Relationship between fatigue and depression in children with cancer undergoing chemotherapy

Abstract

Background: Fatigue and depression are the most common and annoying complaints in cancer patients undergoing chemotherapy and cancer patients feel more tired and stable than healthy people and this condition does not improve with enough sleep and rest. In addition, the psychological and social health of children with cancer may be severely affected as a result of the disease and its treatment.
Objectives: The present study aimed to investigate the relationship between fatigue and depression in children with cancer undergoing chemotherapy.

Methods: The present cross-sectional study was conducted on 65 children aged 7-12 years admitted under chemotherapy in the hospital (Isfahan, Iran) in 2015. Samples were selected by convenience sampling method and data were collected using the Multidimensional Scale of Child Fatigue and the Mariaquax Children and Adolescents Depression Inventory. Data were analyzed using SPSS software version 16 by descriptive and analytical statistics (correlation coefficient, regression).

Results: The average age of children was 9.55±1.95 and the average number of chemotherapy courses was 4.7±2.25. The mean score of depression in children was 20/11 ±4/65 and the score of fatigue in children was 63/11 ±22/45. Pearson correlation coefficient showed that there was a direct relationship between children's depression score and total fatigue score and all its dimensions (P<0.001, r=0/085). There was a direct relationship between fatigue and depression scores with demographic variables (P<0.05).

Conclusion: Early identification of symptoms of fatigue and depression in these children and counseling sessions should be considered. Also, teaching and counseling the parents of these children can play an effective role in controlling and managing these symptoms.

Keywords: *Fatigue, Depression, Children, Cancer, Chemotherapy*

Zahra Tahmasebi[1]*
Master of pediatric nursing, Borojen school of nursing, Shahrekord university of medical sciences, shahrekord, Iran E-mail address: zahratahmasebi92@gmail.com

Dr. Mostafa Roshanzadeh[2]
Department(s) and institution(s): Assistant Professor of Nursing Education, Borojen School of Nursing, Shahrekord University of Medical Sciences, Shahrehkord, Iran
E-mail address: mroshazadeh62@gmail.com

Zahra Babaei[3]
Department(s) and institution(s): Master's Degree in Child and Adolescent Clinical Psychology, Shahrekord University of Medical Sciences, Shahrehkord, Iran
E-mail address: Mitra.752001@yahoo.com

Introduction

1.Background

Cancer is one of the important and main issues of health and treatment in Iran and all over the world. Cancer is the second cause of death in America and the third cause of death in Iran (1). One of the age groups affected by cancer is children and teenagers. The prevalence of cancer in Iranian children is 1.4 percent (2). Although with recent advances in the treatment of children's cancers, more of these patients are saved from death (3), but the treatment period in this disease is still a very stressful experience in a child's life (4). And children undergoing cancer treatment experience physical and psychological problems such as fatigue, sadness, and depression (5,6).

Fatigue is the most common and bothersome complaint in cancer patients undergoing chemotherapy and patients with cancer feel more intense and persistent fatigue than healthy people, and this state does not improve with enough sleep and rest (7,8). This fatigue is different from other fatigues and it is a continuous, intense and painful state of mind that reduces the

ability of a person physically and mentally (9). Fatigue has a negative impact on the lives of cancer patients and causes a decrease in emotional, mental, social and physical functioning of the person (10-13). Studies show that cancer-related fatigue severely reduces the quality of life and is related to decreased survival and increased mortality (14 , 15).

In addition to fatigue, these patients are also exposed to severe mental pressures (16,17). Anxiety and depression are the second most common psychiatric diagnoses in these patients (18,19). Studies have shown that the prevalence of depression in cancer patients is 2 to 3 times higher than that of the normal population (20). The results of studies show that depression in children with cancer is more than healthy children, which can interfere with the process of the disease and its recovery (21). What is suggested as the necessity of conducting a study in this field is that depression at the same time as cancer is a risk factor in reducing the survival rate of cancer patients and is an important factor in the non-acceptance of treatment by these patients (22). Also, it has a negative effect on performance status, quality of life, length of hospitalization, and treatment

outcome (23). Depression and anxiety cause a lack of energy and interest in continuing the treatment and reduce the quality of life of cancer patients (24). In general, the simultaneous occurrence of depression with cancer leaves numerous side effects in various fields of personal and social life, mental and physical health, treatment and progress of the individual's disease; therefore, prevention, diagnosis and timely intervention in the field of depression disorder in cancer patients are of particular importance and necessity (22). Although fatigue is one of the symptoms of depression, there is a possibility that this symptom may appear without the presence of depression as a precursor and predictor variable for the occurrence of depression (25).

In a study that was conducted with the purpose of determining the relationship between maternal fatigue and postpartum depression, the results showed that the occurrence of fatigue in the last weeks of pregnancy and the postpartum period is related to the occurrence of postpartum depression and fatigue symptoms in pregnant women should be considered as predictors of postpartum depression (26). Also, the results of the study by Pourmovahed et al., which was conducted with the aim of investigating the relationship between fatigue and depression in students of Shahid Sadoughi University of Medical Sciences in Yazd in 2013, showed that there is a positive and significant relationship between fatigue and depression scores in students (27). The findings of the study by Wolfgang et al showed that fatigue is related to symptoms of anxiety and depression (28).

The analysis of various studies indicates that fatigue and depression are among the common problems of different groups such as pregnant women and students. In cancer patients, especially in children, this issue has not been investigated well, and the relationship between fatigue and depression has not been addressed.

2.Objectives

The purpose of this study was to investigate the relationship between fatigue and depression in children with cancer undergoing chemotherapy.

3.Methods

3.1. Study Design

The present study is a cross-sectional study that was conducted in Isfahan University of Medical Sciences, Iran. The population of this research was considered to be all children with cancer hospitalized in (Syed al-Shahda) hospital of Isfahan, Iran who were undergoing chemotherapy.

3.2. Study Setting and Participants

65 children were selected and enrolled in the study by the available sampling method. The criteria for entering this study include: children between the ages of 7 and 12 years, definitive diagnosis of cancer by a doctor, children who are at least in the third round of chemotherapy, absence of physical and mental retardation, no diagnosed anxiety and depression, not using psychotropic drugs or antidepressants and obtaining a minimum score of 12 on the Children's Depression Scale (CDI).

3.3. Data Collection and Measurement

In order to collect data, demographic information questionnaire (age, gender, number of chemotherapy courses and type of cancer), children's fatigue questionnaire, child report version, and depression questionnaire for children and adolescents were used.

The Pediatric Quality of Life Inventory (PedsQL) Multidimensional Fatigue Scale (MFS) by child self-report, designed by Varni et al. (1998) to measure fatigue in children, was used to assess fatigue(29). This scale had 18 items and 3 subscales: general fatigue (6 questions), fatigue during sleep and rest (6 questions) and cognitive fatigue (6 questions). The 5-point Likert scoring system is zero (never), almost never (1), sometimes (2), often (3) and almost always (4). The range of scores from zero to 100 is expressed as (zero: 100, 1: 75, 2: 50, 3: 25, 4: zero). Scores near zero indicate less tiredness and scores near 100 indicate more fatigue in children (29). This scale has a reliability of 0.92 (30). Due to the fact that this questionnaire has not been used in Iran, therefore, Wilde's method (2005) (31) was used for its translation and cultural adaptation. Finally, its content validity was calculated by the opinions of 10 faculty members of the university (content validity index: 0.81). The reliability of this questionnaire was investigated by the sample size of 30 children undergoing chemotherapy in this study and its Cronbach's alpha was reported as 0.77.

In order to check the level of depression in this research, the Maria Kovacs Children's Depression Inventory (CDI) (1981) was used, which is the most common self-measurement tool for depression for ages 7-17, which was compiled by Maria Kovacs and translated by Nasreen Akbarzadeh in Iran in 1991 and made reliable This tool contains 27 items, its options include zero, 1 or 2, and higher scores are a sign of increased severity. Zero means no sign of the disease, one means an average sign, and 2 means a definite sign of the disease. The total scores of this questionnaire range from 0 to 54. The cut-off point for diagnosing depressed people is a score higher than 18. 0 to 8 healthy, 9 to 19 symptoms of depression but without depression disorder, 20 and above is labeled as depression and the more it is, the higher the depression level will be (32). Also, this questionnaire is a valid and standard tool, which has been reported as 0.81 and 0.83 in most studies (33-34).

In order to conduct the study, after obtaining the necessary permits from the University of Isfahan and the hospital where the study was conducted, the questionnaires were completed by the researchers after obtaining the permission of the parents and children and explaining the purpose and working method

to them. In the child's room, the researcher read and explained each question of the questionnaires to the child and marked the option that the child chose; also, it took 20-25 minutes for each child to complete the questionnaires. 65 children who scored more than 12 in the depression questionnaire for children and adolescents and met other criteria for entering the study were selected as a sample and were included in the study and then the fatigue questionnaire was completed about them.

3.4. Data Analysis

The data were analyzed using SPSS version 16 software and using descriptive (mean and standard deviation) and analytical methods (t-test, one-way analysis of variance, Pearson correlation coefficient, and linear regression). To check the normality of the data distribution, the Kolmogorov-Smirno test was used, and to check the equality of variances, the Leven test was used by default in the t-test and one-way ANOVA tests. The use of significance level in the $P<0.05$ test was considered.

3.5. Ethical Considerations

All ethical considerations were considered in the process of conducting the study. The process of conducting the study was explained to the child and his parents, and written informed consent was obtained from the parents, as well as asking the child about their consent and desire to participate in the study. It was also emphasized on the confidentiality of the information and the freedom of the research samples to enter and leave the study. Considering that the questionnaire was completed by the researcher himself, all 65 questionnaires were completed and there were no distorted items.

4.Results:

The average age of the children was 9.55 ± 1.95, and the average number of chemotherapy courses was 4.7 ± 2.25. In terms of the frequency of the type of cancer, the most common type of cancer among children was leukemia. Evaluation of frequency distribution of quantitative variables using the Kolmogorov-Smiro test showed that the distribution of data was normal ($p>0.05$). The demographic characteristics of the children studied are reported in Table 1.

Table 1: Demographic characteristics of children with cancer undergoing chemotherapy (n=65)

Variable		Frequency (Percentage)	Depression (mean and standard deviation)	Fatigue (mean and standard deviation)
Sex	Female	27(41.5)	28/58±4/05	70/12±11/65
	Male	38(58.5)	31/99±8/95	65/17±10/99
	p-value (Test Statistics)		**P=0/107** **t=3/08**	**P=0/076** **t=3/54**
The type of cancer	Leukemia	33(50.76)	29/4±1/65	71/17±9/19
	Sarcoma	12(18.46)	29/4±6/35	76/97±8/06
	Brain Tumor	6(9.23)	32/15±9/66	85/12±11/66
	Lymphoma	5(7.69)	21/16±8/05	70/12±10/89
	Wilms' tumor	3(4.61)	37/4±9/11	65/12±8/13
	Neuroblastoma	3(4.61)	20/87±9/05	62/18±5/03
	Bone tumors	3(4.61)	32/99±6/15	60/92±9/93
	p-value (Test Statistics)		**P=0/065** **F=5/09**	**P=0/128** **F=1/58**

The mean and standard deviation of children's depression in this study was reported as 20.11 ± 4.26. And the mean and standard deviation of total fatigue and its dimensions in the children of this study were reported as an average of 63.11 ± 22.45. The mean and standard deviation of different dimensions of these variables are presented in Table 2.

Table 2: Mean and standard deviation of depression and fatigue scores and its dimensions in children with cancer undergoing chemotherapy (n=65)

Variable		Mean and standard deviation
Depression		20/11±4/26
Fatigue	General	62/65±7/61
	Sleep/Rest	59/54±8/11
	Cognitive	67/32±11/95
	Total	63/11±22/45

The Pearson correlation coefficient test showed that there is a direct and significant relationship between children's

depression score and total fatigue score as well as its dimensions (r=0.85, P<0.001). (Table 3)

Table 3: The relationship between the depression score and the fatigue score and its dimensions in children with cancer undergoing chemotherapy (n=65)

Fatigue	Depression	
	P-value	r
General fatigue	<0/001	0/91
Sleep/rest fatigue	<0/001	0/73
Cognitive fatigue	<0/001	0/61
Total fatigue	<0/001	0/85

Linear regression was used to predict depression through the dimensions of fatigue. Before performing this test, its presuppositions were checked. Tolerance statistic was used for collinearity in predictor variables, the amount of this statistic was calculated in this study as 0.5, which indicates low collinearity between predictor variables. Durbin-Watson test was used to check the independence of the errors, the value of which was obtained in this study was 2.054, which was in the range of 1.5 to 2.5 and it means no correlation between errors. To check the normality of the distribution of the dependent variables, the Kolmogorov-Smirno test was used, which in this study indicated the normality of the dependent variables (p>0.05).

Linear regression analysis to predict depression through the dimensions of fatigue indicated that 70% of the changes in depression can be predicted by fatigue (R^2=0.722). All fatigue dimensions can significantly predict depression (P<0.001). The unstandardized beta value showed that the contribution of the general fatigue dimension in predicting depression was 24.04, the contribution of the sleep and rest fatigue dimension in predicting depression was 17.56, and the contribution of the cognitive fatigue dimension in predicting depression was 27.24. The standardized beta value showed that by increasing one standard deviation in the general fatigue dimension, 0.345 standard deviations will be added to depression (standardized β=0.345). With an increase of one standard deviation in the sleep and rest fatigue dimension, 1.098 standard deviations will be added to depression (standardized β=1.098). With an increase of one unit in the standard deviation in the dimension of cognitive fatigue, 3.546 standard deviations will be added to depression (standardized β=3.546). (Table No. 4)

Table 4: Predicting depression through fatigue dimensions in children with cancer undergoing chemotherapy (n=65)

Predictive variables	standardized β	Standard error	unstandardized β	t value	P-value	R	R2	Adjusted R2
Constant value	-	43/45	44/12	11/01	0/001<	0/85	0/722	0.641
General fatigue	0/345	9/88	24/04	5/11	0/04			
Sleep/rest fatigue	1/098	11/45	17/56	7/01	0/03			
Cognitive fatigue	3/546	13/79	27/24	9/11	0/001<			

5.Discussion:

This research was conducted with the aim of investigating the relationship between fatigue and depression in children with cancer undergoing chemotherapy, and Pearson's correlation coefficient showed that there was a direct and significant relationship between the depression score of children and the fatigue score. Also, there was a direct, strong and positive relationship between depression score and total fatigue, general fatigue and sleep/rest fatigue, but there was a direct, positive and moderate relationship between depression score and cognitive fatigue score.

The results of the study by Haqit et al. (2007) revealed that nearly half of the cancer patients complained of fatigue. In addition, multivariate analysis showed that fatigue was significantly related to depression, pain, recent tamoxifen use, mastectomy, and anxiety. From the findings of the study, it seems that physical, emotional and mental complaints play a more important role in cancer fatigue compared to treatment factors (35). Also, the relationship between anxiety, depression and fatigue has been confirmed in the study of Serves et al. (2001). In this study, severe fatigue was associated with concentration and motivation problems, reduced physical activity, emotional health problems, and pain. There was also a relationship between fatigue and depression and anxiety, but no relationship was found between fatigue and the type of cancer, previous treatment methods, duration of treatment. (36). As a result, long-term fatigue is a serious problem after treatment. In addition to fatigue, these patients also experience many mental and physical problems.

In the study of Salari et al. (2008), the results of the study showed that the incidence of fatigue in the last weeks of pregnancy and postpartum period is related to the occurrence of postpartum depression and fatigue symptoms in pregnant women should be taken into consideration as predictors of

postpartum depression (26). Also, in the study of Pourmovahed et al. (2014), the results showed that there is a positive and significant relationship between the fatigue score and depression in students (27). Other studies have shown that fatigue is related to other symptoms such as anxiety and depression (28). Therefore, the results of the present study are consistent with the results of the above studies.

In addition, the findings of the present study showed a strong relationship between fatigue and depression. The most common model in this field is Syle's adaptation syndrome (1987). Hans Syle and his colleagues presented a broad theory to describe how organisms react to stress. Severe or stress reactions were presented under the title of general adjustment syndrome. According to this theory, a high level of anxiety leads to the experience of stress in a person, and when a person encounters a stressful event, the person becomes tired and depressed. This fatigue remains even after the stress or anxiety is gone. So according to this model, anxiety causes the body to get tired and this fatigue leads to depression symptoms (37). Therefore, according to the results of the present study and previous studies, the existence of a connection between fatigue and depression is not far from expected.

5.1. Limitations and Strengths

Among the limitations of the present study, we can mention the small sample size, which due to the small sample size in this region of the country, more samples were not available, and it is recommended to conduct studies with a larger sample size in other parts of the country.

5.2. Conclusions

The results of this research showed that the occurrence of fatigue symptoms in children with cancer undergoing chemotherapy is related to the occurrence of depression in them, and fatigue symptoms in these patients should be considered as a predictor of depression in these patients, and prevention of fatigue of children suffering from cancer under chemotherapy as one of the related factors will be effective in reducing their depression.

Therefore, the medical personnel should play an important role in maintaining their physical and mental health by identifying the symptoms of fatigue in children with cancer. Here it should be said that health systems through various methods such as providing game rooms, and methods such as massage, the use of acupressure, and painting techniques can reduce fatigue symptoms and plan to prevent depression of these children. Also, counseling services for the early identification of fatigue and depression symptoms can play an important role in preventing these complications in children. Informing parents in this field and educating them to help identify and improve fatigue and depression in these children can also play an effective role in the process of identifying and reducing these complications in children.

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