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UNDERSTANDING THE LINK BETWEEN DEPRESSION AND PAIN PERCEPTION IN IRANIAN CANCER PATIENTS

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Abstract – *Objective:* *This study aimed to investigate the relationship between depression and pain perception in cancer patients.*

Patients and Methods: *In this cross-sectional study (from October to December 2015) 380 cancer patients were admitted to one of our hospitals associated with the Mazandaran University of Medical Sciences (Sari, Iran), and were entered to the study using accessible sampling. Data was collected by demographic questionnaire, depression scale of Center for Epidemiological studies and McGill pain questionnaire. The statistical package for social sciences, version 20.0 (SPSS Inc., Chicago, IL, USA) was utilized for data analysis by descriptive and inferential statistic tests, including Spearman's correlation and Generalized Linear models.*

Results: *Males (48.39±13±39; CI 95: 46.41-50.38) were older than females (45.33±18.44; CI 95: 42.79-47.87). There is a positive and significant correlation between pain perception and depression and there is a negative and significant correlation between depression and stages of cancer (p<0.05).*

Conclusions: *Considering the adverse effects of depression on the treatment process and secondary problems, more comprehensive studies should be conducted about the effects of depression on pain perception in order to take effective steps towards intervention and health promotion of these patients.*

KEYWORDS: *Depression, Cancer, Pain perception, Iran, Cross-sectional study.*

INTRODUCTION

Cancer can reduce a person's ability to play his/her role, leading to a feeling of lack of competence, thus reducing the individual's self-esteem and, eventually, causing psychological reactions such as depression, anxiety, and stress[1]. Several studies have acknowledged that depression is a common psychiatric disorder in cancer patients[2-4]. Depression is very detrimental to cancer patients because it reduces the individual's resistance against the disease[5]. The prevalence of advanced depression in cancer patients has been reported to be 1.5% to 30%[6,7]. Furthermore, cancer, as the most common chronic disease, is often accompanied with severe pain[8]. Cancer pain can have various causes, including tumor growth and spread, side effects of therapies such as chemotherapy, radiotherapy, surgery, and underlying diseases[9]. The prevalence of pain varies from 5% in patients with leukemia to 85% in patients with primary bone tumors[10]. There are several ways to treat and relieve the pain. One of the more popular methods involves the prescription of analgesics, but these drugs often have considerable side effects on patients, either physical or mental[11]. Besides conventional pharmacological methods of pain relief, a number of behavioral techniques

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have also attracted a degree of academic scrutiny of late[12,13], but researchers need to find and explain the various ways of pain relief in this group of patients[10]. Studies suggest a link between pain and depression in cancer patients. Pain and depression interact each other and aggravate the conditions[14]. The mechanism of the relation of pain and depression has not been clearly stated[15,16], but a study on the possible mechanisms of this relationship speculates on the sharing of the neural pathways and behavioral cycle change[17]. The results show that an increase in depression impairs part of the neural circuitry in the brain that regulates emotions, thus intensifying the perception of pain. In other words, the brain processes pain more accurately when a person is in a depressed mood, thus making pain unbearable[10]. Despite the high prevalence of cancer in Iran[16] and the need to investigate the complications associated with it, no studies have been conducted until now on the relationship between depression and pain in cancer patients. Therefore, the present study aimed to investigate the relationship between depression and pain perception in cancer patients.

PATIENTS AND METHODS

In this cross-sectional study conducted in 2015 (from October to December), 380 cancer patients were admitted to one of our hospitals associated with the Mazandaran University of Medical Sciences (Sari, Iran) and were recruited randomly. In four months, about 600 patients were admitted to the Oncology Unit of one of these hospitals; about 430 patients met the inclusion criteria (participation rate was 63.3%). Inclusion criteria included an age range of 18 years and above, cancer treatment with radiation, chemotherapy or surgery, and the ability to read and write Persian. The exclusion criteria included taking antidepressants in the last six months, the transfer of patients to other hospitals, and the occurrence of acute medical conditions (such as loss of consciousness).

Ethical Issue

After explaining the purpose of the study and how to complete the questionnaire, an informed consent form was signed by the eligible patients. Then, they were given the details of the study objectives and the questionnaires were distributed. If a question was vague, explanations were offered to the patients to make things clear. It should be noted that these explanations were given only in order to avoid ambiguity and were without bias.

Data Collection tools

Data was collected with the help of a socio-demographic questionnaire, the questionnaire of the Center for Epidemiologic Studies Depression Scale (CES-D) and McGill Pain Questionnaire (MPQ). The socio-demographic questionnaire sought data on age, sex, education level, economic status, history of drug use, family history of cancer, and the stage of cancer. *CES-D* is a 20-item tool used to assess symptoms associated with depression experienced in the past week[18]. Each of the 20 items available in this tool was given a score as per the Likert scale: 0 = rarely or never (less than one day), 1 = occasionally or in few cases (1 to 2 days), 2 = occasionally or a moderate amount of time (3 to 4 days), and 3 = most of the time or all the time (5 to 7 days)[14]. The total scores ranged from 0 to 60. Knight et al[14] have reported the reliability of this tool to be 0.88 using Cronbach's alpha. In this study, the reliability of the instrument in assessing Iranian cancer patients was calculated to be 0.741 by using Cronbach's alpha. *MPQ* includes 78 descriptive sentences out of 20 collections[9]. The patients were asked to select the most fitting description of their pain with just one word from each group. If all options in a group failed to provide an appropriate description of the pain, the patient was not free to choose an option from that group. When patients chose more than one option in each group, the highest rating (maximum pain) was chosen for the final analysis[19]. The score of each group was collected separately to calculate the final score. The MPQ total score is described as the "pain rating index based on the scores of the words," leading to a sum of the scores of each group[20]. The score range varies from 0 (when no word is selected) to 78 (maximum pain when selected in each group)[19]. Dworkin et al[21] calculated the reliability of this tool to be 0.77 using Cronbach's alpha. In the present study, the reliability of this tool was calculated to be 0.94 using Cronbach's alpha.

Statistical Analysis

The statistical package for social sciences, version 20.0 (SPSS Inc., Chicago, IL, USA), was used for data analysis. First, descriptive statistics for the continuous variables were shown as means with standard deviation (SD) and n (%) for the categorical variables. Spearman's correlations were used to probe the relationship between depression and pain perception. Finally, the predictors associating with pain perception were determined using the generalized linear models (GLM). Statistical significance was set at $p<0.05$.

RESULTS

The demographic characteristics of 380 cancer patients are summarized in Table I. Men's age (48.39±13.93; CI 95%: 46.41-50.38) was higher than the age of women (45.33±18.44; CI 95%: 42.79-47.87). About 69.7% of cases were at an early stage of the disease (Stage I-II) and 31.3% of them were in an advanced stage of cancer (Stage III-IV). It was found that 29.5% of them had a family history of cancer, 38.7% were with a history of a particular disease, and 18.7% had a history of drug use. The mean score of depression was (24.14±5.45; CI 95%: 23.59-24.69) in cancer patients. Moreover, the perception of pain was equal to (21.61+13.55; CI 95%: 20.36-22.17). The results of the Spearman correlation analysis to determine the association between depression and pain in cancer patients, showed that there was a significant positive correlation between the perception of pain and depression (r = 0.106; $p<0.05$), and this correlation was negative with respect to the stage of cancer (r = -0.337; $p<0.05$). According to the results of the GLM, there was a significant relationship between depression and the four stages of cancer in cancer patients (B = 0.046; $p = 0.032$). Also, according to Table II, there was a significant relationship between depression and level of education ($p<0.05$), average economic status (B = 1.6; $p = 0.027$), age (B = -0.048; $p = 0.046$), sex (B = 2.44; $p<0.001$), marital status (B = 3.8; $p<0.001$) and history of drug use (B = -2.36; $p = 0.001$) in cancer patients.

TABLE 1. Sample characteristics of cancer patients in the study.

Characteristic	*N (%)*
Sex	
– Male	175 (46.1)
– Female	205 (53.9)
Economic situation	
– Weak	110 (28.9)
– Average	204 (53.7)
– Good	66 (17.4)
Education	
– Illiterate	210 (55.3)
– Diploma	138 (36.3)
– BS	22 (5.8)
– MSc and above	10 (2.6)
Material	
– Single	51 (13.4)
– Married	329 (86.6)
Cancer stage	
– One	132 (34.7)
– Two	133 (35)
– Tree	92 (24.2)
– Four	23 (6.1)
Family history of cancer	
– Yes	112 (29.5)
– No	268 (70.5)
Depression	
– Down	261 (68.7)
– Up	119 (31.3)
History of drug use	
– Yes	71 (18.7)
– No	309 (81.3)
Past medical history	
– Yes	147 (38.7)
– No	233 (61.3)
Characteristic	***Mean (SD)***
Age	46.74 (16.328)
Pain	21.61 (13.55)
Depression	24.14 (5.45)

DISCUSSION

This study aimed to investigate the relationship between depression and pain perception in cancer patients. Based on our findings, the average score of cancer in patients was from moderate to high, a feature that has been reported in many studies[22-24]. Cancer can reduce a person's ability to play his/her role and create a feeling of lack of competence, thus reducing a person's self-esteem and, eventually, causing psychological reactions such as depression, anxiety and stress[25]. Also, the perception of pain in the present study was from moderate to low in cancer patients. These findings were also consistent with the findings of several studies[26-30]. It should be noted that the perception of pain, in the context of the cancer type and the stage of the disease, was different in various studies [31]. In most cases, factors such as lack of knowledge or fear of strong analgesics and their side effects, prevented the effective treatment pain, resulting the accentuation of the pain perception[32]. One of the most important results of the present study was finding a significant positive relationship between depression and pain perception in cancer patients. These results are consistent with the results of Farnam et al[33], Mollazade et al[34], Kroenk et al[35], Sullivan-Singh et al[36] and Mirghaforvand et al[37]. Among the possible mechanisms associated with this relationship, one can refer to Shared neural pathways and change of behavioral cycle[17]. The results show that an increase in depression impairs a part of the neural circuit in the brain that regulates emotions, intensifying the pain perception. In other words, the brain processes pain more accurately while a person is in a depressed mood and, as result, the perception of pain can become more acute[10]. In the present study, there was a significant difference between depression and the level of education, economic status, age, sex, marital status and a history of drug use in cancer patients, a trend consistent with other stud-

TABLE 2. Relationship between depression and its covariates in Iranian cancer patients.

Variable	B	SE	95%	CI	p
Education					
– Illiterate	7.486	1.5964	4.357	10.615	0.000[b]
– Diploma	6.715	1.5244	3.727	9.703	0.000[b]
– BS	3.324	1.6747	0.042	6.607	0.047[b]
– MSc and upper	0[a]	–	–	–	–
Economic situation					
– Weak	1.390	-.148	-0.148	2.927	0.077
– Average	1.609	-3.032	-3.032	-0.186	0.027[b]
– Good	0[a]	–	–	–	–
Cancer stage					
– One	10.934	8.590	8.590	13.277	0.000[b]
– Two	10.706	8.593	8.593	12.818	0.000[b]
– Tree	8.796	6.425	6.425	11.168	0.000[b]
– Four	0[a]	–	–	–	–
Age	-0.048	-0.095	-0.095	-0.001	0.046[b]
Sex	2.442	1.241	1.241	3.643	0.000[b]
Marital	3.795	2.032	2.032	5.558	0.000[b]
History of drug use	-2.366	-3.808	-3.808	-0.923	0.001[b]
Family history of cancer	0.395	-0.852	-0.852	1.641	0.535
PMH*	0.880	-0.167	-0.167	1.927	0.100
Pain	0.046	0.004	0.004	0.087	0.032[b]

[a] Set to zero because this parameter is redundant; [b] statistically significant at $p \leq 0.05$. **Past medical history.

ies[38-40]. Although the results of the study by Farnam et al[33] showed a positive and significant relationship between gender, occupation, depression and pain, they did not report a relationship between age, intensity of pain, and depression. Rayner et al[41] study showed there was no difference between the age of depressed and non-depressed groups. Several possible causes of this paradox can be the type of pain, the sample size, and the instruments used to determine depression.

Limitations

The most important limitation of this study was a lack of access to patients in other hospitals in the Mazandaran Province and Country. So, the small sample size makes it difficult to generalize the results correctly. The other limiting factor was cultural differences of the patients, a variable that was not controllable in this study. Impatience and imprecision of some of the patients in the completion of the questionnaire due to disease-related treatments could affect the results. It is suggested that, because of the importance of the issue, similar studies should be conducted more frequently in the future with a bigger sample size.

Application of Results

Depression, as a consequence of cancer, must be one of the important nursing diagnoses in healthcare centers. Given the prevalence of depression in these patients, holding psychotherapy sessions for early diagnosis of depression and, if necessary, therapy and use of antidepressants, must be started. Moreover, considering the significant effect of depression in the perception of pain, it is expected that by controlling depression in these patients, the pain tolerance threshold can be significantly controlled.

CONCLUSIONS

According to the results, a significant positive correlation was found between depression and the perception of pain in cancer patients. Also, there was a significant relationship between depression and level of education, average economic status, age, sex, marital status, and history of drug use in cancer patients. Regarding the adverse effects of depression and pain on the treatment process and secondary problems, more comprehensive studies must be done on the effects of depression on pain control in these patients, to take effective steps to promote the health of these patients.

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Author's role:
AH. G contributed to the study design, data collection, and the writing of the draft of the manuscript, A. J contributed to data collection, and the writing and revision of the draft manuscript, M. BN contributed to data analysis and the revision of the manuscript, and F. Z contributed to data collection and the writing of the draft of manuscript. All the authors approved the final version of the manuscript.

Conflict of interest:
There is no conflict of interest in the design of this study and the report of results.

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