

RESEARCH ARTICLE

Quality of Life and Chemotherapy-related Symptoms of Turkish Cancer Children Undergoing Chemotherapy

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Abstract

This cross-sectional and descriptive study was designed to determine symptoms emerging due to chemotherapy treatment and their effects on children's quality of life. The research was carried out between February 2008 and February 2009 at the pediatric oncology clinics in four hospitals, focusing on 93 patients receiving chemotherapy. A survey form, the Pediatric Quality of Life Inventory (PedsQL 4.0) and the Memorial Symptom Assessment Scale (MSAS) were used as data collection tools. Chi-square and Student t tests were performed for data analysis. Some 51.6% of the children were aged 13-15 years old, and 51.8% were boys and 50.5% were diagnosed as having solid tumors. There were significant relations between: antimetabolite chemotherapeutics and feeling irritable and worrying ($p=0.001$, $p=0.030$); vinkoalkaloid and numbness/tingling in hands/feet ($p=0.043$); antracyclines and lack of energy and skin changes ($p=0.021$, $p=0.004$); and corticosteroids and lack of appetite, nausea and sadness ($p=0.008$, $p=0.009$, $p=0.009$). Several symptoms such as feeling sad, worrying and feeling irritable caused a significant decrease in the total domain of quality of life scores ($p=0.034$, $p=0.012$, $p=0.010$, respectively). Chemotherapeutic drugs can cause symptoms that can seriously affect quality of life in children.

Keywords: Children - cancer - chemotherapy - symptoms - quality of life - Turkey

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Introduction

Children experience many side effects related with chemotherapy during cancer treatment (Pizzo and Poplack, 2001; Andersen et al., 2006; Woodgate, 2008; Rodgersa et al., 2013). During cancer treatment, various symptoms including nausea and vomiting, appetite loss, anorexia, pain, fatigue, bone marrow suppression (anemia, leukopenia, and thrombocytopenia), alopecia, mucositis, skin problems, sleep problems; neurological problems are frequently reported by children and adolescents. The treatment-related side effect depends on the characteristics of the drugs (Miller and Kearney, 2001; Collins et al., 2002; Nagel, 2004; Pound et al., 2012; Krull et al., 2013; Rodgersa et al., 2013). Those side effects can cause many physical and psychological effects that have an adverse impact on the quality of life of cancer patients (Woodgate and Degner, 2003; Chou et al., 2007; Savage et al., 2008; Kaleyias et al., 2012).

Previous studies have examined the chemotherapy-related symptoms and their effects on quality of life of children and adolescents (Hockenberry et al., 2010; Klaassen et al., 2010; Kaleyias et al., 2012). However, most studies have focused on a single or few symptoms effect on quality of life (Hongo et al., 2003; Stone et al., 2003; Yılmaz et al., 2009). Several studies have

demonstrated that treatment related symptoms such as pain, nausea and fatigue on effect quality of life (Bergkvist and Wengström, 2006; Hockenberry and Hooke, 2007, von Lützu et al., 2012; Hansson et al., 2013). It is seen to affect the quality of life many of the symptoms.

Quality of life refers to the social, emotional, and physical outcomes of healthcare treatments as perceived by the children and adolescents with cancer. It has considerable changes in overall quality of life and dimensions in cancer patients (Tas and Yılmaz, 2008; Tremolada et al., 2011, Hansson et al., 2013).

Symptom controls in patients with cancer can make it possible to improve individuals' quality of life (Paice, 2004; Uyar et al., 2006; Hockenberry and Hooke, 2007). Linder (2005) reported that there have been very little literatures about the evaluation quality of life, determination of symptoms and their control in childhood cancer according to the research conducted by the Oncology Nurse Society (ONS) and the Association of Pediatric Oncology Nurses (APON).

In literature review, patients with cancer have great emotional symptoms and those have considerable effects on quality of life (Hongo et al., 2003; Fulcher, 2006; Meeske, 2007; Theunissen et al., 2007; Kaleyias et al., 2012). Kerr et al. (2007) stated that parents of children with cancer have required information about first

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sensitivity emotional in children care, physical and moral spiritual supports as well as care techniques applying for those patients.

In a study, healthcare professionals (n=32) have researched 165 of 202 physical symptoms and 44 of 103 psycho-social symptoms in children and adolescents with cancer (Theunissen et al., 2007). They found that quality of life in childhood and adolescents with cancer were affected especially in terms of sensitivity emotional symptoms, and nursing services care should be organized in accordance of these findings

Aim

The aim of this study was to evaluate relationship between chemotherapy and its related symptoms, and to document whether these symptoms affect children' quality of life in our patient population.

Materials and Methods

Design

The study was designed as descriptive and cross-sectional research, and was carried out in the pediatric oncology units of four children hospitals in Izmir between February 2008- February 2009.

Sample

Criteria for inclusion of volunteered patients taking part in the study: child with a diagnosis of cancer, who were within the first six months of the chemotherapy sessions, who were receiving chemotherapy, were 10-18 years-old; were able to communicate, read and write in Turkish. Patients were excluded if they had: a history of major depression or in the terminal period.

A total of 120 patients were seen in one year. Thirty-seven of these patients were not included in the study because; 18 patients did not within the first six months of the chemotherapy sessions, 10 patients were in the terminal period, 6 patients were in the preparation period for stem cell transplantation, 2 patients had mental retardation, one patient had major depression. The study was conducted in the remaining 93 patients.

Procedure

Institutional approval was taken by 4 children hospital in Izmir, Turkey. Potential participants (children) were informed about study, and were asked to participate in interview after their agreement. Parents and children signed an informed consent form for the questionnaire. Participants were told they could withdraw from the study at any time and that all information would be kept strictly confidential. Data were collected by face to face interview technique.

Symptoms and their characteristics during the last fifteen days after chemotherapy session were determined by researcher interview.

Data collection

Data were collected using Patient Information Form, PedsQL 4.0.0 (Pediatric Quality of Life Inventory) (8-12 age and 13-18 age), and MSAS (Memorial Symptom

Assessment Scale) (10-18 ages).

Instruments

Patient Information Form: This included questions about demographics such as age, gender, and illness (diagnosis, time elapsed since cancer treatment, chemotherapeutic agents, etc..).

Pediatric Quality of Life Inventory (PedsQL 4.0): The PedsQL consists of developmentally appropriate forms for children ages 8-12 years and ages 13-18 years. The scale was developed in 2001 by Varni et al. (Varni et al., 2001). The PedsQL 4.0 Generic Core Scales consist of 23 items applicable for healthy school and community populations, as well as pediatric populations with acute and chronic health conditions. The generic module comprises twenty-three items that contribute to four subscales: physical functioning (8 items), emotional functioning (5 items), social functioning (5 items) and school functioning (5 items). A five-point response scale is used. The instructions ask how much of a problem each item has been during the past one month. The response scale for each item was "never" (0), "almost never" (1), "sometimes" (2), "often" (3), and "almost always" (4). Responses were transformed to 100, 75, 50, 25, and 0, respectively, resulting in a scale range of 0-100, so that higher scores indicate better health-related quality of life. In this study the Cronbach alpha reliability coefficients for physical functioning subscale was 0.83, emotional functioning subscale was 0.75, social functioning subscale was 0.81, school functioning subscale was 0.47, and for the total scale 0.73.

Memorial Symptom Assessment Scale (MSAS): MSAS was developed in 2000 by Collins et al. to assess 30 cancer-related symptoms (Collins et al., 2000). The MSAS 10-18 for older children, provide children the opportunity to rate multiple symptoms with respect to symptom severity, frequency, and associated distress in addition to estimates of symptom prevalence. Likert scales were a 30-items patient-rated instrument. Twenty-two symptoms were evaluated for each of the three dimensions; frequency was not relevant for eight symptoms (e.g., weight loss), and for these only severity and distress were assessed. Symptoms were recorded as present or absent, and if present, were rated using 3- or 4-point scales for frequency, severity, and associated distress. The MSAS is one of the few available comprehensive cancer-related symptom assessment tools. In this study found that Cronbach alpha reliability coefficient the total scales 0.76.

Ethical considerations

The Ethics Committee of the Ege University Nursing School approved this study. The patients and parents were informed about the nature of the study and written content was obtained. Before starting the study, permissions to use the scales in this study were also obtained by the authors.

Statistical analysis

Data from the standardized questionnaire was coded and analyzed using the Statistical Package for Social Sciences (SPSS). Descriptive statistics and scales' means, standard deviation, minimum, maximum, median, and

percentage values were examined and, Chi-square and Student t test were also used. A p value less than 0.05 was considered as significant.

Results

Sample characteristics

Table 1 gives demographic and clinical characteristics of the patients. There were 58.1% male and 41.9% female, and the mean age was 14.01±2.06 years. The mean time at study since treatment beginning was 4.10±1.47 months. The most commonly administered chemotherapy drugs were antimetabolites, vinca alkaloids (43%), alkylating agents (41.9%), anthracyclines (32.3%) and corticosteroids (26.9%).

The relationship between symptoms and chemotherapy

A possible relationship between symptom experience by the patients and chemotherapy drugs were questioned.

As seen in Table 2, differences between the eight symptoms rates and chemotherapy drugs were found to be significant. In the study, feeling irritable and worrying was observed high in the antimetabolite group while experiencing symptoms of numbness and tingling in the hands and feet was high in the vinko alkaloid group (p=0.001, p=0.030, p=0.043, respectively).

Lack of energy and changes in skin were higher in the anthracycline group than those in the other groups (p=0.021, p=0.004, respectively).

Lack of appetite and nausea was found to be less in the corticosteroid group (p=0.008, p=0.009), but incidence of feeling sad was greater in this group (p=0.009).

Quality of life

The mean scores of the children for the four domains and total domain were determined. Mean scores were 63.11 (SD=35.38), 62.74 (SD=19.11), 71.72 (SD=22.12), 5.80 (SD=14.96) and 50.84 (SD=38.75) in the physical, emotional, social, school and total domains, respectively. The highest score of the PedsQL scale was in the social domain, and the lowest score was in the school domain.

Table 1. Demographic and Clinical Characteristics of Children

Variable	n	%	
Gender	Female	39	41.9
	Male	54	58.1
Age	10-12	21	22.6
	13-15	48	51.6
	16-18	24	25.8
Diagnosis	Leukemia and lymphoma	46	49.5
	Solid tumor	47	50.5
Time since treatment (month)	2	20	21.5
	3	20	21.5
	4	18	19.4
	5	17	18.4
	6	18	19.4
	Most common chemotherapeutic agents*		
Antimetabolites (MTX, Ara-C)	40	43	
Vinca alkaloids (Vincristine)	40	43	
Alkylating agents (Ifosfamide, cyclophosphamide, procarbazine)	39	41	
Anthracyclines (doxorubicine, daunorubicine)	30	32.3	
Cortisone	25	26.8	

*Multiple choices are marked

Table 2. Chemotherapeutic Drugs and Related Symptoms Experienced by the Children with Cancer

Symptoms		Antimetabolites		Vinca alkaloids		Anthracyclines		Corticosteroid									
		No		Yes		No		Yes									
		n	%	n	%	n	%	n	%								
Lack of appetite	Yes	43	81.1	30	75	45	28	28	70	50	79.4	23	76.7	58	85.3	15	60
	No	10	18.9	10	25	8	12	12	30	13	20.6	7	23.3	10	14.7	10	40
Statistics		X ² =0.508		P=0.611		X ² =3.000		P=0.083		X ² =0.088		P=0.767		X ² =6.928		P=0.008	
Nausea	Yes	38	71.7	29	72.5	42	79.2	25	62.5	45	71.4	22	73.3	54	79.4	13	52
	No	15	28.3	11	27.5	11	20.8	15	37.5	18	28.6	8	26.7	14	20.6	12	48
Statistics		X ² =0.007		P=0.932		X ² =3.174		P=0.075		X ² =0.037		P=0.848		X ² =6.820		P=0.009	
Lack of energy	Yes	37	69.8	29	72.5	36	67.9	30	75	40	63.5	26	86.7	47	69.1	19	76
	No	16	30.2	11	27.5	17	32.1	10	25	23	36.5	4	13.3	21	30.9	6	24
Statistics		X ² =0.080		P=0.777		X ² =0.554		P=0.457		X ² =5.297		P=0.021		X ² =0.420		P=0.517	
Feeling sad	Yes	30	56.6	28	70	32	60.4	26	65	43	68.3	15	50	37	54.4	21	84
	No	23	43.4	12	30	21	39.6	14	35	20	31.7	15	50	31	45.6	4	16
Statistics		X ² =1.743		P=0.187		X ² =0.208		P=0.649		X ² =2.885		P=0.089		X ² =6.818		P=0.009	
Worrying	Yes	16	30.2	21	52.5	22	41.5	15	37.5	25	39.7	12	40	25	36.8	12	48
	No	37	69.8	19	47.5	31	58.5	25	62.5	38	60.3	18	60	43	53.2	13	52
Statistics		X ² =4.737		P=0.030		X ² =0.153		P=0.696		X ² =0.001		P=0.977		X ² =0.963		P=0.326	
Feeling irritable	Yes	9	17	19	46.7	20	37.7	8	20	21	33.3	7	23.3	21	30.9	7	28
	No	44	83	21	53.3	33	62.3	32	80	42	66.7	23	76.7	47	69.1	18	72
Statistics		X ² =10.090		P=0.001		X ² =3.408		P=0.06		X ² =0.966		P=0.326		X ² =0.072		P=0.788	
Numbness and tingling	Yes	19	35.8	8	20	11	20.8	16	40	17	27	10	33.3	20	29.4	7	28
	No	34	64.2	32	80	42	79.2	24	60	46	73	20	67.7	48	70.6	18	72
Statistics		X ² =2.779		P=0.095		X ² =4.098		P=0.043		X ² =0.398		P=0.528		X ² =0.018		P=0.894	
Changes in skin	Yes	12	22.6	11	27.5	14	26.4	9	22.5	10	15.9	13	43.3	17	25	6	24
	No	41	77.4	29	72.5	39	73.6	31	77.5	53	84.1	17	56.7	51	75	19	76
Statistics		X ² =0.289		P=0.591		X ² =0.188		P=0.665		X ² =8.232		P=0.004		X ² =0.010		P=0.921	

Table 3. PedsQL Total Score and Subscale Scores in Relation to the Experienced Symptoms

Symptoms		n	Physical subscale		Emotional subscale		Total scale	
			M (SD)	Statistical values	M (SD)	Statistical values	M (SD)	Statistical values
Feeling nervous	Yes	72	63.54(35.98)	t=0.213	58.95 (18.51)	t=-3.781	49.37 (15.45)	t=-1.682
	No	21	61.66(34.07)	P=0.832	75.71(15.35)	P=0.000	55.89(16.21)	P=0.096
Lack of energy	Yes	66	57.95(34.64)	t=-2.248	60.75(18.93)	t=-1.578	49.48(16.07)	t=-1.303
	No	27	75.74(34.60)	P=0.027	67.59(19.03)	P=0.118	54.16(14.78)	P=0.196
Feeling sad	Yes	58	61.37(34.39)	t=-0.608	57.32(18.35)	t=-3.758	48.16(14.57)	t=-2.149
	No	35	66.00(37.29)	P=0.545	71.71(17.06)	P=0.000	55.28(16.88)	P=0.034
“I don’t look like myself”	Yes	42	62.14(34.37)	t=-0.241	58.21(20.74)	t=-2.111	48.83(14.29)	t=-1.115
	No	51	63.92(36.51)	P=0.810	66.47(16.97)	P=0.038	52.50(16.86)	p=0.268
Pain	Yes	37	62.16(36.06)	t=-0.211	57.16(19.45)	t=-2.343	48.78(14.47)	t=-1.025
	No	56	63.75(35.24)	P=0.834	66.42(18.13)	P=0.021	52.20(16.56)	P=0.308
Worrying	Yes	37	59.59(33.83)	t=-0.791	51.21(17.49)	t=-5.401	45.84(13.33)	t=-2.559
	No	56	65.44(36.48)	P=0.431	70.35(16.20)	P=0.000	54.15(16.49)	P=0.012
Feeling drowsy	Yes	34	65.00(39.58)	t=0.387	55.00(21.24)	t=-3.100	49.33(19.36)	t=-0.698
	No	59	62.03(33.03)	P=0.699	67.20(16.35)	P=0.003	51.71(13.39)	P=0.487
Feeling irritable	Yes	28	55.89(36.69)	t=-1.297	53.21(18.96)	t=-3.322	44.50(14.87)	t=-2.664
	No	65	66.23(34.63)	P=0.198	66.84(17.80)	P=0.001	53.57(15.47)	P=0.010
Constipation	Yes	26	50.00(29.86)	t=-2.277	57.69(18.77)	t=-1.610	46.92(12.62)	t=-1.504
	No	67	68.20(36.24)	P=0.025	64.70(19.02)	P=0.114	52.36(16.68)	P=0.136
Sweating	Yes	24	77.70(40.21)	t=2.405	66.45(21.64)	t=1.107	56.14(18.05)	t=1.939
	No	69	58.04(32.33)	P=0.018	61.44(18.15)	P=0.271	49.00(14.60)	P=0.056

Relationship between PedsQL and symptoms

In the groups of lack of energy, constipation and experiencing sweating, the physical subscale score was lower and this difference was significant ($p=0.027$, $p=0.025$, $p=0.018$, respectively). In the group of feeling nervous, feeling sad, “I don’t look like myself” pain, worrying, feeling drowsy and experiencing feeling irritable, the emotional subscale score was found to be lower, and such difference was also statistically significant ($p=0.000$, $p=0.000$, $p=0.038$, $p=0.021$, $p=0.000$, $p=0.003$, $p=0.001$, respectively). In addition, in the group of feeling sad, worrying and experiencing feeling irritable, total scale score was lower, and difference was significant ($p=0.034$, $p=0.012$, $p=0.010$, respectively) (Table 3).

Discussion

Studies report significant changes in many dimensions of the quality of life of cancer patients. The use of high doses of chemotherapy drugs for treatment of cancer patients has led to large number of symptoms or problems caused by those symptoms (Hedström et al., 2005; Thatcher et al., 2005; Hockenberry and Hooke, 2007; Atay et al., 2012; Krull et al., 2013).

Feeling irritable and worrying were higher in the group receiving antimetabolite drugs and such finding was found to be significant. It is thought that feeling irritable and worrying symptoms were not associated with use of drugs and different interactions, may play a role in experiencing these symptoms. In a study, it is emphasized that clarification of use of antineoplastic drug-related psychiatric conditions was difficult (Kantar et al., 2008). In the literature reviews, children receiving chemotherapy treatment have a huge number of emotional symptoms such as depression, anxiety, helplessness, hopelessness, irritability, psychotic disorder (Baser and Öz, 2003; Hongo et al., 2003; Meeske et al., 2007; Kantar et al., 2008).

A higher rate in symptoms of numbness and tingling in the hands and feet were reported in the group receiving vinca alkaloids, and this result was also significant. Vinca alkaloids can cause sensory or motor peripheral neuropathy (Beker, 2007; 2009) treated with vinca alkaloids experienced myalgia and arthralgia in lower extremities (Campbell et al., 2005). Our results concur with such literature.

Symptoms of lack of energy and changes in skin were found to be higher in the group receiving anthracycline, and the result was found to be significant. Anthracycline usually results in myelosuppression. The emergence of anemia in myelosuppression and fatigue symptoms are inevitable results.

Chemotherapy drugs can cause linear hyperpigmentation in skin (Can, 2005; Beker, 2007; Beker, 2009). Yoruk and Yukselgungor, (2003) stated that changes of nails or nail band in children with cancer were resulted from different combinations of chemotherapy drugs such as daunorubicine, idarubicine, vincristine and cyclophosphamide.

Symptoms of lack of appetite and nausea were found less, but symptom of feeling sad was higher in the group receiving corticosteroids, and this result was found to be significant. Many researchers (Wong and Hockenberry, 2003; Can, 2005; Beker, 2007; 2009; Kantar et al., 2008; Pound et al., 2012) reported that not only psychiatric disorders and depression, but also increase in appetite were resulted from use of cortisone. On the other hand, it is known that use of cortisone in patients with cancer reduces symptoms of nausea or vomiting.

Many studies have been conducted in the past using by Pediatric Quality of Life Scale, in healthy and children with chronic diseases (Varni et al., 2002; Upton et al., 2005; Meeske et al., 2007; De Bolle et al., 2008; Matzioua et al., 2008). Varni et al. (2002) reported that quality of life scores were 83.41 ± 14.88 and 68.92 ± 15.97

for healthy and children with cancer therapy, respectively. Upton et al. (2005) determined quality of life score of 66 children with cancer therapy by using same scale was 75.68 ± 15.40 . Matziou et al. (2008) reported that by using scale of the PedsQL in children and adolescents with and without exposing to the cancer treatment for 6-18 years of age group, patients' quality of life scores for physical, emotional, social, school domain and total scale were 55.83 ± 28.66 , 70.74 ± 21.33 , 77.58 ± 16.63 , 67.92 ± 18.93 and 69.18 ± 16.85 , respectively.

In our study, the social score for sub domain of quality of life of children with cancer were higher than other areas. In our country, children patients and their families are social supported by the effect of cultural and traditional structure as a result of this, it is thought that quality of life is higher than other areas. On the other hand in our study, scores of life quality for school and emotional domain in children are lower than other studies. The reason of low school domain score might be due to the hospitalization of adolescents for the treatment of cancer and interruption of schools to maintain treatment.

In addition, low emotional domain score was the indicator of quality of life affected the most.

In the present study, total score of quality of life scale of adolescents with cancer was found lower than other similar studies.

As to the relationship between PedsQL and symptoms, depending on the process of treatment of patients with cancer, quality of life is negatively affected from inability to adequately symptoms control and inappropriate care (Uyar et al., 2006).

In terms of experiencing symptoms of lack of energy, average scores of quality of life of physical domain were found to be significantly lower in the study group. Studies with cancer patients showed that quality of life was inversely affected from symptoms of lack of energy (fatigue) (Zebrack and Chesler, 2002; Hongo et al., 2003; Stone et al., 2003). Yilmaz et al. (2008) noted that children with cancer exposed to fatigue resulted in negative effects on studying areas activities, relationship with their friends, moral status, play activities, life energy and relationship with other family members. Especially in disease- and treatment-related fatigue, unhealthy statement and difficulties in meeting their own needs may cause some problems for those children (Erdem, 2006).

In our study, average physical domain score in experiencing symptoms of constipation group was found significantly lower. Wong and Hockenberry, (2003) found that constipation resulted from neurotoxic effects of treatment, changes in inactivity and nutrition had a negative effects on life of child (Wong and Hockenberry, 2003). In the study of Santucci and Mack (2007) reported that better management of nausea, vomiting, constipation, anorexia and cachexia symptoms may increase quality of life in cancer patients but constipation symptoms also results pain and nutritional problems (Santucci and Mack, 2007). It is thought that quality of life is negatively affected due to the time spend long in the toilet and difficulties in meeting discharge requirements in children experiencing symptoms of constipation.

The mean physical domain score of the group

experiencing symptoms of sweating was significantly lower, but sweating symptom has alone no effect on quality of life. This was thought that different situations played a role in such effect.

In the present study, mean scores of emotional domain of quality of life were significantly lower in experiencing symptoms of feeling nervous group. Common psychological problems such as becoming nervous and anger are widely observed in children and adolescents with cancer (Er, 2006). Stress has, not only effect on quality of life, but also on cancer-related physical symptoms and treatment results (Burns, 2001; Waldon, 2001).

It has often been observed that patients with cancer are obliged to cope with the symptoms of treatment and the adverse effects of the disease while they can get a proper education like other teenagers, spend their time with their peers and become an independent individual and express themselves. However, it was also widely assumed that because they have not been familiar with the diagnostic and curative procedures before and they have to stay in a hospital room instead of their own rooms in their houses, they experience these symptoms more severely, which eventually influences the adolescents' relation with their families (Er, 2006). Our study, therefore, is considered to reflect the moods and emotional status of adolescents.

Our results of the study suggested that emotional domain and total scale averages were considerably lower in the group with the symptoms of feeling sad. To have a cancer diagnosis causes fear, anxiety and depression in individuals (Bektaş and Akdemir, 2006). Since diagnosis and side effects of cancer have a long lasting effect which correspondingly influence family relations, school and social life of people, it may also result in loss of social roles, hopelessness, social isolation, exhaustion and depression (Er, 2006; Meeske et al., 2007; Rodgers et al. 2013). Beser and Öz, (2003) found that patients who experienced depression after chemotherapy illustrated significant differences in experiencing quality of life and symptoms (fatigue, pain, nausea and vomiting, dyspnea, sleeping difficulties, loss of appetite, constipation and diarrhea) (Beser and Öz, 2003). It was further reported that emotional status of adolescents were negatively affected by the symptoms caused by the nature of the disease, future anxieties, replacement of expectations and hopelessness and fear, the idea of losing their classmates and peers and pejorative diagnosis (Er, 2006). It seems unreasonable to expect from a sad child and adolescent to enjoy life and enhance their quality of life. The results emphasized the significance of providing emotional support for the adolescents.

Moreover, the group experiencing "I don't look like myself" had meaningfully lower mean scores in the emotional domain. It is similarly noted that adolescents with cancer may feel different about changes in their bodies (Tas and Basbakkal, 2009). Likewise, children with cancer may have stress symptoms due to cancer treatment-related hair loss (Savage et al., 2008). The studies also confirmed that patients who experienced bodily changes after chemotherapy were more likely to have significant increases in their anxiety-depression levels (Baser and

Öz, 2003). It is also specified that hair loss in children and adolescents with cancer adversely influences their body perception (Collins et al., 2000; Tas and Basbakkal, 2009). Our study results showed that common hair loss in adolescents with cancer is a considerably crucial determinant in creating self-alienation. It was concluded that changes in the physical appearance of adolescents adversely influenced their emotional status.

The study results also indicated that the group experiencing pain had meaningfully lower mean scores in the emotional domain. It has often been reported that cancer pain heavily influenced the quality of life physically, emotionally and spiritually, and insufficient pain management reduced their quality of life (Duggleby, 2000; Hansson et al., 2013).

Recent studies illustrated that cancer patients with no pain or moderate pain levels reportedly had much better health and wellness results than those who complained about severe and constant pain (Ferrell, 1995). Hockenberry and Hooke (2007) conducted a study and found that children experienced cancer treatment related fatigue, pain and insomnia, which often led to behavioral and physical changes (Hockenberry and Hooke, 2007).

The group who experienced worrying was reported to have meaningfully lower mean scores in the emotional domain and total scale averages. It was further suggested that cancer patients who felt worrying about their future demonstrated meaningfully higher increase in postchemotherapy anxiety (Baser and Öz, 2003; Er, 2006; Elçigil and Conk, 2010) and depression levels (Baser and Öz, 2003). It was also emphasized that stress symptoms reduced the quality of life of patients and adversely influenced the cancer related physical symptoms and treatment results (Burns, 2001; Waldon, 2001). Accordingly, it was considered that children had concerns about their future and experienced severe worrying.

The group feeling drowsy also showed meaningfully lower mean scores in the emotional domain in our study. Woodgate and Degner (2003) stated that children with cancer who felt dreadfully sleepy also complained about their well-being (Woodgate and Degner, 2003). The study results agreed that the quality of life of children who feeling drowsy were anticipated to be adversely influenced by depression and fatigue.

Our study results similarly proposed that the group who experienced feeling irritable had significantly lower mean scores in the emotional domain and total scale averages. It is doubtless that cancer cannot be regarded to be independent from emotional and social factors as it affects various aspects of life (Wong and Hockenberry, 2003; Er, 2006). Cancer mostly arouses fear, and it is considered to be equal to death, which brings out many psychological problems (Bektaş and Akdemir, 2006; Kantar et al., 2008).

In limitations, there were some limitations in this study. The sample in this study reflects only one area of Turkey. The findings, therefore, cannot be generalized to all children with cancer in Turkey.

In conclusion, in light of the study results, we report that there was a statistically significant difference between antimetabolite drugs and feeling irritable and worrying,

between vinca alkaloids and numbness and tingling in the hands and feet, between anthracycline drugs and lack of energy and changes in skin, and between corticosteroids and lack of appetite, nausea and feeling sad symptoms. The physical domain scores of the quality of life were found to be meaningfully lower in those who experienced lack of energy, constipation and sweating while the mean scores of the emotional domain were lower in the group who experienced feeling nervous, "I don't look like myself", pain, worrying, feeling drowsy and feeling irritable. The total scale score of the quality of life was significantly lower in those who feeling sad, worrying and feeling irritable.

It is noteworthy to report that the number of emotional symptoms that influenced quality of life were considerably higher than physical symptoms. We eventually recommend that the emotional characteristics of children with cancer should be evaluated and appropriate care initiatives should be implemented to improve their quality of life.

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