS; for chronic daily intake (CDI) formula, the amount of the sample and other factors were determined via interviewing and measurement.

The US-EPA recommended formula for calculating HQ is proportion of measured concentration divide by RFC. Furthermore, for the determination of LCR, CDI and slope factor (SF) were used. Since, based on the division of the IARC, benzene and ethylbenzene are among the group 1 and group 2B carcinogens, respectively, LCR was used in order to determine the carcinogenic risk of benzene and ethylbenzene. To determine LCR, first, the terms of the factors for CDI (Equation 1) must be determined.

$$CDI=\frac{C*IR*ED*EF*LE}{BW*ATL*NY} \qquad \text{(Equation 1)}$$

In this formula, C is the pollutant concentration in inhalation in work shift in milligrams per cubic meter, IR is the respiration rate in terms of cubic meters per hour, ED is the duration of exposure in terms of hours per week, EF is the frequency of exposure in terms of weeks per year, BW is body weight in kilograms, ATL is the average lifespan of a person, and NY is the number of days per year.

After the CDI was determined, the SF of benzene had to be determined. The SF of benzene was 0.0273 which was provided by the Risk Assessment Information System

(RAIS) and the SF of ethylbenzene was 0.0087 which was provided by the California Office of Environment Health Hazard Assessment (OEHHA). LCR was determined according to the formula of LCR = CDI * SF. LCR of higher than 10^{-4}, 10^{-4}-10^{-5}, and less than 10^{-5} was considered to be a definite risk, a possible carcinogenic risk, and a probable risk of carcinogenesis, respectively. In order to determine the HQ, reference concentration was determined. The inhalation reference concentrations (RfCs) values are provided by the Integrated Risk Information System (IRIS) database. The RFC for toluene and xylene is 5 and 217 mg per cubic meter, respectively. The information of BTEX compounds for carcinogenic and non-carcinogenic risk assessment is presented in table 1.

After determination of RFC, the HQ was determined using the equation HQ = C/RFC. Risk classification was determined for non-carcinogens. Thus, if the HQ was less than or equal to 1, risk was considered acceptable, and if the HQ was more than 1, risk was considered unacceptable.

Table 1. The information of BTEX for carcinogenic and non-carcinogenic risk assessment

Substance	Variable	Provided by
Benzene	Slope factor : 0.0273	RAIS
Toluene	RFC: 5	IRIS
Ethylbenzene	Slope factor: 0.0087	OEHHA
Xylene	RFC: 0.217	IRIS

RAIS: Risk Assessment Information System; IRIS: Integrated Risk Information System database; OEHHA: the California Office of Environment Health Hazard Assessment

Results

The LCR of benzene for the quality control, loading 2, and safety officers was higher than 10^{-4} which was a definite risk. Moreover, for sealing, deep handling, loading 1, inspection gates, and security, it was between 10^{-4} and 10^{-5}, which was probable risk. The LCR of ethylbenzene for quality control and loading 1 was higher than 10^{-4} which was a definite risk, and for the loading 2, deep handling, and safety officer the risk was 10^{-4}-10^{-5} which was considered as a probable risk.

Moreover, for security, inspection gate, and sealing, it was less than 10^{-5} which was a possible risk. The results of carcinogenic risk assessment due to exposure to benzene and ethylbenzene in various employers are shown in table 2.

The HQ of toluene for the quality control, loading 1, loading 2, and safety officers was greater than 1, which was considered unacceptable. The HQ of toluene for sealing, deep handling, loading 1, inspection gates, and security was less than 1, which was considered an acceptable risk. The HQ of xylene for quality control, loading 1, loading 2, sealing, security, and the safety officer was greater than 1, which was considered as an unacceptable risk. In addition, the HQ of xylene for inspection was less than 1 that was considered as an acceptable risk.

The results of non-carcinogenic risk assessment due to exposure to toluene and xylene in various employers are illustrated in table 3.

Table 2. The carcinogenic risk of benzene and ethylbenzene in various worksites

Site	Benzene		Ethylbenzene	
	Risk	Risk classification	Risk	Risk classification
Security	$7.6*10^{-5}$	Probable risk	$1*10^{-6}$	Risk possible
Inspection gate	$1.8*10^{-4}$	Probable risk	$1.11*10^{-6}$	Risk possible
Sealing	$7.2*10^{-4}$	Probable risk	$1.23*10^{-6}$	Risk possible
Safety officer	0.14	Probable risk	$1*10^{-5}$	Probable risk
Quality control	0.45	Probable risk	$3.5*10^{-3}$	Definite risk
Deep handling	$1.1*10^{-4}$	Probable risk	$1.37*10^{-5}$	Probable risk
Loading 1	$1.6*10^{-4}$	Probable risk	$1*10^{-3}$	Definite risk
Loading 2	0.17	Definite risk	$1.9*10^{-5}$	Probable risk

Table 3. The non-carcinogenic risk of toluene and xylene in various worksites

Site	Toluene		Xylene	
	Risk	Risk classification	Risk	Risk classification
Security	0.04	Acceptable risk	1.40	Unacceptable risk
Inspection gate	0.04	Acceptable risk	0.34	Acceptable risk
Sealing	0.27	Acceptable risk	7.20	Unacceptable risk
Safety officer	31.50	Unacceptable risk	760.00	Unacceptable risk
Quality control	62.50	Unacceptable risk	26.30	Unacceptable risk
Deep handling	0.13	Acceptable risk	1.60	Unacceptable risk
Loading 1	6.89	Unacceptable risk	4.80	Unacceptable risk
Loading 2	16.20	Unacceptable risk	160.00	Unacceptable risk

After calculating the risk, the various divisions of the company were ranked in terms of the risk of benzene as quality control, load 2, safety officer, sealing, inspection gates, loading 1, and deep handling. Furthermore, they were ranked in terms of the risk of ethylbenzene as quality control, loading 1, loading 2, deep handling, safety officer, sealing, inspection gates, and security. Various parts of the company were ranked as quality control, safety officer, loading 2, loading 1, sealing, deep handling, inspection gates, and security in terms of the risk of toluene.

Different parts of the company were prioritized in terms of the risk of xylene as safety officer, loading 2, quality control, sealing, loading 1, deep handling, security, and inspection gates. The cumulative risk of toluene and xylene was calculated by hazard index (HI) method. Thus, the cumulative risk was 88.8 for quality control, 791.5 for safety officers, 176.2 for loading 2, 11.6 for loading 1, 7.33 for sealing, 1.73 for deep handling, 1.44 for security, and 0.38 for inspection gates. However, the cumulative effect of benzene and ethylbenzene has not been established yet. After calculating the cumulative risk, ranked risks of various parts were calculated. The highest risk was related to the quality control and the lowest risk was related to the inspection gate. In any shift, 12 people worked at loading 1, and 12 at loading 2, 4 in deep handling, and 2 in sealing, 3 in the laboratory, 4 in security, and 2 at the inspection gate. Each shift lasted 8 hours, and the company personnel worked in three shifts. Table 4 shows the results of carcinogenic and non-carcinogenic risks due to exposure to BTEX at various worksites.

The results of cumulative risk of exposure to BTEX at different worksites are presented in table 5.

Discussion

Protecting health workers in the oil-depend industries is very important, as these workers are exposed to carcinogens and non-carcinogenic compounds. One of the most

Table 4. The carcinogenic and non-carcinogenic risks due to workers exposure to BTEX in various worksites

Benzene		Ethylbenzene		Toluene		Xylene	
Quality control	0.045	Quality control	3.50×10^{-3}	Quality control	62.50	Safety officer	760.0
Loading 2	0.017	Loading 1	1.00×10^{-3}	Safety officer	31.50	Loading 2	160.0
Safety officer	0.014	Loading 2	1.90×10^{-5}	Loading 2	16.20	Quality control	26.3
Sealing	7.2×10^{-4}	Deep handling	1.37×10^{-5}	Loading 1	6.89	Sealing	7.2
Inspection gate	1.8×10^{-4}	Safety officer	1.00×10^{-5}	Sealing	0.27	Loading 1	4.8
Loading 1	1.6×10^{-4}	Sealing	1.23×10^{-6}	Deep handling	0.13	Deep handling	1.6
Deep handling	1.1×10^{-4}	Inspection gate	1.11×10^{-6}	Inspection gate	0.04	Security	1.4
Security	7.6×10^{-5}	Security	1.00×10^{-6}	Security	0.04	Inspection gate	0.3

Table 5. Cumulative risk of exposure to BTEX in different worksites

Site	Cumulative risk (HI = $\sum HQ$)
Quality control	62.5 + 26.3 = 88.8
Safety officer	760 + 31.5 = 791.5
Loading 2	160 + 16.2 = 176.2
Loading 1	6.89 + 4.8 = 11.69
Sealing	7.2 + 0.13 = 7.33
Deep handling	1.6 + 0.13 = 1.73
Security	1.4 + 0.04 = 1.44
Inspection gate	0.34 + 0.04 = 0.38

important industries for exposure to chemicals is in oil products distribution companies. Risk assessment is effective in preventing, and appropriate risk assessment is a legal requirement in safety management and risk control systems. In oil distribution companies, due to volatile chemicals, many people expose to benzene, toluene, ethylbenzene, and xylene. In oil distribution companies, the main route of human exposure to chemical compounds is through respiratory exposure. Today, quantitative risk assessment is very important; thus, many international organizations, including the US FDA, US-EPA, and the WHO, consider using a quantitative risk assessment as the basis for legislation on chemical substances.

In this study, quantitative risk assessment of occupational exposure to BTEX was conducted in the Petroleum Distribution Company based on the US-EPA instruction. For chemicals in groups 1 and 2 in the IARC category, a carcinogenic risk assessment method should be used. The LCR index was used in the present study. In addition, for the quantitative risk assessment of non-carcinogenic compounds, HQ was used for groups 3 and 4 of the classification of the IARC. In which, benzene, ethylbenzene, toluene, and xylene are classified as group 1, 2, and 3, respectively. This risk assessment method is a comprehensive approach, because it considers many factors that can affect the exposure, such as exposure time, frequency of exposure, history of the individual, respiration rate, body weight, and concentration of pollutants. The results of this study can be used to classify different parts of the company to reduce the risk, and rank them to control the engineering and management. Risk classification allows people to obtain a good understanding of risk. By risk assessment, the various divisions of the company were classified. In this way, HI was used for non-carcinogenic hydrocarbons, which represented cumulative risk, determined by the total HQ of non-cancerous pollutants. In this study, the cumulative risk was calculated. The cumulative effect of toluene and xylene has been proven, but for benzene and ethylbenzene the investigation continues. The risks of benzene, ethylbenzene, and toluene were higher in quality control than other parts of the company. In the quality control of petroleum products distribution companies, because of maintenance products, pure chemicals, and inadequate ventilation, exposure to BTEX is high. In loading 2, fuel was loaded, while in loading 1, oil and diesel fuel were loaded which produce less VOCs than petrol; thus, loading 2 showed higher risks. Security and inspection gate operators had less exposure than the quality control operators and safety officers. According to the cumulative risk of toluene and xylene, quality control operators, safety officers, and loading 2, loading 1, sealing, deep handling, security, and inspection gate operators were at high risk, respectively. LCR of benzene was definite and probable. The LCR of ethylbenzene was definite, probable, and possible. The risk level for benzene in most parts was higher than ethylbenzene. The HQ of Xylene for all areas, except the inspection gate, was unacceptable. However, the HQ of toluene was unacceptable for quality control, loading 2, safety officer, and loading 1, but was acceptable for the other parts. In a study that was conducted by Colman Lerner et al. in 2012 in Argentina, the risk of benzene was certain and possible in repair workers and laboratory personnel, respectively.[4] In a study by Tanasorn Tunsaringkarn et al. in Thailand in 2012 at a petrol station, the risk of benzene was a

definite risk.[13] The result of the study by Ramirez et al. in petrochemical plants showed that the risk of ethylbenzene was possible in all 3 studied sites.[7] The result of the study by Ramirez et al. showed that the risk of toluene in petrochemical residents was less than the amount recommended by the WHO.[7] In the study by Lee et al., the risk of toluene was lower than the reference value.[20] The study by Ramirez et al. showed that the risk of xylene in petrochemical sites was lower than the reference value.[7] The studied company operated in three shifts, operators changed per shift, and the duration of work was 8 hours per shift. In this study, everyone was examined, and measurements and calculations were performed for each shift. In order to reduce the level of risk in quality control operators, who had the highest risk level, engineering controls (such as the designing of ventilation systems) and management controls should be used. Management control, such as reducing exposure time can be effective on the reduction of the level of risk.

Conclusion

The exposure to pollutants in the studied company was due to the spillage of chemical materials, as well as the loss of oil tankers and pollution caused by them. The method of risk assessment used in the present study is comprehensive and the obtained results can be used for correcting and controlling the prioritization of resources in order to reduce the level of risk. The health risk assessment conducted at this site indicated that employees were at risk of carcinogenic compounds. The highest carcinogenic risk was related to benzene in the quality control unit and the highest non-carcinogenic risk was related to xylene in the safety officer. Except for the gateway inspection unit, the remaining parts were unacceptable in terms of non-carcinogenic risk. The carcinogenic risk in the quality control and loading 1 units was definitive, and the highest risk of carcinogenicity was in these units.

Conflict of Interests

Authors have no conflict of interests.

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The relationship between participating in public sports and life expectancy in the staff of Kurdistan University of Medical Sciences, Sanandaj, Iran

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Original Article

Abstract

BACKGROUND: One of the most important causes of psychological problems is the loss of life expectancy. Life expectancy plays a very important role in mental health, quality of life and self-esteem. This research was conducted to investigate the relationship between public sports and life expectancy in the staff of Kurdistan University of Medical Sciences, Sanandaj, Iran.

METHODS: Using Krejcie-Morgan table, 369 individuals were selected via random sampling. Data were collected using standardized physical activity questionnaire of Bahram and Shafizadeh, and life expectancy questionnaire of Snyder and Forsyth. Data analysis was performed using Kolmogorov-Smirnov, binomial, Mann Whitney U, and Spearman correlation coefficient tests.

RESULTS: Men's participation rate in general and recreational activities was higher than that of women employees. However, the rate of life expectancy for staff of Kurdistan University of Medical Sciences was not favorable.

CONCLUSION: Based on the results of the present study, it is suggested to the officials and managers of Kurdistan University of Medical Sciences to promote sports and recreational programs in order to increase the level of life expectancy in the staff.

KEYWORDS: Staff Participation, Sports, Life Expectancy

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Introduction

Sport is one of the leisure activities that play a decisive role in maintaining the physical and mental health of humans. Having a healthy life requires exercise and physical activity.[1] This phenomenon is one of the ways in which people can relieve their physical and emotional stresses. Researchers have shown that people who exercise regularly are less likely to suffer from cardiovascular disease, bear less stress, and have more self-esteem.[2]

General sport provides many benefits at any age. There are various types of physical activities including irregular games and regular physical exercises such as morning exercises, activity in parks and open spaces, hiking or fitness classes; these activities are commonly referred to as non-competitive and cost-effective sports.[3] General sport is a form of physical activity that improves physical and mental health and creates social relationships.[4]

Public and recreational sports were

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organized in the form of five activities and separate programs including exercise, informal sports, in-field sports, out-of-school sports, and club sports.[5] The study by Sanaei et al. showed that physical activity affects the life quality of the elderly both physically and mentally.[6]

In this research, the relationship between participation in public, recreational sports and life expectancy in the staff of Kurdistan University of Medical Sciences, Sanandaj, Iran, was studied.

Materials and Methods

This descriptive-correlational study was conducted by field experiment. The information needed for this study was obtained through library studies and questionnaires. The statistical population consisted of all staff (medical and administrative) and professors of Kurdistan University of Medical Sciences.

Considering the size of the population and the use of Krejcie-Morgan table, 365 people were selected. Sampling method was stratified random method. The researcher collected the data by obtaining the necessary permissions and distributing the questionnaires among the staff. The data collection tools were standardized questionnaire of Bahram and Shafizadeh[7] and the adult hope scale (AHS) by Snyder and Forsyth.[8]

The standardized Bahram and Shafizadeh's physical fitness questionnaire consisted of five questions including duration, severity, number of sessions, sport history, and activity type.[7] The total score of physical activity was calculated according to how the questions were answered based on the five-point Likert scale, and each of the qualitative values were assigned an integer value from 1 to 5.

Snyder and Forsyth's AHS questionnaire was used to collect information about life expectancy.[8] AHS is a self-report questionnaire including 12 questions.

The reliability of the questionnaires was obtained 0.89 and 0.88 using Cronbach's alpha in 30 research samples, respectively.

Research variables included participation in public and leisure sports (independent variable) and life expectancy (dependent variable).

To analyze the data, descriptive statistical tests including frequency, frequency percentage, average, and standard deviation of the demographic features, such as Kolmogorov-Smirnov test for evaluation of the normal distribution of samples, binomial test, Mann Whitney U test, and Spearman correlation coefficient were used. All statistical operations were performed using SPSS Software (version 21, IBM Corporation, Armonk, NY, USA).

Results

Out of the total number of 369 subjects, 270 individuals (73.2%) performed individual activities, 57 individuals (15.4%) performed teamwork, and 42 subjects (11.4%) did both individual activities and teamwork.

Moreover, about 10% of the employees had physical activity each day, while 36.9% did physical activity 3 to 5 times a week, and the rest did physical activity less than 3 to 5 times a week. In addition, 200 employees (54.2%) had been physically active for more than a year, 36 employees (9.8%) for 9-12 months, 18 (4.9%) for 6-9 months, 49 (13.3%) for 3-6 months, and 66 (17.9%) for less than 3 months.

Spearman correlation coefficient for the public sports and life expectancy variables was 0.135 (Error ratio: 0.010, P = 0.009). Therefore, there was a significant relationship between these two variables at the 95% confidence level.

Using Mann-Whitney U test for comparing life expectancy among women and men employees, despite the difference in the life expectancy variable between the average rate among men (187.34) and women (182.23), this difference was not significant (P = 0.645).

The frequency distribution of the life expectancy variable among the employees was as 3, 29, and 327 for low, moderate, high rates, respectively.

Table 1. Binomial test results for evaluating the extent of participation in sport and recreational activities among studied population

Group	Number	Observed ratio	Cut point	Test percentage	P
High participation	277	0.75	3	0.50	0.001
Low participation	92	0.25			

Using Mann-Whitney U test, there was a significant difference between the two groups of men and women employees regarding the variable of participation in public and recreational activities with the average rates of 207.56 and 158.30, respectively (P = 0.001).

There was a significant difference between the two groups of high and low participation with regard to the extent of participation in public and recreational sports using binomial test (Table 1).

Discussion

One of the most important causes of psychological problems is the loss of life expectancy. In Snyder life expectancy questionnaire,[8] frustration is a shocking state that manifests itself by feeling of impossibility of affairs, feeling of disability and lack of interest in life. The person becomes severely disabled due to frustration and cannot measure his or her own position and decision.

Despite the difference in male and female employees in the variable of participation rate, there is a significant relationship between life expectancy and public and recreational activities. In other words, increasing or decreasing the staff's rate of participation in public and recreational sports will increase or decrease their life expectancy. The results are consistent with those of Mavrovouniotis et al.[9] and Sprangers et al.[10]

One of the most important issues related to the development of health and life expectancy is sport activity. Amini's study shows that participation in sport activities has a positive effect on the quality, the expectancy and desire of the lives of female employees.[11] The results of this study showed that sport and leisure activities have an impact on life expectancy. In a study by Ishizaki et al., it was revealed that people who perform physical activity through tools and equipment have less hope in comparison with those who are physically involved in physical activity.[12] Muangpaisan et al. showed that living without disabilities and defects physical health, healthy nutrition, and desirable physical activity are among the factors affecting life expectancy.[13]

In another study, Keeler et al. reported that desirable situations such as lack of disability, physical health, active leisure, exercise and physical activity contribute to life expectancy in the elderly.[14] Other researches also have indicated a significant relationship between physical activity and life expectancy. These activities, called public and recreational activities, contribute to the physical and psychological well-being of the individuals, and, are low-cost and joyful; therefore, it is possible for everyone to participate in them. These activities, either individually or in a group, promote health and physical fitness in the community.

In another part of the findings, the results showed that despite the difference in the mean score of male and female employees in the life expectancy variable, this difference was not statistically significant. The results are consistent with that of Muangpaisan et al.,[13] which may be due to differences in the type of statistical population. Muangpaisan et al.[13] showed that physical activity is one of the factors affecting life expectancy.

Having a life expectancy is necessary for men and women, and it seems to be impossible to live without hope. Generally, men are more affected by their jobs and economic satisfaction, while women are more affected by their children and family health. In this study, the

results showed that there is no difference in the life expectancy of female and male employees of Kurdistan University of Medical Sciences.

Moreover, the findings showed that there is a significant difference in the rate of participation in public and recreational activities between male and female employees of Kurdistan University of Medical Sciences. In a study by Baradaran-Rezaei et al., on 808 boys and girls, the results showed that boys were less active compared to the girls.[15] The results of the present study contradicts that of Baradaran-Rezaei et al.[15] study, perhaps because of the difference in the nature of the research or the difference in the type of statistical population. According to the results of the present study, the rate of participation in the public and recreational activities of male employees is greater than that of female employees, which may be due to the constraints and lack of facilities for women to participate in recreational activities.

As organizational life is accompanied by stress and mental pressure, behavioral science specialists, introduce sport activities as an effective means to provide freshness and increase work ability, to grow and develop moral and psychological aspects as well as hope and life satisfaction. Since most employees spend much of their time working and allocate less time to physical activity in their leisure time, long-term physical and mental health problems may occur; thus, encouraging physical activity is very important in preventing from diseases. Moreover, it is necessary to provide sport facilities for the participation of women in public and recreational activities.

Conclusion

According to the findings of this research, it is suggested to the officials and directors of Kurdistan University of Medical Sciences to develop recreational and sport programs for the employees and their families; and provide the facilities and infrastructure of public and recreational sports in this university to increase the staff's participation rate in order to reach the desired level of life expectancy in the employees.

Conflict of Interests

Authors have no conflict of interests.

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The effectiveness of hypnotherapy with physiotherapy: Pain intensity, functional disability, and psychological distress among patients with non-specific low back pain

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Original Article

Abstract

BACKGROUND: It has been demonstrated in previous investigations that non-specific low back pain is caused by multiple factors. Evidently, integrative therapies should be used in order to improve this disorder. Documents exhibit that integrative therapies are capable of improving different aspects of low back pain and preventing the recurrence of clinical symptoms. The aim of the present study was to determine the effectiveness of hypnotherapy with physiotherapy on low back pain.

METHODS: The statistical sample included 28 women who were randomly divided into two groups. One group received hypnotherapy with physiotherapy and the other received pure physiotherapy. The Depression Anxiety and Stress Scales (DASS-21), the Numerical Rating Scale (NRS), the Roland Morris Disability Questionnaire (RDQ) were used to measure the trend of changes (pretest, mid-test, and posttest) of psychological distress, pain intensity, and functional disability. The Hypnotic Induction Profile (HIP) was used to measure suggestibility. In order to analyze data, repeated measures analysis of variance (ANOVA) was used in SPSS software.

RESULTS: The results revealed that hypnotherapy with physiotherapy affects pain intensity in the same way as pure physiotherapy ($P < 0.050$). Furthermore, it was found that hypnotherapy with physiotherapy is more effective than pure physiotherapy on functional disability ($P < 0.050$). It was also discovered that only hypnotherapy with physiotherapy can improve psychological distress ($P < 0.050$).

CONCLUSION: It can be concluded that hypnotherapy with physiotherapy can improve pain intensity, functional disability, and psychological distress, and the total effectiveness of hypnotherapy with physiotherapy is more than the total effectiveness of pure physiotherapy.

KEYWORDS: Hypnotherapy, Physiotherapy (Techniques), Low Back Pain, Psychological Stresses

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Introduction

Pain is a protective mechanism in coping with physical illness. When an organ is injured, this causes the person to omit the reasons of pain.[1] Based on the International Classification of Diseases 10th Revision (ICD-10), non-specific low back pain (NSLBP) is one of the disorders the main feature of which is pain.[2] NSLBP is a disabling disorder which the individual suffers from his/her whole lifetime.[3] According to the

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available literature, NSLBP can be triggered by both medical and psychological causes. Pain catastrophizing, pain avoidance, psychological distress, and passive coping styles can be more effective than physical factors in the appearance of symptoms.[4] NSLBP is a multifactorial disorder that has directed etiological theories toward a bio-psychosocial perspective.[4] There have been different therapeutic modalities for NSLBP, almost all of which have ignored the psychosocial factors.[5] One of the prominent features of therapeutic modalities in NSLBP is that each method focuses on one especial aspect of NSLBP.[6]

NSLBP is a common disorder; the prevalence of NSLBP has been estimated through numerous investigations to be approximately 49 to 80%. Moreover, it has been illustrated that NSLBP can transform into a chronic disorder in 7% of patients. In England, it has been estimated that the cost of NSLBP therapeutic care is about 10668€ per year.[7] Since NSLBP is one of the most prevalent reasons for referral to general hospitals and clinics, inattention to resolving this problem can result in its chronicity and numerous economic and social harms.[8]

Investigations indicate that hypnosis can decrease stress and block pain receptors in the central nervous system (CNS), and as a result, decrease pain intensity and psychological distress in patients experiencing chronic pain. Hypnosis is a safe and effective pain management method that affects both the sensation and affection of pain.[9] The other common physical method of pain alleviation is physiotherapy. However, there are not enough evidence-based documents about its being the most effective method to manage chronic pain.[10]

In order to treat this sophisticated illness, we require an integrative therapy to focus on the main aspects of disorders. In fact, both hypnotherapy and physiotherapy have been shown to improve symptoms of NSLBP. Thus, the effectiveness of hypnotherapy with physiotherapy on predominant aspects of NSLBP was investigated in the present study. Therefore, the biggest problem is measuring the effectiveness of hypnotherapy with physiotherapy on pain intensity, psychological distress, and functional disability among patients with NSLBP. It is expected that the integrative treatment including hypnotherapy and physiotherapy be more effective than other individual therapeutic modalities and it be more economic than other long and expensive treatment methods for low back pain. Given the importance of integrated interventions in the treatment of NSLBP, the role of hypnotherapy with physiotherapy was investigated in the treatment of NSLBP.

Materials and Methods

The present research was a randomized controlled trial. In order to control excessive variables, the participants were selected accidently and randomly divided into two groups. The statistical population encompassed 20 to 45-year-old patients who had referred to Tabatabayi rehabilitation clinic at Semnan University of Medical Sciences, Iran. In total, 36 patients with NSLBP were accidentally selected and randomly divided into two groups from winter 2015 to spring 2016. In this study, one group received hypnotherapy with physiotherapy and the other group only received pure physiotherapy. Subsequently, 4 patients from the pure physiotherapy group and 4 patients from the hypnotherapy with physiotherapy group were excluded from the study due to incomplete questionnaires, and not conforming to the research criteria. The final sample of the study included 28 patients (14 patients in each groups). In order to control the obtrusive variables, we matched the groups in terms of demographic variables. The inclusion criteria were age ranging between 20 and 45 years, NLBP diagnosis, literacy of higher than grade 5 of elementary school, and more than 3 suggestibility ranks. The exclusion criteria were

psychotic disorder diagnosis and a lack of cooperation in the therapeutic process. The present study was reviewed and approved by the Institutional Review Board (IRB) of Semnan University of Medical Sciences under the code of IR.SEMuMS.REC.1394.128 and was registered by the Iranian Randomized Controlled Trials Site under the code of IRCT2016011926111N1.

Pain intensity: The Numerical Rating Scale (NRS) was used in the present study to measure pain intensity. The NRS was made by McCaffery in 1999. The NRS is a unidimensional instrument of pain intensity and includes its total score ranges between 1 and 10, where 1 means no pain and 10 mean the most severe pain. This instrument has been supported by the National Institute of Pain in the USA for the measurement of pain intensity.[10] This instrument is user-friendly and the patients do not require powerful visible ability or high literacy to use it. According to literature, this tool has suitable validity and reliability.[11] Different investigations have estimated its reliability to be about 0.84, 0.89, and 0.92.[12] NRS scores strongly correlated to visual analogue scale (VAS) scores at all time periods (r = 0.94, 95% CI = 0.93 to 0.95). The slope of the regression line was 1.01 (95% CI = 0.97 to 1.06) and the y-intercept was -0.34 (95% CI = -0.67 to -0.01). The minimum clinically significant difference in pain was 1.3 (95% CI = 1.0 to 1.5) and 1.4 (95% CI = 1.1 to 1.7) on the NRS and VAS, respectively.[13]

Psychological distress: The Depression Anxiety and Stress Scales (DASS-21) has 3 elements, including depression, anxiety, and stress, and contains 21 questions. This tool was made by Lovibond in 1995 in order to measure the common signs of stress, anxiety, and depression. This tool measures the mental situation in the previous two weeks.[12] Each element contains 7 questions, and the degree of each element is determined by computing the sum of the scores of these questions. The reliability of this instrument in Iran has been estimated about 0.95, 0.92, and 0.97.[14] In another investigation, it has been reported that the DASS-21 had very good Cronbach's alpha with amounts of 0.84, 0.74, and 0.79 for depression, anxiety, and stress, respectively. In addition, it had good factor loading values for most items (0.39 to 0.73).[15] Correlations among scales were between 0.54 and 0.68. This tool can measure psychological distress in the continuum of normal, mild, severe, and extremely severe.[16]

Functional disability: The Roland Morris Disability Questionnaire (RDQ) was made by Roland and Morris in 1983 in order to measure the level of functional disability among patients with NSLBP. It is a paper-and-pencil questionnaire that contains 24 questions.[17] This instrument is one of the most sensitive tools for the measurement of functional disability. The reliability of this tool has been estimated as about 0.94.[18] It has been reported that this tool has appropriate reliability based on the test-retest method and internal consistency. Sufficient reliability was demonstrated with a Cronbach's coefficient of 0.85. This sensibility is the result of different aspects which the RDQ can measure.[19]

The Hypnotic Induction Profile (HIP): The Hypnotic Induction Profile (HIP) is a clinical instrument for the measurement of biological readiness in suggestibility. This method was designed by Spiegel and Bridger in the 1970s. It measures the suggestibility level by computing the ranks of deviation and rotation of eyes. The highest level of suggestibility is 7 and the lowest level equals 1. The usefulness of the HIP in relation to psychodiagnosis has been demonstrated elsewhere and is not the subject of this paper. Evidence has been presented of the satisfactory reliability of the profile and induction scores. Some information on validity is provided through satisfactory correlation with existing standardized scales; the HIP and Stanford Hypnotic Susceptibility Scale correlate.[20] This tool is a suitable instrument to measure the readiness of people

to be hypnotized.[21]

The process of therapy: In this process, we selected the patients accidentally with respect to the inclusion criteria. The participants underwent 6 sessions of hypnotherapy. Each hypnotherapy session lasted about 60 minutes, and the hypnotherapy was performed immediately before the physiotherapy procedure. Each hypnotherapy session was done before every session of physiotherapy.

The protocol of hypnotherapy contained 6 sessions of hypnotherapy. This protocol was in accordance with the manual outlined by Hammond (1990). The hypnotherapy protocol was implemented individually. The first session was allocated to introduction and pretest in order to determine the baselines. Each session lasted 45 minutes. Session 1 included familiarization, socialization, and preparation of the patient for a deep and flowing trance. Then, the trance is induced through progressive muscle relaxation (PMR); the patient enters a trance state and eventually returns to a normal state. In session 2, induction of the main suggestions are suggested including changing sense of pain to itching, and conditioning this change to hand touch of low back. Then, participants gradually return to the normal state. In session 3, after induction of a trance and suggesting a change in the sense of pain, suggestions are made on tolerating bad sensations (all negative sensations not only pain). Finally, the patient returns to a normal state. In session 4, after changing the sense pain and increasing the tolerance of pain, suggestions on ego strength are presented for the patient to promote beliefs on living normally like others. Session 5 included the induction of all of the previous suggestions, fixation of conditioning, prepare the patient for termination of therapeutic sessions in the next session, and gradual return to normal state. Fixation of conditioning is also the main task of session 6; in addition, the patients receive feedbacks on their sensations. After the end of the trance, recommendations are presented to fix the post-hypnotic suggestions. The protocol of hypnotherapy was implemented by MA students of clinical psychology who were educated in hypnotherapy in the Iranian Association of Hypnotism.

The protocol of physiotherapy consisted of 10 sessions each lasting 30 minutes and included the increasing of blood flow around the lower back via a hot pack for 15 minutes. Transcutaneous electrical nerve stimulation (TENS or TNS) is the therapeutic use of electric current for nerve stimulation. The term TENS refers to the whole range of transcutaneous currents applied for nerve stimulation. However, TENS is mostly used to describe the use of pulses produced by portable stimulators in the treatment of pain. Another procedure is pain alleviation using the TENS instrument with the frequency of 5 to 10 units for 15 minutes. Subsequently, the ultra sound procedure is performed for 5 minutes.[22] The therapeutic ultrasound procedure is commonly used in the treatment of lower back pain. In this procedure, a hand-held vibrating device is rubbed against the skin on the lower back with the goal of providing body parts with heat and energy in order to reduce pain and speed up the recovery process.[23] There were also sport experiments which were performed at home. The protocol of physiotherapy was implemented by an associate professor of physiotherapy from the Department of Physiotherapy at Semnan University of Medical Sciences.

The patients provided written informed consent forms for cooperation in the study. In addition, the questionnaires were completed in the order of the HIP, NRS, DASS-21, and RDQ. This investigation was performed from winter of 2015 until spring of 2016.

In order to analyze data, repeated measures analysis of variance (ANOVA) was applied in SPSS software (version 19, SPSS Inc., Chicago, IL, USA). In addition, repeated measurements were taken during the therapy. To determine the

baseline, a pretest was conducted on the first session, mid-test at the termination of both protocols, and a posttest 2 months later. The level of significance in this investigation was 0.05.

Results

The sample consisted of 28 patients who were randomly divided into two groups. Their age range was 24 to 45 years and their mean (standard deviation) age was 37.82 (6.22). The mean (standard deviation) of suggestibility was 5.714 (0.658). The lowest level of literacy was grade 5 of primary school, and the highest level was diploma; 3 patients had primary education, 8 had a middle school degree, and 17 had a diploma. The majority of participants were married; only 3 of them were single and 25 of them were married. The lowest and highest level of suggestibility was 5 and 7, respectively. The result of Mauchly's test of sphericity for pain intensity was 0.923 (P = 0.366), for DASS-21 was 0.603 (P = 0.716), and for RDQ was 0.847 (P = 0.126).

The mean of pain intensity in the pretest of the hypnotherapy with physiotherapy group was 8.142; in the mid-test and the posttest, it was 3 and 2.285, respectively. Thus, in this group, the pretest of psychological distress was 1.207, and the mid-test and the posttest were 0.673 and 0.323, respectively. The functional disability of this group in the pretest was 1.400, and increased to 1.710 and 1.830 in the mid-test and posttest, respectively. Moreover, in the pure physiotherapy group, the mean of pain intensity changed from 7.857 in the pretest to 4.285 and 3.285 in the mid-test and posttest, respectively. Therefore, the psychological distress in the pure physiotherapy group started from 1.023 in the pretest and changed to 0.84 and 0.721 in the mid-test and posttest, respectively. In addition, in this group, functional disability started from 1.452 and changed to 1.631 and 1.705 in the mid-test and posttest, respectively (Table 1).

Table 1. Mean and standard deviation of dependent variables (n = 28)

Dependent variables	Measure	Group	Mean (Standard deviation)
Pain intensity	Pretest	Hypnotherapy/physiotherapy	8.142 (0.949)
		Physiotherapy	7.857 (1.099)
		Total	8.000 (1.018)
	Mid-test	Hypnotherapy/physiotherapy	3.000 (2.112)
		Physiotherapy	4.285 (1.069)
		Total	3.642 (1.768)
	Posttest	Hypnotherapy/physiotherapy	2.285 (2.016)
		Physiotherapy	3.285 (1.637)
		Total	2.785 (1.872)
Psychological distress	Pretest	Hypnotherapy/physiotherapy	1.207 (0.413)
		Physiotherapy	1.023 (0.588)
		Total	1.115 (0.508)
	Mid-test	Hypnotherapy/physiotherapy	0.673 (0.289)
		Physiotherapy	0.840 (0.323)
		Total	0.756 (0.313)
	Posttest	Hypnotherapy/physiotherapy	0.323 (0.128)
		Physiotherapy	0.721 (0.332)
		Total	0.522 (0.339)
Functional disability	Pretest	Hypnotherapy/physiotherapy	1.400(0.215)
		Physiotherapy	1.452 (0.176)
		Total	1.430 (0.194)
	Mid-test	Hypnotherapy/physiotherapy	1.711 (0.130)
		Physiotherapy	1.631 (0.104)
		Total	1.671 (0.122)
	Posttest	Hypnotherapy/physiotherapy	1.830 (0.082)
		Physiotherapy	1.705 (0.166)
		Total	1.767 (0.143)

Table 2. Multivariate tests on the within-subject and between-subject effects

Effects			Value	F	df	Error df	P	Partial Eta Squared
Between group	Intercept	Wilks' Lambda	0.003	3003.815	3	24	0.001	0.994
	Group	Wilks' Lambda	0.906	0.835	3	24	0.488	0.094
Within group	Factor	Wilks' Lambda	0.039	85.497	6	21	0.001	0.961
	Factor*group	Wilks' Lambda	0.387	5.555	6	21	0.001	0.613

dF: Degree of freedom

The results of this analysis regarding F value, then the significance level of F value showed that the model in between-subjects and within subjects is significant (Table 2).

There are significant differences between interventions of the two groups. The efficacy of the procedure of hypnotherapy with physiotherapy in the ralated group was more than that in the hypnotherapy with pure physiotherapy group (Table 3).

Discussion

In the present study, it was found that the group which underwent hypnotherapy with physiotherapy showed a higher decrease in pain intensity than the group which underwent pure physiotherapy. The data also showed that only the patients who underwent hypnotherapy with physiotherapy experienced a decrease in psychological distress. A decrease was observed in both groups in the aspect of functional disability; however, it should be noted that the effectiveness of hypnotherapy with physiotherapy was higher than pure physiotherapy in decreasing functional disability. The present study indicates that hypnotherapy with physiotherapy affected all three variables meaningfully, while pure physiotherapy only affected pain intensity and functional disability. It is worth mentioning that hypnotherapy with physiotherapy was more effective than pure physiotherapy on functional disability.

In agreement with this result, a systematic review reported that hypnotherapy decreased the use of sedative drugs and psychiatric drugs among patients with pain by decreasing their pain intensity.[24] Additionally, hypnotherapy can decrease the use of anti-inflammatory drugs among patients with chronic pain. In another study, it was found that physiotherapy cannot influence patients' viewpoints on pain, locus of control, and psychological indications, but affects pain intensity meaningfully.[25] Another systematic review disclosed that pure physiotherapy can only affect pain intensity, and that investigations have utilized psychological treatments in order to change the psychological indications of pain.[26]

Table 3. Paired comparison of the interactive effect of time and group

Item	Test	Group (I)	Group (J)	Mean difference[#]	Standard error	P
Pain intensity	Pretest	Physiotherapy	Hypnotherapy/physiotherapy	4.357*	0.304	0.001
	Mid-test	Physiotherapy	Hypnotherapy/physiotherapy	4.357*	0.304	0.001
	Posttest	Physiotherapy	Hypnotherapy/physiotherapy	-5.214*	0.338	0.001
Psychological distress	Pretest	Physiotherapy	Hypnotherapy/physiotherapy	0.539*	0.096	0.003
	Mid-test	Physiotherapy	Hypnotherapy/physiotherapy	-0.539*	0.096	0.003
	Posttest	Physiotherapy	Hypnotherapy/physiotherapy	-0.594*	0.075	0.001
Functional disability	Pretest	Physiotherapy	Hypnotherapy/physiotherapy	-0.241*	0.029	0.001
	Mid-test	Physiotherapy	Hypnotherapy/physiotherapy	0.241*	0.029	0.001
	Posttest	Physiotherapy	Hypnotherapy/physiotherapy	0.338*	0.040	0.001

[#] Significance of mean difference with regard to paired comparison
* P = 0.050 (For column values)

Concerning the effectiveness of pure physiotherapy on pain intensity, there are no differences between physiotherapy techniques. It has been shown that pure physiotherapy can influence the biomechanical aspects of NSLBP.[27] An investigation revealed that physiotherapy in combination with psychotherapy can affect pain intensity more than pure physiotherapy; this result is more enduring than pure treatments.[28] In an Iranian investigation, it was reported that disability is affected by psychological aspects more than pain intensity.[29] In a systematic review, 10 randomized controlled trials (RCTs) were reviewed which indicated that hypnotherapy, by affecting psychosocial aspects, was more effective on functional disability than the control group and other treatments.[30] Another study also showed that hypnotherapy decreased psychological distress, and this decrease predicted the reduction in pain intensity in the near future.[31] However, some scientific investigations defy the effectiveness of hypnotherapy on psychological distress, especially stress.[32]

The present analysis demonstrated that hypnotherapy with physiotherapy can influence both the psychological and physical aspects of NSLBP, while pure physiotherapy only affects pain intensity as a physical aspect of NSLBP.

In an investigation, it was pointed out that this result can be due to the focus of hypnotherapy on psychosocial aspects; however, physiotherapy focuses on the physiological aspects of NSLBP.[33] The philosophy of physical therapies, such as physiotherapy, ignores patients' different fears of pain, psychological distress, and affection of disorder. Accordingly, these items can cause the recurrence of the signs of NSLBP in the future after the end of treatment.[34] Consistent with this fact, NSLBP is a multifactorial disorder; thus, physiotherapy only improves its physical aspects and ignores other different causes of NSLBP.[35] This result is in agreement with that of an investigation which reported that hypnotherapy with morphine can affect the signs of NSLBP more than pure morphine therapy.[36]

Conclusion

The present study findings revealed that hypnotherapy with physiotherapy and pure physiotherapy both affected pain intensity. It should be noted that hypnotherapy with physiotherapy was more effective than pure physiotherapy on pain intensity. This was also true regarding functional disability. Furthermore, it was found that psychological distress decreased only by hypnotherapy with physiotherapy. Thus, it can be concluded that hypnotherapy accompanied with physiotherapy is an applicable and effective treatment for NSLBP.

Limitations: One of the important limitations of the present study was not using a combination of qualitative and quantitative methods. The other limitation was solely using self-report instruments to measure the variables such as pain intensity in place of using clinical observations or biological indicators like MRI. With regard to the situation of the university clinics, it was not possible to investigate the effect of pure hypnotherapy on NSLBP and this was another limitation of this study.

Suggestions: It is recommended that a group in which patients only undergo pure hypnotherapy be studied. Another suggestion is that in order to measure the variables, biological instruments like MRI be used to measure biological indicators. With regard to the multifactorial etiology of NSLBP, the use of a combined method in future investigations is recommended.

Conflict of Interests

Authors have no conflict of interests.

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A case of recurrent eccrine porocarcinoma

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Case Report

Abstract

BACKGROUND: Eccrine porocarcinoma, first described in 1963, is a rare malignant lesion arising from the eccrine sweat glands. It is usually a primary tumor, even more commonly, a malignant degeneration of an eccrine poroma. It usually affects elderly, and is located commonly in the lower extremities. About 20% of the cases will reappear after treatment. The treatment consists of wide local excision of the primary lesion. This uncommon skin tumor is locally aggressive and has a high recurrence rate.

CASE REPORT: We report a 95-year-old woman with a large tumor on the left knee. A large number of tumoral cells showed immunolabeling of p63 supporting squamous or myoepithelial differentiation. They were also positive for cytokeratin-7 (CK7), epithelial membrane antigen (EMA), and carcinoembryonic antigen (CEA) highlight luminal differentiation in some of the vacuolated cells and this was also seen with periodic acid-Schiff-diastase (PAS-diastase) staining.

CONCLUSION: Eccrine porocarcinoma is a rare aggressive form of skin cancer with unknown etiology, and little guidance is available in the literature on exact protocols for treatment and follow up. It should be on the differential diagnosis of any suspicious skin lesion seen by the plastic surgeon. Histologic assessment is indicated in suspicious lesions.

KEYWORDS: Eccrine Porocarcinoma, Recurrence, Sweat Glands

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Introduction

Eccrine porocarcinoma (EPC) is a rare malignant cutaneous appendageal tumor that develops from intraepidermal eccrine sweat duct.[1] Pinkus and Mehregan were the first to describe EPC in 1963.[2] 0.005% to 0.01% of all epidermal skin neoplasms were caused by these tumors.[3] Patients' age ranging is being reported from 21 to 90 years old. It occurs predominantly in elderly people who are more than 60 years, and indicates a female predominance. Its etiology is not well understood. However, some studies have demonstrated that the tumor developed from a pre-existing eccrine poroma.[4]

From another point of view, prompting factors include chronic light exposure, exposure to chemical agents, and immunosuppression. Porocarcinoma is a hazardous disease because of high rate of recurrence after resection and aggressive behavior.[5] Due to seldom occurrence of the problem, there is controversy regarding both presentation and management. One characteristic histologic feature of EPC is ductal differentiation of poromatous basaloid epithelial cells that forms an irregular tumor shap.[6] Prevalent occurring sites consist of lower extremities, followed by the trunk, head, and upper and lower limbs.[7]

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Case Report

She was a 95-year-old woman with a large tumor on the left knee. The sections of biopsy in year 2014 showed skin and underlying tissues containing a highly infiltrative adnexal carcinoma. The tumor composed predominantly of nests of epithelial cell, with round nuclei, and vacuolated cytoplasm lying myxoid stroma. Some cells had cytoplasmic vacuoles. Many of the nests showed central zone necrosis. Many mitotic figures were presented. Areas of squamous differentiation were also accompanied by focal differentiation to form ductal lumina. These areas mostly consisted of porocarcinoma cells. In some areas of the tumor, there was abundant myxoid stroma; that was less expected in porocarcinoma, and suggested chondroid syrindoma. The neoplasm had high infiltrative growth pattern, extending to all of the margins of the biopsy (Figure 1).

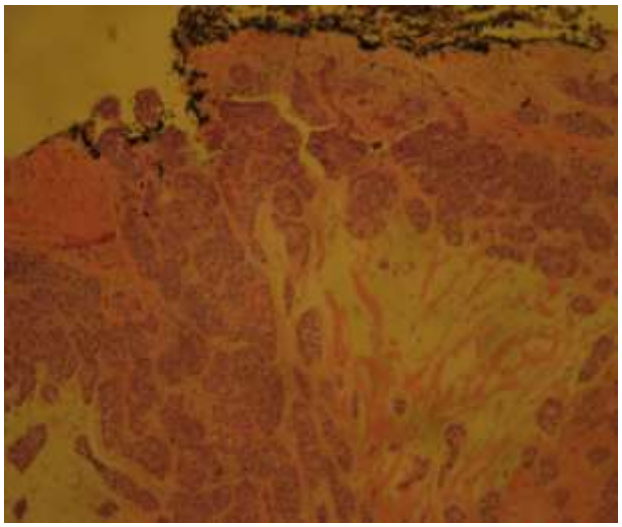

Figure 1. Hematoxylin and eosin (H&E) staining (× 100) showing high infiltrating growth pattern with margin involvement

There was also pagetoid invasion of overlying epidermis. Most of the tumoral cells showed immunolabeling for p63 supporting squamous or myoepithelial differentiation (Figure 2).

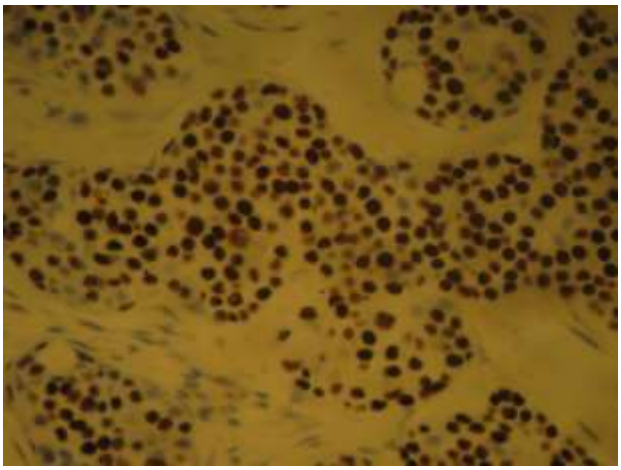

Figure 2. P63 staining (× 400) strongly supporting squamous differentiation

Most of the cells were also positive for cytokeratin-7 (CK7), epithelial membrane antigen (EMA), and carcinoembryonic antigen (CEA) highlight luminal differentiation (Figure 3).

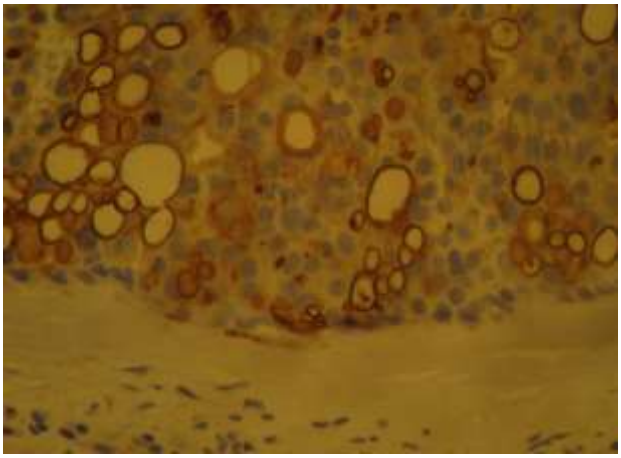

Figure 3. Immunohistochemistry (IHC) staining (× 400) of carcinoembryonic antigen (CEA) supporting luminal differentiation

A few number of the vacuolated cells were also seen via periodic acid-Schiff-diastase (PAS-diastase) staining (Figure 4).

There was a few amount of intracytoplasmic mucins indicated in some of the cells. Sections of excision in year 2017 showed a recurrence of the tumor that had the identical morphology to the one seen in year 2014. Extensive areas of necrosis were seen.

The recurrent tumor appeared to have been excised incompletely again.

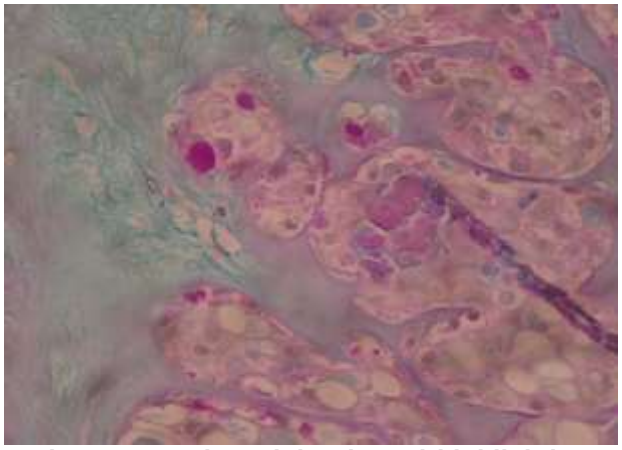

Figure 4. Mucin staining (× 400) highlighting luminal differentiation

Discussion

Theoretically, EPC develops from benign to malignant. EPC is a biologically aggressive neoplasm and has a high rate of recurrence and metastasis.[8] Its histogenesis is yet to be known, but is believed to have an origin from the acrosyringium.[9,10] From the view of histology, EPC has two types: intraepidermal, and dermal porocarcinoma. The intraepidermal type develops horizontally and generates pagetoid infiltration along the epidermis; the dermal form indicates nodular aggregates, usually without attachment to the epidermis.[11]

Our patient had an intraepidermal lesion presented with mitotic figures, such as affected dermis. The EPC clinical manifestations are not specific, and different types of papule, nodule, and plaque form lesions with various sizes (1-10 cm) could be seen.[12-14] According to Mulinari-Brenner et al. review article, the lesions can be sized between 1.2 × 2.0 and 4 × 5 cm.[15] EPC is more common in women and has had higher incidence in the age group of 70 years in some case studies.[15,16]

Bowen's disease, extramammary Paget's disease, cutaneous metastasis, amelanotic melanoma, cutaneous lymphoma, cutaneous squamous cell carcinoma, and other primary skin appendageal tumors should be in mind as differential diagnosis.[16] Robson et al. in a case series of 69 patients with EPC concluded that aggressive behavior might be the exception; as they reported 17, 10, and 20 percent that local recurrence, distant metastasis, and lymph node metastasis in EPC cases, respectively.[17] This issue is confirmed by some other researchers.[8-10,18]

It should be noticed that despite these case series, diagnosis, treatment, and prognosis issues of EPC are still provocative due to the lack of enough data on this disease. Some authors recommended the four histopathological findings as predictive factors in patients with EPC;[17-19] as lymphovascular invasion, and invasion depth of more than 7 mm or more than 14 mitoses per 10 high-power field (HPF) was associated with death, and infiltrative growth pattern was prognostic of local recurrence.[17,19]

Conflict of Interests

Authors have no conflict of interests.

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None.

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