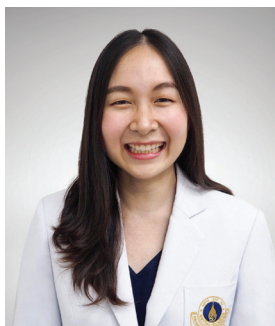


Symptom Experiences and Quality of Life in Adolescents with Cancer Receiving Cancer Treatments

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Abstract

OBJECTIVES: This descriptive correlational study aimed to explore symptom experiences, quality of life (QOL), and the relationship between these variables in adolescents with cancer receiving treatments.

MATERIAL AND METHODS: 25 adolescents, recruited from a university hospital, Thailand, diagnosed with various types of cancer; age 10-15 years; having received at least one cycle of chemotherapy. The participants reported their symptom experiences, using MSAS (10-18) and their QOL, using the pediatrics quality of life (PedsQL) 4.0. Descriptive statistics and Pearson's product-moment correlational coefficient were used to describe the results.

RESULT: Most of the participants were male (68%), with a mean age of 12.74 ± 20.44 years, and were diagnosed with hematological cancers (56%). They experienced a mean of 11.80 ± 5.61 symptoms. Dry mouth was found to be the most common and frequent symptom; swelling at arms or legs was rated as the most severe, and changes in the way food tastes was the most distressing symptom. All dimensions of symptom experiences had significant negative correlations with overall QOL ($p < 0.05$).

CONCLUSION: Symptom experiences and QOL among adolescent cancer patients after chemotherapy showed specific differences. Therefore, nurses should assess every aspect for both inpatient and outpatient departments, thereby leading to improved QOL.

Keywords: adolescents with cancer, symptom experiences, quality of life, cancer treatments

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Cancer is a major illness for adolescents globally. In Thailand, for the 2010-2012 period, the rate of cancer diagnosed in adolescents aged between 10 and 14 years was 10.2 per 100,000 for males and 9.4 per 100,000 for females. Among teenagers aged between 15 and 19 years, the incidence rate was found to be 12 per 100,000 for males and 14.6 per 100,000 for females.¹ Statistical reports from Ramathibodi Hospital in Thailand showed that the number of adolescents aged between 10 and 15 years who were diagnosed with cancer was equal to 30 and 29 in 2015 and 2016, respectively.^{2,3} This study focused specifically on adolescents aged between 10 and 15 years, because adolescents older than 15 are admitted to adult treatment facilities and are treated by non-pediatric physicians. Therefore, they are likely to receive different treatment protocols, which in turn would affect their symptom experiences and QOL.

Adolescents can be treated with various regimens that are usually used for both children and adults. They generally receive more intense, longer treatments, and may encounter adverse outcomes when compared to other age groups.⁴ These cancer treatments can cause a major disruption to adolescents' achievement of developmental tasks. Adolescents with cancer cannot perform usual activities and tend to depend on their parents, may drop out of school, and this can eventually impact their relationship with friends. This disruption to major developmental milestones leads to poor QOL.⁵⁻⁸ Health-related QOL is described as "an overall sense of well-being based on being able to participate in usual activities, to interact with others and feel cared about; to cope with uncomfortable physical, emotional and cognitive

reactions; and to find meaning in the illness experience".⁹ QOL has been used as an indicator to measure the effectiveness of treatment during various stages of treatment instead of using clinical data such as mortality and morbidity.⁹

Cancer and its treatment can produce multiple symptoms that affect the QOL of adolescents with cancer during treatment.⁵⁻⁸ Adolescents with cancer usually experience several unpleasant symptoms simultaneously, with an average range of six to ten symptoms.⁷⁻⁸ Several studies increasingly focus on the dimension of multiple symptoms rather than a single symptom. In particular, the number⁷, severity⁵⁻⁷, and distress⁷⁻⁸ of symptoms experienced by adolescents with cancer were found to be directly related to a lower level of QOL.

Nursing interventions should include an evaluation of symptom experiences and its relationship with QOL to manage symptoms effectively and improve better QOL in adolescents with cancer. Since symptom experiences is an individual subjective perception there may be variations between different cultures, leading to different perceptions of QOL.¹⁰ Children with cancer in Hong Kong who experienced more severe symptoms reported lower QOL.⁶ Adolescents with cancer in the United States also perceived lower QOL when they were faced with more severe and distressing symptoms.^{5,7-8} In Thailand, several studies have explored multiple symptoms experienced by younger children but little is known about symptom experiences in adolescents with cancer.¹¹⁻¹² The perception of symptoms of adolescents maybe differ from younger children. Only one study described multiple experienced symptoms of adolescents with cancer in terms of severity.¹¹ It showed that symptom severity had a negative correlation to functional status, which mainly focused on the physical aspect of patients.¹¹ The data about symptom experiences as well as QOL, which shows overall well-being in this unique group needs to be explored further in order to improve symptom management and QOL. Thus, this study aims to investigate the relationship between symptom experiences and QOL among adolescents with cancer receiving cancer treatments in Thailand. Consequently, the results will assist in detecting adolescents with cancer who might have poorer QOL and can guide nurses to plan nursing interventions to improve their QOL.

The Theory of Unpleasant Symptoms (TOUS) developed by Lenz et al.¹³ was selected as the conceptual framework for this study. TOUS proposes that symptoms are "perceived indicators of change in normal functioning as experienced by patients".¹⁴ Each symptom consists of four dimensions including intensity, time, distress, and quality which is influenced by many influential factors. Generally, several symptoms are simultaneously perceived by a person. Symptom experiences, therefore can be explained as experiencing multiple symptoms at the same time. The outcome of symptom experiences is performance including functional and cognitive activities.¹⁴

Based on this theory, QOL was conceptualized as performance because of its domains: physical, emotional, cognitive, and social functioning that reflect both types of performance.

This study focused on some particular dimensions of the symptoms, which were selected based on the literature review. The frequency of symptoms was not included in this study, because it is clear from the study of Collins and associates that frequent symptoms are usually reported similarly to severe symptoms.¹⁵ In the study framework, symptom experiences (the number of symptoms, symptom severity, and symptom distress) affects performance and overall QOL in adolescents with cancer.

Materials and Methods

This descriptive correlational study consisted of adolescents with cancer at both the inpatient and outpatient departments of Ramathibodi Hospital from February to June 2018. This study was approved by the Committee on Human Rights Related to Research Involving Human Subjects, Faculty of Medicine Ramathibodi Hospital, Mahidol University.

The inclusion criteria were as follows:

1. Adolescents with any type of cancer.
2. Aged 10-15 years.
3. Received at least one cycle of chemotherapy prior to their participation in this study, and receiving chemotherapy during data collection.
4. Able to communicate and understand Thai language.
5. Willing to participate in this study.
6. No diagnosis of mental illness or cognitive impairment.

The calculation for the sample size at the level of power = 80%, $\alpha = 0.05$; effect size = 0.5 ($r = -0.52$, the lowest correlation coefficient of Baggott and associates⁷) determined that 25 participants were required for this study.

Instruments

1. **The Demographic and Clinical Data forms** were used to collect general information about the participants, including their gender, age, date of birth, and educational level and disease characteristics including diagnosis and treatments.
2. **The Memorial Symptom Assessment Scale 10-18 (MSAS 10-18)** was developed by Collins and team.¹⁵ It covers 30 symptoms. This self-report instrument assesses each respondent's symptoms, as experienced during the previous week, in terms of the occurrence, frequency (1-4 scores), severity (1-4 scores), and distress (0-4 scores) of each symptom. If a symptom occurs, the patient rates each symptom's dimension. Higher scores indicate higher frequency, severity, and distress. The total number of symptoms was the number of symptoms reported by each participant. With regards to the mean symptom severity

and distress for the 30 symptoms, a zero value was used to calculate each symptom for the entire sample. The ranking of symptom frequency, severity, and distress was explained as a percentage of rating in 3-4 scores of each dimension. This instrument was translated to Thai using back-translation technique. The Cronbach's alpha coefficients in the pilot sample were 0.96, 0.90, 0.94, and 0.75 for the categories of total, psychological, physical, and global symptom distress. For the actual study sample, they were found to be 0.96, 0.90, 0.94, and 0.75, respectively.

3. **The Pediatric QOL Inventory Generic Core Scales Version 4.0** (PedsQL™) was developed by Varni and team¹⁶ specifically for children aged 8-12 and for teens aged 13-18 years (Thai version¹⁷). They consist of 23 items including physical, emotional, social, and school functioning. These items are used to assess the level of QOL of children and adolescents during the preceding month. For each item, there is a five-point Likert response scale, with the following meanings: 0 (Never a Problem) to 4 (Almost Always a Problem). To score this instrument, each person's response to the items is reversed to a 0-100 scale, as follows: 0 = 100; 1 = 75; 2 = 50; 3 = 25; and 4 = 0. Higher PedsQL 4.0 scores indicate better QOL. In the pilot sample, the Cronbach's alpha coefficients were found to be 0.93, 0.91, and 0.85 for the total, physical health, and psychosocial subscales. For the main study sample, they were found to be 0.89, 0.86, and 0.83, respectively.

Data Analysis

The demographic data, clinical data, symptom experiences, and QOL of participants were analyzed using various concepts of descriptive statistics. The relationships between each variable of symptom experiences and overall QOL were analyzed using Pearson's product-moment correlational statistics.

Results

A total of 26 adolescents with cancer met the inclusion criteria. Only one adolescent declined to participate in the study, citing inconvenience as a reason. Therefore, the study sample consisted of 25 adolescents with cancer. The majority of the adolescents were male (68%) with a mean age of 12.74 ± 20.44 years (range = 10.2-15.8 years). Sixteen participants (64%) had stopped attending school. The most common cancer diagnoses were hematological cancers (56%); leukemia (85.7%) and lymphoma (14.3%). The participants' length of time since diagnosis to their entry into the study ranged from 1 to 11 years (1.8 ± 31.58) with most (84%) less than 3 years. Thirty-six percent (36%) of the adolescents had been treated with surgery, in addition to chemotherapy, and slightly more than half of them (56%) had been treated as inpatients (Table 1).

Table 1: Demographics and characteristics (n = 25)

Variables	n (%)
Gender	
Male	17 (68)
Female	8 (32)
Age (years) (Mean±SD)	12.74 ± 20.44
Educational status	
Not attending school	16 (64)
Attending school	9 (36)
Types of cancer	
Hematological cancer	14 (56)
Acute Lymphoblastic Leukemia	10
Acute Myeloid Leukemia	2
Lymphoma	2
Solid tumor	11 (44)
Brain tumor	6
Sarcoma	5
Time since diagnosis (years) (Mean±SD ; Median)	1.8 ± 31.58 ; 1
< 3 years	21 (84)
3-6 years	2 (8)
> 6 years	2 (8)
Recurrence of cancer	
No	21 (84)
Yes	4 (16)
Types of prior cancer treatments	
Chemotherapy	25 (100)
Surgery	9 (36)
Radiation	6 (24)
Treatment setting	
Inpatient (IPD)	14 (56)
Outpatient (OPD)	11 (44)
Symptoms experienced from previous chemotherapy administration	
Fatigue	12 (48)
Loss of appetite	10 (40)
Nausea	8 (32)
Pain	6 (24)
Vomiting	4 (16)
Constipation	2 (8)
Other (dizziness, fever, diarrhea, worrying)	7 (28)

Symptom Experiences

According to MSAS 10-18, the participants experienced a mean number of 11.80 ± 5.61 symptoms. The mean rating of the symptom frequency was 0.82 ± 0.46 , with a symptom severity rate of 0.62 ± 0.41 , and a symptom distress rate of 0.40 ± 0.42 (Table 2). The number of experienced symptoms, or the prevalence rate of symptoms among the participants, ranged from 1 to 23 symptoms. More than half of the participants experienced dry mouth (80%), lack of appetite (68%), and lack of energy (64%) (Table 3). The most frequent symptom was

dry mouth (45%), followed by numbness (40%), and lack of energy (37.5%). The most severe symptom was swelling of arms or legs (33.3%) as well as hair loss (30%), and nausea (28.6%). The most distressing symptom was changes in the way food tastes (42.9%) followed by swelling of arms or legs (33.3%), and lack of energy (31.3%). There were differences

in every dimension of each symptom. The prevalence of each symptom was not related to its rate of frequency, severity, or distress. Dry mouth was reported to be the most common and frequent symptom, but not as the most severe or distressing symptom for them (Table 4 and Figure 1).

Table 2: The symptom experiences on MSAS 10-18 scores (n = 25)

MSAS 10-18	Possible range	Range	Mean \pm SD
Median age (Number of symptoms experienced)	0 - 30	1 - 23	11.80 \pm 5.61
Symptom frequency	0 - 4	0 - 4	0.82 \pm 0.46
Symptom severity	0 - 4	0 - 4	0.62 \pm 0.41
Symptom distress	0 - 4	0 - 4	0.40 \pm 0.42

Table 3: The experienced symptoms (n = 25)

No.	Symptom	n (%)	No.	Symptom	n (%)
1	Dry mouth	20 (80)	16	Dizziness	9 (36)
2	Lack of appetite	17 (68)	17	Constipation	9 (36)
3	Lack of energy	16 (64)	18	Changes in skin	9 (36)
4	Nausea	14 (56)	19	Sweating	9 (36)
5	Feeling drowsy	14 (56)	20	Feelings of sadness	8 (32)
6	Diarrhea	13 (52)	21	Change in the way food tastes	7 (28)
7	Pain	12 (48)	22	Feeling nervous	7 (28)
8	Itching	12 (48)	23	Worrying	7 (28)
9	Cough	12 (48)	24	Mouth sores	7 (28)
10	Vomiting	11 (44)	25	Difficulty concentrating	7 (28)
11	Feeling irritable	11 (44)	26	Shortness of breath	6 (24)
12	Weight loss	11 (44)	27	Difficulty swallowing	6 (24)
13	"I don't look like myself"	11 (44)	28	Numbness	5 (20)
14	Hair loss	10 (40)	29	Swelling at arms or legs	3 (12)
15	Difficulty sleeping	10 (40)	30	Problems with urination	2 (8)

Table 4: The overview of total 30 experienced symptoms by sample in every dimension (n = 25)

No.	Symptom	Symptom prevalence	Symptom frequency rating	Symptom severity rating	Symptom distress rating
		n (%)	Mean \pm SD	Mean \pm SD	Mean \pm SD
1	Dry mouth	20 (80)	2.30 \pm 0.98	1.55 \pm 0.69	0.75 \pm 0.91
2	Lack of appetite	17 (68)	2.06 \pm 0.83	1.65 \pm 0.79	1.06 \pm 1.09
3	Lack of energy	16 (64)	2.13 \pm 1.09	1.81 \pm 1.05	1.38 \pm 1.41
4	Nausea	14 (56)	2.14 \pm 1.10	1.86 \pm 1.17	1.5 \pm 1.35
5	A feeling of being drowsy	14 (56)	2.07 \pm 0.62	1.29 \pm 0.47	0.64 \pm 0.84
6	Diarrhea	13 (52)	1.69 \pm 0.75	1.46 \pm 0.52	0.85 \pm 0.69
7	Pain	12 (48)	2.25 \pm 0.87	1.67 \pm 0.65	1.17 \pm 1.12
8	Itching	12 (48)	1.83 \pm 0.84	1.50 \pm 0.67	0.83 \pm 1.03
9	Cough	12 (48)	1.67 \pm 0.89	1.08 \pm 0.29	0.50 \pm 0.80
10	Vomiting	11 (44)	2.00 \pm 0.89	1.64 \pm 0.81	1.27 \pm 1.10
11	Feelings of being irritable	11 (44)	2.18 \pm 0.75	1.73 \pm 0.79	0.91 \pm 0.83
12	Weight loss	11 (44)	NE	1.45 \pm 0.82	0.55 \pm 0.82
13	"I don't look like myself"	11 (44)	NE	1.27 \pm 0.47	0.91 \pm 0.83
14	Hair loss	10 (40)	NE	2.10 \pm 1.37	1.40 \pm 1.71
15	Difficulty sleeping	10 (40)	1.60 \pm 0.84	1.20 \pm 0.42	1.00 \pm 0.82
16	Dizziness	9 (36)	2.00 \pm 0.71	1.67 \pm 0.71	1.33 \pm 1.23
17	Constipation	9 (36)	NE	1.78 \pm 0.98	1.22 \pm 1.30
18	Changes in skin	9 (36)	NE	1.78 \pm 0.67	1.11 \pm 1.05

No.	Symptom	Symptom prevalence n (%)	Symptom frequency rating Mean \pm SD	Symptom severity rating Mean \pm SD	Symptom distress rating Mean \pm SD
19	Sweats	9 (36)	2.11 \pm 0.60	1.11 \pm 0.33	0.22 \pm 0.67
20	Feelings of sadness	8 (32)	2.25 \pm 1.28	1.75 \pm 0.89	1.13 \pm 0.99
21	Change in the way food taste	7 (28)	NE	2 \pm 0.82	1.86 \pm 1.57
22	Feeling of being nervous	7 (28)	1.43 \pm 0.54	1.57 \pm 0.79	1.14 \pm 1.07
23	Worrying	7 (28)	1.71 \pm 0.95	1.57 \pm 0.79	0.86 \pm 1.22
24	Mouth sores	7 (28)	NE	1.86 \pm 0.69	1.57 \pm 0.54
25	Difficulty concentrating	7 (28)	2 \pm 0.56	1.14 \pm 0.38	0.57 \pm 0.54
26	Shortness of breath	6 (24)	1.83 \pm 0.75	1.67 \pm 0.82	1 \pm 1.10
27	Difficulty swallowing	6 (24)	1.67 \pm 0.52	1.17 \pm 0.41	0.83 \pm 0.41
28	Numbness	5 (20)	2.4 \pm 1.14	1.8 \pm 0.84	1.4 \pm 1.34
29	Swelling at arms or legs	3 (12)	NE	2 \pm 1.73	1.67 \pm 2.08
30	Problems with urination	2 (8)	1 \pm 0	1 \pm 0	0

NE = not evaluated

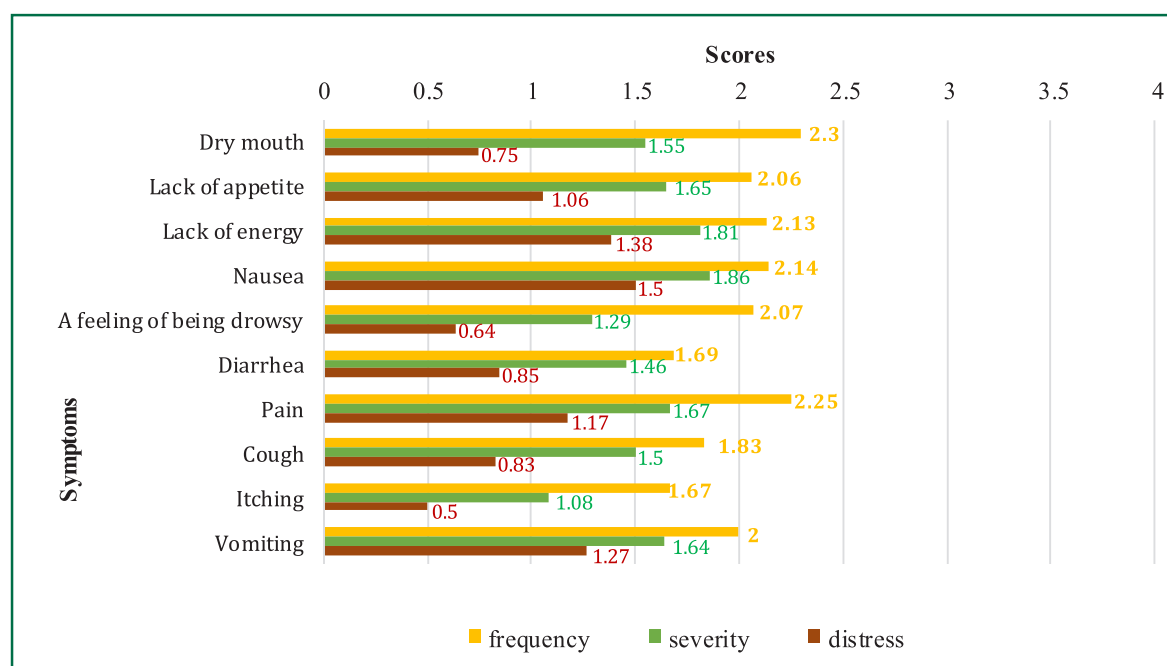


Figure 1: The 10 most prevalent symptoms with mean frequency, severity, and distress ratings

Quality of Life (QOL)

Regarding QOL, the participants reported a mean total score of QOL of 72.09 (SD = 16.70). The mean scores of each aspect of QOL revealed that most of the participants had high scores in the following aspects of their QOL: 1) Social (84 scores); 2) Emotional (77.40 scores); 3) School (68.4 scores); and 4) Physical functioning (63.63 scores).

Relationship between Symptom Experiences and QOL

In regards to the correlation between symptom experiences and QOL, each dimension of symptom experiences (the number

of symptoms experienced; symptom severity; and symptom distress) was negatively correlated with overall QOL, with the statistical significance at $p < 0.05$ ($r = -0.597$, -0.594 , and -0.582).

Discussion

The result of this study showing that the participants experienced a mean of 11.8 symptoms is similar to the study of Baggott and associates⁷ (10.6 symptoms). The most prevalent symptom experienced by the participants was dry mouth. Most of the participants were in their first year after their diagnosis of cancer, during which patients usually receive intense and

frequent treatment cycles. Almost half of them were receiving high doses of methotrexate at the time of data collection, and so they mostly experienced dry mouth. Methotrexate generally affects normal cells in the same way as malignant cells, and so the healthy cells, especially the oral mucosa, tend to be damaged. As a result, most patients first experience oral pain or dry mouth, followed by oral mucositis.¹⁸

Given these reasons, dry mouth was also reported as the most frequent symptom during the first 7 days after chemotherapy administration. In contrast, Collins and associates¹⁵ found that problems with urination was the most frequent symptom in adolescents who were receiving chemotherapy and those who were off treatment, while this study consisted only of adolescents who were receiving treatment. Therefore, the symptoms were differently perceived by both groups.

In terms of symptom severity, the mean rating of symptom severity was 0.62 which was similar to Baggott and associates⁷; 0.7. Swelling of the arms or legs was reported as the most severe symptom. Most of the chemotherapy agents which the participants received were administered intravenously, which involves receiving a large volume of fluid. Most of them were also given hydration, prior to the administration of their chemotherapy. Therefore, many of the participants experienced swelling at arms and/or their legs. Furthermore, inactivity during hospitalization is another possible reason for experiencing swelling.

In regard to symptom distress, the mean rating was 0.40. Changes in the way food tastes was rated as the most distressing symptom. Besides methotrexate, vincristine and cyclophosphamide were given most often to participants. Vincristine damages several cranial nerves and can lead to changes in a person's swallowing and tongue movements, usually leading to altered taste sensations. Cyclophosphamide also interferes with the glossopharyngeal nerve, leading to altered perceptions of taste among patients.¹⁹ Patients, consequently, are not able to eat or drink as usual. In addition, most Thai culinary dishes involve a taste combination of sweet, sour, and salt. Therefore, experiencing taste alterations while receiving cancer treatment could contribute to loss of appetite, weight loss, and malnutrition which can affect the effectiveness of cancer treatments. This is why participants perceived changes in food taste as their most distressing symptom.

Quality of Life (QOL)

According to the results, the participants reported an average overall QOL score of 72.09, indicating a high QOL. This was similar to the study done on children in Thailand with chronic health conditions; 72.7.¹⁷ In terms of the subscales, they had a high average QOL, according to social, emotional, school, and physical functioning.

Social functioning was rated with the highest average score (84), showing that these participants had the ability to get along with others and to keep contact with their friends. Most of them had to stop attending school during their treatments. However, due to the modern technologies of various forms of social networking, the adolescents tended to have the opportunity to keep in contact with their relatives and friends. Therefore, they did not feel different from their healthy friends in terms of social interaction, as shown by their high scores of QOL in the area of social functioning. In the same way, there was no difference in this regard for both patients and healthy groups.^{7,17}

The participants reported emotional functioning with an average score of 77.4. This can be explained by some aspects of Thai culture. That is, Thai parents usually encourage their children, using both words and various activities, so that these participants are able to cope with the unpleasant experiences of both the progression of their disease and the side effects of their cancer treatments. Consequently, most of them felt that they had not been abandoned to fight cancer alone.²⁰

Adversely, these participants had a low QOL in school functioning, with an average score of 68.4. Most of them had stopped attending school during their treatment, causing them to fall behind academically. There was a significant difference between the QOL in this area among healthy Thai children and those with chronic health conditions.¹⁷ Likewise, Sandeberg and colleagues²¹ found that those children who did not attend school while receiving cancer treatment reported a low QOL. The physical functioning obtained the lowest scores among these participants, with a mean score of 63.63. This is consistent with the results of Baggott and team.⁷

Experiencing symptoms simultaneously forced the participants to confront unpleasant physical problems. Consequently, they were not able to perform many activities of daily life, thereby leading to a lower QOL. Also, Thai children with chronic health conditions generally had lower scores in the area of physical functioning than healthy children.¹⁷

Relationship between Symptom Experiences and QOL

This study shows that the symptom experiences of adolescents with cancer (the number of symptoms experienced, symptom severity, and symptom distress) negatively correlate with their overall QOL. This was congruent with the findings of previous studies.^{5,7}

The number of experienced symptoms had a significant negative correlation with overall QOL. Experiencing several symptoms simultaneously can result in patients being unable to perform daily activities, leading to a low QOL in all areas. In a study conducted by Baggott and associates,⁷ adolescents with cancer, while they were receiving treatments, experienced more symptoms and reported a lower total QOL, as compared to those who had fewer symptoms.

Severity of symptoms negatively correlated with QOL, at a significant level of 0.05. The intensity of symptoms perceived by adolescents with cancer is likely to increase when they experience multiple symptoms at the same time with the accompanying impact on their QOL. This finding was congruent with several previous studies.^{5,7}

Symptom distress was also found to have a significant negative correlation with QOL. This is, because, during their cancer treatment regimens, adolescents with cancer generally experience various symptoms concurrently, and these co-occurring symptoms catalyze each other and, thus, tend to contribute to a low QOL. Similarly, in the study done by Baggott and associates⁷, most adolescents with cancer also reported that distressing symptoms affected their levels of QOL. Moreover, Hinds and associates also discovered that the degree of symptom distress could predict the QOL among children and adolescents who had either acute myeloid leukemia or osteosarcoma.⁸

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Conclusion

Symptom experiences and QOL in adolescents with cancer after receiving at least one cycle of chemotherapy shows specific differences in every dimension of each symptom. Therefore nurses are advised to assess every dimension of each symptom during chemotherapy for both inpatients and outpatients to ensure better QOL.

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