

The Effectiveness of Palliative Care Program on Symptoms Management and Psychosocial Health among Adolescents Receiving Chemotherapy

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Abstract

Background: Palliative care focuses on the relief of suffering and management of distressing symptoms among adolescents receiving chemotherapy as well as promoting adolescents' psychosocial health. **The study subjects** were composed of a purposive sample of 60 adolescents with cancer and receiving chemotherapy. **Setting:** The study was conducted at the pediatric oncology ward in a children's Hospital affiliated to Ain Shams University Hospitals, Cairo, Egypt. **Tools:** data was collected by using 1) an Interview Questionnaire Format 2) Palliative Care Knowledge Scale; 3) Symptoms Management Questionnaire; 4) The Multidimensional Anxiety Scale for Children 2; 5) The Children Depression Symptoms Inventory 2. 6) Social interaction with others: **Results** of the study revealed that a statistically significant difference before, and after implementation of palliative care program regarding palliative care knowledge scores (t test= 7.62 with P value < 0.001) and symptoms management questionnaire scores as regards daily activities, physical autonomy, social issues, and psychological issues (t test= 3.22, 7.69, 2.14, 3.89, 2.98, and 4.78 respectively with P value ≤ 0.05) Also, the results revealed statistically significant differences in total mean scores of the multidimensional anxiety scale and depression symptoms inventory scores before and after implementation of the program (t-test 10.62, 5.72 respectively with P value ≤ 0.05). **Conclusion:** The palliative care program has a significant effect on the adolescents' symptoms management and their psychosocial health, the studied adolescents improved their mean scores regarding knowledge, symptoms management anxiety and depressive symptoms, and social interaction after implementing the palliative care program. **Recommendation:** A palliative care program should be implemented as an intervention protocol at the time of cancer diagnosis and throughout all stages of cancer treatment.

Keywords: Palliative Care Program, Symptoms Management, Psychosocial Health, Chemotherapy, Adolescents.

Introduction:

Cancer represents the fourth leading death among adolescents, about 1.2 billion adolescents worldwide die from cancer (UNICEF, 2011), and the number between 5000 to 6000 per year adolescents die from cancer in the United States (American Cancer Society, 2022). Based on the National Cancer Registry Program (NCRP), in Egypt, the incidence rate of cancer in adolescents is about 10.5%, and incidence rates face to grown over the years (Ibrahim et al., 2014). According to Pediatric Oncology Care in Egypt, the number of childhood cancer survivors within 5 years was calculated at about 40% (Soliman et al., 2021).

Chemotherapy is a type of systemic cancer treatment aimed at stopping or slowing the growth of cancer cells. Chemotherapy medications attack rapidly growing cancer cells, but they can also affect healthy cells (Abalo et al., 2017). There are massive side effects and complications of chemotherapy such as hair loss, nausea and vomiting, and disturbance of adolescent appearance. These physical problems affect how adolescents feel, as well as how they relate to their families and communities (Feroli et al., 2018).

The physical and psychological impact of cancer and chemotherapy on adolescents have serious emotional and social consequences. The severity of the symptoms negatively affects the adolescents' perception

of their body image, and their academic achievement compared to others of the same age. Moreover, their relationships with peers, negative self-esteem, anxiety regarding the disease's future, and depression are also affected. The intensification of chemotherapy and its maintenance phases, which may last for 2–3 years can induce difficulty in controlling physical symptoms and elevate psychosocial problems among adolescents (Grassi et al., 2017; Ferioli et al., 2018).

Palliative care is a program aimed at enhancing adolescents' quality of life and their psychosocial aspects by managing physical symptoms because of the disease process and intensified chemotherapy. Palliative care is an important approach and part of health team providers, especially nurses. Therefore, it is important for nurses to develop palliative care intervention programs based on the adolescent's needs and problems that help to participate the patients and their families in decisions (Osse et al., 2007; Mallon et al., 2021).

Significant of the study:

Based on the National Cancer Institute Surveillance, Epidemiology, and End Results report (2022), there is the possibility of growing cancer at the adolescent stage. There are about 8400 children in Egypt estimated to develop cancer and 24% of these children will die due to inadequate treatment and management. Palliative care is specialized care that focuses on relieving suffering of cancer symptoms, pain, and psychosocial problems because of disease and complications of chemotherapy. The palliative intervention program is the essential role of oncology nurses to provide patients with sufficient knowledge and required skills to adapt to cancer. Therefore, the current study aims to evaluate the effectiveness of palliative care program on symptoms management and psychosocial health among adolescents receiving chemotherapy.

Aim of the study:

To evaluate the effectiveness of a palliative care program on symptoms management and psychosocial health among

adolescents receiving chemotherapy through the following:

1. Assess the adolescents' knowledge about the palliative care program before its implementation.
2. Assess the adolescents' ability to manage their symptoms before implementing the palliative care program.
3. Assess the adolescents' psychosocial health before implementing the palliative care program.
4. Develop and implement the palliative care program based on the adolescents' needs.
5. Evaluate the adolescents' ability to manage their symptoms and psychosocial health after implementing the palliative care program.

Research hypothesis:

H1; Adolescents who receive chemotherapy may have more ability to manage their symptoms after implementing the palliative care program.

H2; Adolescents who receive chemotherapy may improve their psychosocial health after implementing the palliative care program.

Subjects and Methods:

Study design

This study is quasi-experimental (one group pre-posttest).

Study setting

The study was conducted at a pediatric oncology ward in a children's hospital affiliated to Ain Shams University Hospitals.

Study subjects

A purposive sample of 60 adolescents with cancer and receiving chemotherapy with inclusive criteria:

- Age from 12-18 years.
- From both sexes.
- Free from co-morbid physical or psychiatric disorders.
- Confirmed diagnosis of cancer from one year.

- Receiving chemotherapy and appear physical changes in their bodies.
- Adolescents who did not receive any previous palliative care program.

Exclusive criteria:

- Terminal ill adolescents.
- The adolescents undergo bone marrow or stem cell transplantation.

Sample size:

A sample size of 60 adolescents was determined by using the Fishers' formula z^2pq/d^2 . It is based on the sample criterion and approval as well as the statistical equation. By adjusting the power of the test to 80% and the confidence interval to 95% with a significance level at 0.05, the sample size was estimated as follows:

$Z\alpha$ = Standard normal deviation for $\alpha = 1.7800$.

$Z\beta$ = Standard normal deviation for $\beta = 0.7816$.

$B = (Z\alpha + Z\beta)^2 = 7.1889$.

$C = (E/S\Delta)^2 = 0.1517$.

$N = B/C = 53.8772$.

Tools for data collection

Data was collected by using the following tools and translated into simplified Arabic Language by a language expert:

Tool (1): Interview Questionnaire Format:

It was constructed by researchers in the Arabic language and composed of three parts.

- **First part:** included the demographic characteristics of studied adolescents as regards their age, gender, residence, and level of education.
- **Second part:** included adolescent's disease history as regards their medical diagnosis, previous surgical operation, and presence of postoperative scare
- **Third part: Adolescent Physical Assessment Sheet** included physical symptoms among adolescents receiving chemotherapy of the respiratory system, digestive system, nervous system, urinary tract system, musculoskeletal system, hair, vision, mouth, and skin.

Tool (2): Palliative Care Knowledge Scale (PaCKS):

It was developed by Kozlovet al., (2018). It self-reported 13 questions in the form of true/false PaCKS items about various domains of palliative care knowledge. The number of correct responses was tallied, and scores ranged from 0 (lowest knowledge) to 13 (highest knowledge). "I don't know" responses were scored as incorrect when calculating total PaCKS scores. Studied adolescents submitted their knowledge as follows:

- Unsatisfactory level $< 60\%$ ($0 < 7$)
- Satisfactory level $\geq 60\%$ ($8 \leq 13$).

Tool (3): Symptoms Management Questionnaire (SMQ):

It was developed by (Osse, Vernooij-Dassen & Schadé et al, 2007). It is a short form to assess problems and needs related to the palliative care program as well as the patient's abilities to control and manage their undesirable symptoms of the disease process and side effects of the cancer therapy. The questionnaire was modified by researchers to fit the problems and needs of adolescents with cancer as well as to suit their identifiable developmental stages. The questionnaire consists of 33 questions distributed into 8 domains: daily activities (3 items), physical symptoms (12 items), autonomy (4 items), social issues (5 items), psychological issues (5 items), and spiritual issues (4 items). Patients' response yes= zero which means the patient has specific needs or problems or no= one, which means the patient does not have a specific need or problem.

Scoring system:

- 0- 11= Low ability to manage symptoms.
- 12-22= Moderate ability to manage symptoms.
- 23- 33= High ability to manage symptoms.

Tool (4): The Multidimensional Anxiety Scale for Children 2 (MASC2):

The original scale was designed by March (2013). It is a pediatric self-report scale

that contains 50 items comprised of two major indexes (anxiety disorders index, and inconsistency index). The scale measuring total anxiety as well as the subscale on physical or somatic symptoms harms avoidance, social anxiety, generalized anxiety, and separation anxiety. Separation anxiety items (1-9) generalized anxiety items (10-19), social anxiety items (20-28), obsessive-compulsive and physical symptoms items (29-38), and harm avoidance items (39-50).

Scoring system:

The instrument uses a Likert scale such that any item from (0= never), (1= rarely) (2 = sometimes), and (3 = often).

- Mild anxiety <50%
- Moderate anxiety 50-70%
- Severe anxiety >70%

Tool (5): The Children Depression Symptoms Inventory 2 (CDI2):

It was adapted from Kovacs (2010), to assess the manifestation of depression in adolescents with cancer. It involved a 27-item self-rated symptoms-oriented scale suitable for individuals aged from 7-17 years. It included a five-factor structure that assesses negative mood, interpersonal problems, ineffectiveness, anhedonia, and negative self-esteem. Negative mode items (1-9), ineffectiveness items (10-14), interpersonal problems items (15-18), anhedonia items (19-22) and negative self-esteem items (23-27).

Scoring system:

The rating of this scale from 0 (absent of depression symptoms), 1 (indicating mild depression symptoms) to 2 (indicating definite depression symptoms). The total score ranges from (0-54).

- Mild depression <50%.
- Moderate depression 50-70%.
- Severe depression >70%.

Tool (6): Social interaction with others:

It was adapted from Baron (2009), it consists of 27 questions, answered by yes or no to assess the social interaction of adolescents with others.

Scoring system:

Each question answered yes was scored as zero and one mark to the question answered no. The total score was collected and according to the answers of children interaction was clarified as $\geq 60\%$ interacted, $< 60\%$ non-interacted.

0-9= Low level of social interaction

10-17= Moderate level of social interaction

19-27= High level of social interaction

Validity:

The Content validity of the tools was reviewed by 5 experts, one expert in oncology nursing, two experts in pediatric nursing, and two experts from the psychiatric/mental health nursing department, Faculty of Nursing, Ain Shams university for evaluating face and content validity and to judge their clarity, comprehensiveness, accuracy, relevance, and whether they elicited the type of information.

Reliability:

The internal reliability of data collection tools was determined by Cronbach's Alpha as follows:

Tool	Cronbach Alpha
Interview questionnaire format	0.92
SMQ	0.87
MASC2	0.91
CDI2	0.89
Social interaction with others	0.92

Ethical consideration:

The research approval was obtained from the ethical committee in the Faculty of Nursing, Ain Shams University, Egypt with a research ethical code (23.05.64). An agreement letter was obtained from the director of the Children's Hospital to conduct the study. Each adolescent included in the study was fully informed about the purpose and the study method, as well as oral consent, was obtained. They guarantee that all the gathered data will be confidential and will be used for research purposes only. The researcher assures maintaining anonymity and confidentiality of the subjects' data included in the study. Adolescents were informed that

they were allowed to withdraw from the study at any time.

Pilot Study:

A pilot study was carried out on 10% of the total studied adolescents in the previously mentioned settings to test the clarity and applicability of the study.

Fieldwork

The actual fieldwork was conducted from the beginning of April to the end of June 2023. The researchers selected the studied adolescents according to the previously mentioned inclusive criteria from the study settings. The researchers explained the purpose and method of the study to each adolescent and accompanying parents to obtain their written consent to be recruited in the study. The palliative care program was conducted through the following phases:

Assessment and planning phase:

During the assessment phase, the researchers interviewed each adolescent and accompanying parent reviewed the personal data and disease history and treatment, and discussed the physical symptoms associated with chemotherapy as well as anxiety and depression symptoms and social interactions with others to obtain a holistic understanding and prioritize the suffering needs of each adolescent participated in the study. After discussion, the researchers with the adolescent and accompanying parents established the goals of the palliative care program aimed at (1) supporting the adolescent by providing direct care for symptoms management by relief of pain, physical, emotional, social, and spiritual symptoms associated with chemotherapy, (2) maximize adolescents' comfort which consequently enhances their psychological health. The time needed to complete the interview was 45 minutes.

The most common symptoms reported by the studied adolescents were various types of somatic pain, shortness of breath, difficulty in swallowing, loss of appetite, nausea, vomiting, constipation, feeling sick and weak, hair loss, change of skin color, sweating, loss

of weight, flu-like symptoms, and sleeping problems.

Based on a comprehensive review of related literatures **Docherty et al., (2012) & Knops et al. (2015)** and adolescent needs assessment, pediatric palliative care program sessions were designed including objectives, teaching content, timing, teaching materials, and palliative care program booklet.

The program booklet content was reviewed by three experts in pediatric nursing, palliative care specialists, and psychiatric mental health nursing to confirm its safety, validity for covering objectives, the accuracy of information as well and representativeness. The program booklet involved palliative care interventions for symptoms management and psychological health and was categorized using color schema as green for "do", yellow for "consider" and red for "don't".

Implementation phase:

The palliative care program sessions were conducted over a period of three months through 8 sessions, 30 minutes for each session. The researchers met the studied adolescent two times per month for three consecutive months, in addition to communicate with them as they preferred through using of social media platforms or phone call and followed the adolescent's health conditions. The researchers complied with the safety measures for infection control during the session throughout the program and wear personal protective barriers (face mask, gloves, and gown) during the session to decrease the risk of cross infection of the participated adolescent due to immunocompromised related to cancer treatment.

The researchers distributed program content, teaching materials, and a palliative care program booklet to all adolescents who participated in the study. The program booklet was distributed and explained to all studied adolescents and their parents at the beginning of the program to manage their symptoms related to chemotherapy by applying daily palliative care interventions to relieve distressing symptoms and maximize adolescents' comfort.

Evaluation phase:

After three months of applying palliative care sessions, each adolescent was interviewed individually to evaluate the effectiveness of the program on managing adolescent's symptoms and psychological

health by using the previously mentioned study tools.

Summary of the palliative care program sessions

Sessions	Symptoms	Session content
(1)	- Adolescent's needs assessment. - Assessment of symptoms (physical & psychological)	- Discuss the aim of palliative care program. - Assess adolescent's physical and psychological problems and needs by using the previously mentioned study tools.
(2)	- Palliative care program for managing chemotherapy related physical & Psychosocial symptoms.	- Discussing the importance and components of palliative care programs interventions focusing on cancer and chemotherapy related physical symptoms. - Effects of cancer and chemotherapy symptoms on psychosocial health of adolescence.
(3)	- Pain - Shortness of breath and cough and related stress management	- Practicing non-pharmacological pain management techniques with prescribed analgesics (e.g., relaxation, distraction strategies, kinesthetic massage, and journaling). - Practicing breathing exercises to relief shortness of breath and cough.
(4)	- Fatigue and generalized weakness. - Sleeping problems and sleep hygiene. - Sweating	- Practicing fatigue reducing activities (e.g., scheduling adolescent's activities of daily living, organizing adequate rest time and keeping a diary to determine fatigue and activities. - Practice sleep hygiene measures such as provide adequate sleeping time with a day nap without environmental stimulants. - Encourage drinking of fluids to decrease sweating and generalized weakness.
(5)	- Nausea, vomiting and loss of appetite. - Oral mucositis - Constipation	- Use non-pharmacological with prescribed pharmacological measures to reduce nausea and vomiting. - Eliminating factors triggering nausea and vomiting. - Practicing measures that increase adolescent's appetite. - Using mouthwashes and oral care for prevention of oral mucositis - Encouraging daily activities such as walking in addition to prescribed laxatives.
(6)	- Emotional regulation among adolescence.	- Emotional awareness. - Unhealthy ways to cope with negative emotions. - Emotion regulation strategies.
(7)	- Hair loss, skin, and nails changes - Dealing with body image changes	- Provide hair and skin care such as scalp protection by gentle brushing, avoiding pulling of hair, use lotion and avoid wearing tight-fitting shoes. - Ways to improve adolescence body image and self-esteem.
(8)	- Social engagement and participation.	- Enhance school re-integration. - Assertiveness skills. - Tips to improve social skills.

Statistical design

Data collected from the studied sample was revised, coded, and entered using a personal computer (PC). Computerized data entry and statistical analysis was carried out using the Statistical Package for Social Sciences (SPSS) version 26.

Results:

Table (1) shows that the mean age of the studied adolescents was 14.63 ± 4.64 and 70% of them were aged between 12 and 15 years. 58.3% of the studied adolescents were female gender. Regarding educational level and academic ranking, 75% of them were in preparatory schools, and 40.0% achieved the

third level or more. Furthermore, 68.3% of the studied adolescents lived in urban areas.

Table (2) reveals that 68.3% of the studied adolescents were diagnosed with leukemia and did not have previous surgeries.

It is observed from **Table 3** that the common physical symptoms among studied adolescents were fatigue (100%), joint Pain (91.7%), and weakness in the hand or foot (80.0%). Also, the studied adolescents suffered from difficulty in swallowing, feeling sick, and vomiting constituting the same percentage (78.3%). Chest pain and loss of appetite, pain during urination, hair loss, and change in skin color prevailed among them and have the same percentage (76.7%).

Figure (1) shows that the studied adolescents had moderate physical health changes (44.3%), followed by low changes (30.7%).

Table (4) illustrates the knowledge about the Palliative Care Knowledge Scale before and after the program. There was a significant improvement in the total mean score from 6.71 to 11.84 (P-value significant at 0.001).

Table (5) reveals that there were significant rises in the mean scores regarding symptoms management among the studied adolescents after program implementation. The mean scores increased in all SMQ domains except for the spiritual issues. Daily activities, physical autonomy, social issues, and psychological issues changed their mean scores from 1.33, 4.77, 2.01, 2.84, 2.91 to 2034, 7.28, 3.04, 3.22, and 3.44 respectively. So, there was a statistically significant difference in the total mean score comparison, after the program implementation (P- Value= 0.05).

Table (6) clarifies the MASC2 subscales as reported by the studied adolescents. The mean scores of separation anxiety and social anxiety subscales statistically significantly decreased after the program implementation from 23.74, and 18.22 to 18.71 and 13.23 respectively. While the other subscales were not statistically significantly changed. Furthermore, the total mean score statistically significantly changed in favor of the studied adolescents from 100.91 to 87.98 (P- Value significant at 0.05).

Table (7) shows the statistically significant differences between the pre- and post-program implementation regarding CDI2. The studied adolescents improved their responses in both subscales; ineffectiveness, and interpersonal problems (the mean statistically significantly decreased from 5.48, and 5.25 to 8.38, and 8.95 respectively). So, a significant difference was found in the total mean of CDI2 (P-value significant at 0.05).

Table (8) shows that there were significant differences among studied adolescents regarding the mean score of SIQ after program implementation. The studied adolescents improved their responses (mean changed from 16.11 to 22.75 and P Value= 0.05).

Table (9) studies the relationship between the total studied adolescents between the five scales (PaCKS, SMQ, MASC2, CDI2, and SIQ) after the program implementation. There was a strong positive correlation between the variables; PaCKS, SMQ, and SIQ, Pearson's correlation test = r (after) = 0.663, 0.613 respectively. Meanwhile, a moderate negative correlation between PaCKS, MASC2, and CDI2, Pearson's correlation test = r (after) = -0.408, -0.461 respectively.

Table (1): Distribution of demographic characteristics among the studied adolescents (n=60).

Items	No.	%
Age (years)		
9-<12 years	8	13.3
12-<15 years	42	70
15-≤18 years	10	16.7
Mean ± SD	14.63±4.64	
Gender		
Male	25	41.7
Female	35	58.3
Educational stage		
Primary	7	11.7
Preparatory	45	75.0
Secondary	8	13.3
Academic ranking		
First	17	28.3
Secondary	19	31.7
Third or more	24	40.0
Residence		
Urban	41	68.3
Rural	19	31.7

Table (2): Distribution of disease history among the studied adolescents (n=60).

Items	No.	%
Diagnosis		
Leukemia	41	68.3
Solid tumor	26	31.7
Previous surgical operations		
No	41	68.3
Yes	26	31.7
Post-operative scar(n=26)	9	34.6

Table (3): Distribution of physical symptoms associated with chemotherapy among studied adolescents (n=60).

Items	No.	%
Respiratory system		
Chest pain	46	76.7
Difficulty or shortness of breath	41	68.3
Continuous cough	23	38.3
Difficulty in swallowing	47	78.3
Digestive system		
Loss of appetite	46	76.7
Sick	47	78.3
Vomiting	47	78.3
Constant burning sensation in the stomach	16	26.7
Constipation	39	56.0
Diarrhea	27	45.0
Nervous system		
Constant headache	43	48.8
Fainted more than once.	23	25.0
Weak in the hand or foot	42	80.0
Difficulty in concentration and attention	37	42.5
Urinary system		
Pain during urination	38	71.7
Presence of blood in urine	12	20.0
Change in the color of the urine	37	61.7
The musculoskeletal system		
Joints Pain	55	91.7
Muscle stiffness	16	26.7
Hair		
Hair loss.	45	75
Alopecia	35	58.3
Vision		
Eye infections	45	75
Double vision	13	21.7
Mouth		
Oral pain	40	66.7
Bleeding from gum	14	23.3
Dry mouth	17	28.3
Infection sores in the mouth	12	28.3
Skin		
Color change	43	71.7
Infections	11	18.3
Itching	9	15
Bleeding and bruises under the skin	6	10
Others		
Fever	40	66.7
Sweating	41	68.3
Loss of weight	42	70
Increase in weight.	5	8.3
Sleep problems	42	70.0
Continuous flu	43	71.7
Fatigue	60	100

The number is not mutually exclusive

Figure (1): Percentage distribution of physical health changes among the studied adolescents (n=60)

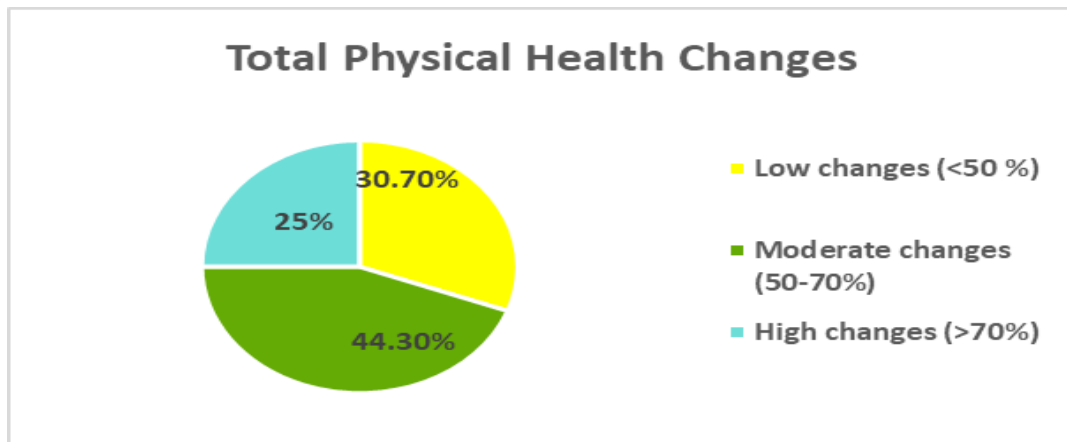


Table (4): Comparison of mean scores among studied adolescents regarding the total Palliative Care Knowledge Scale (PaCKS) before and after the program (n=60).

	Before		After		t-test	P-value
	Mean	SD	Mean	SD		
Total PaCKS	6.71	3.24	11.84	4.41	7.62	0.001***

* = Statistically significant at 0.05 ** = Statistically significant at 0.01 *** =Statistically significant at 0.001

Table (5): Comparison of mean scores among studied adolescents regarding the Symptoms Management Questionnaire (SMQ) domains before and after the program (n=60).

SMQ domains	Before		After		t-test	P-value
	Mean	SD	Mean	SD		
1. Daily activities	1.33	1.41	2.34	0.66	3.22	0.05*
2. Physical symptoms	4.77	3.31	7.28	1.32	7.69	0.01**
3. Autonomy	2.01	1.23	3.04	0.95	2.14	0.05*
4. Social issues	2.84	1.52	3.22	0.89	3.89	0.05*
5. Psychological issues	2.91	1.04	3.44	0.93	2.98	0.05*
6. Spiritual issues	2.15	2.05	2.86	0.56	2.68	0.166
Total SMQ	16.01	10.29	22.18	5.31	4.78	0.05*

* = Statistically significant at 0.05 ** = Statistically significant at 0.01 *** =Statistically significant at 0.001

Table (6): Comparison of mean scores among studied adolescents regarding the Multidimensional Anxiety Scale for Children2 (MASC2) subscales before and after the program (n=60).

MASC2 Subscales	Before		After		t-test	P-value
	Mean	SD	Mean	SD		
1. Separation anxiety	23.84	3.62	18.71	5.31	9.46	0.05*
2. Generalized anxiety	18.22	5.36	17.89	5.21	10.52	0.154
3. Social anxiety	18.14	5.27	13.23	4.33	9.11	0.05*
4. Obsessive-compulsive and physical symptoms	18.58	4.82	16.82	5.22	10.83	0.071
5. Harm avoidance	22.13	5.91	21.33	6.24	9.55	0.105
Total MASC2	100.91	24.98	87.98	26.31	10.62	0.05*

* = Statistically significant at 0.05 ** = Statistically significant at 0.01 *** =Statistically significant at 0.001

Table (7): Comparison of mean scores among studied adolescents regarding the Children Depression Symptoms Inventory 2 (CDI2) subscales before and after the program (n=60).

CDI2 Subscales	Before		After		t-test	P-value
	Mean	SD	Mean	SD		
1. Negative mood	13.84	3.09	11.11	3.31	5.58	0.091
2. Ineffectiveness	8.33	2.38	5.84	3.66	4.38	0.05*
3. Interpersonal problems	7.92	1.82	5.25	4.01	4.35	0.05*
4. Anhedonia	5.58	2.62	4.82	3.26	4.62	0.089
5. Negative self-esteem	6.13	2.68	6.22	3.08	5.33	0.138
Total CDI2	41.8	12.59	33.24	17.32	5.72	0.05*

* = Statistically significant at 0.05 ** = Statistically significant at 0.01 *** = Statistically significant at 0.001

Table (8): Comparison of mean scores among studied adolescents regarding the total SIQ before and after the program (n=60).

SIQ	Before		After		t-test	P-value
	Mean	SD	Mean	SD		
Total	16.11	8.19	22.75	4.02	8.86	0.05*

* = Statistically significant at 0.05 ** = Statistically significant at 0.01 *** = Statistically significant at 0.001

Table (9): Correlation between PaCKS, SMQ, MASC2, CDI2, and SIQ among the studied adolescents (n=60).

The studied variable	Total PaCKS	Total SMQ	Total MASC2	Total CDI2	Total SIQ
Total PaCKS	r test P value				
Total SMQ	r test P value	0.663 0.01**			
Total MASC2	r test P value	-0.408 0.05*	0.733 0.001***		
Total CDI2	r test P value	-0.461 0.05*	-0.784 0.001***	0.879 0.001***	
Total SIQ	r test P value	0.613 0.01**	0.633 0.01**	-0.679 0.01**	-0.689 0.01**

Correlation is significant at the 0.05 level **Correlation is significant at the 0.01 level

*** Correlation is significant at the 0.001 level

Discussion:

Cancer is considered a life-limiting disease and meets many challenges because of the negative physical symptoms, the side effects of the treatment, and the activity limitations as well as the social and psychological burden associated with the disease process (Niedziedz, et al., 2019). Palliative care is a management method aimed at enhancing adolescents' quality of life who live with life-limiting diseases like cancer by helping them manage their physical symptoms and providing psychosocial support (WHO, 2022). So, the aim of the current study was to evaluate the effect of palliative care program on symptoms management and psychosocial health among adolescents receiving chemotherapy.

Concerning the demographic characteristics of studied adolescents, their mean age was 14.63±4.64 and more than half of them were

females, this finding was supported by Nabowy, (2019) who assessed "the effect of physical changes related to chemo and radiotherapy on the psychosocial status of adolescents with cancer" and found that 50.4% was females adolescents, with mean age 13.73±4.67.

As regards the medical history, about two-thirds of the studied adolescents were diagnosed with leukemia, this can reflect the statistical and epidemiological studies that most cancer types among adolescents are leukemia (Arber, et al. 2016; Chimed, et al. 2018; Wagner, et al. 2018; Heron, 2019).

Concerning physical health changes among the studied adolescents, about two-thirds of them suffered from moderate changes and high changes in physical symptoms because of the disease process and side effects of chemotherapy. This could be because about four-fifths of the

studied adolescents reported physical complaints in the current study such as joint pain and weakness in the hand or foot. Furthermore, more than three-quarters of them suffered from difficulty in swallowing, feeling sick, and vomiting, chest pain and loss of appetite, pain during urination, hair loss, and change in skin color. All the studied subjects suffered from general fatigue, especially after the intensified course of chemotherapy. The results agreed with **Erickson, et al. (2013)** who studied “symptoms and symptom clusters in adolescents receiving cancer treatment” and found that most of the studied adolescents suffered from physical symptoms, especially during cancer therapy such as pain, fatigue, and hair loss, nausea, vomiting, and skin changes. This study was also supported by **Arslan, et al. (2013)** and **Linder et al. (2018)** who found that most of the studied adolescents complained of physical symptoms during and continued to several days after chemotherapy.

In a comparison of the knowledge about palliative care perceived by studied subjects before and after the program, significant differences can be observed. This result can reflect the effectiveness of the palliative care program. On the other hand, most of the studied subjects have limited educational levels which in turn results in some difficulties in identifying and understanding their symptoms management, so that they are motivated to increase their necessary information and practices to maintain a healthy life. This study was supported by **Kozlov et al., (2018)** who assessed “Knowledge of Palliative Care Among Community-Dwelling Adults” and asserted that the subjects' lack of information about palliative care as well as the researchers also recommended developing an educational program to improve information regarding palliative care as a part of health care system. This also study agreed with **Mallon et al., (2021)** who conducted qualitative research to assess “the understanding of young adult and their readiness to engage with palliative care” and found that young adults are willing to know about palliative care and symptoms management of terminal patients.

Comparing the management of the symptoms among studied subjects before and after the palliative care program there were statistically significant increases in the mean

scores of all subscale and overall total. This means studied adolescents have more required skills to care for themselves when the symptoms discomfort them. The studied adolescents can manage pain by using pain relieving measures as well and they feel more comfort in performing the essential daily routine activities. So, they become more independent, more socially interactive, and have better psychological conditions. They reported also that they wish to deal with their uncomfortable symptoms such as pain, fatigue, and vomiting in the early stage of the disease. This analysis agreed by **Pinkerton, et al., (2018)** mentioned adolescents who receive palliative care hope to practice it in disease earlier. Furthermore, In the current study, the researchers guide the studied adolescents to perform the essential activities of daily living and leave the non-essential to decrease pain, and feelings of fatigue and save energy specifically at the time of chemotherapy. This study was approved by **McCulloch et al., (2018)** in their study of “symptom management during chemotherapy” and mentioned that it is important for adolescents to rest, drink many fluids, and eat a balanced diet after chemotherapy to alleviate fatigue. The study of **Ahmed et al., (2022)** was in the same line as the current study results applied “the effect of palliative care protocol chemotherapy on cancer patients' outcomes” and found that more than half of the studied adolescents have significant improvements in pain management especially in the 2nd and fourth week of intervention.

Concerning the anxiety symptoms among the studied adolescents, there were statistically significant improvements in the separation anxiety and social anxiety subscales as well as the total MASC2 while no statistically significant changes in the other subscales. The studied adolescents always had fears of being separated from their families especially when they received chemotherapy and performed certain investigations. They also reported that they felt anxious about social contact and presentation. As reported by the studied adolescents, the fear of the unknown about the future disease process as well as the feeling of pain led them to not like to be separated from their families. Uncontrollable physical symptoms and fragility, changing body appearance because of the disease process, and treatment procedures are also other factors that

led them to avoid social presentations. The researchers explain the importance of trusting health teamwork during treatment and their right to ask the health team for any inquiry. Ask the studied adolescents to do short separations by going outside the home. The researchers also emphasized the importance of having friends and spending leisure time as possible as they can even when they are at home. Instruct them also to care for their body appearance such as wearing a head cap and making some cosmetics. Therefore, the statistical improvement in social anxiety after program implementation can also explain the statistical improvement in the social interactions among the studied adolescents. The current study agreed by **Weaver et al., (2016)** who applied a systemic review of “establishing psychosocial palliative care standards for children and adolescents with cancer and their families” and mentioned that palliative care is essential in providing psychosocial support for children and adolescents.

As regards the depressive symptoms among the studied adolescents, statistically significant improvements in the means scores of total CDI2 as well as in the ineffectiveness, and interpersonal problems subscale after palliative care program. while there were no statistically significant improvements in the other aspects of the scale (negative mood, anhedonia, and negative self-esteem) which may need long-term and follow-up intervention Regarding the improvement in the adolescents' responses in the ineffectiveness subscale, this can be due to the studied adolescents becoming more confident when being in contact with people. Furthermore, improving their general appearance and controlling symptoms are important factors in decreasing their depressive symptoms. Examples of the adolescent's responses to improvements in the following items are “I do not like being with people many times”, and “There are some bad things about my looks”. Concerning the studied adolescents decreasing their responses in the interpersonal subscale, this may be because of decreasing pain levels and enhancing their sleep quality after the palliative care program. there are examples of item improvements as reported by adolescents “I worry about aches and pains many times, “ I have trouble sleeping many nights”. This can explain the improvement of depressive symptoms in the total scale after the palliative

care program compared to the pre-assessment. A longitudinal study (**Lyon et al., 2014**) supported the current research “evaluating the impact of randomized, controlled trials of advance care planning for teens with Cancer: anxiety, depression, quality of Life, advance directives, spirituality” and found that there were low anxiety and depressive symptoms with improvement in adolescents' quality of life after applying palliative care. This result was also like the study of **Coughtrey et al., 2018** who “evaluated the 12 randomized control studies assessing the effectiveness and impact of psychosocial interventions in children with cancer younger than 18” and found that 9 studies showed statistically significant enhancements in children's psychosocial aspects such as anxiety and depressive symptoms and quality of life. Another randomized clinical trial in contrast to the current research evaluated the “effect of a combined physical and psychosocial intervention program for childhood cancer patients on the quality of life and psychosocial functioning” (**Van Dijk-Lokkart, et al., 2016**) and asserted that there were no statistically significant changes on adolescents' psychosocial function (health-related quality of life, depressive symptoms, adolescent's perception) compared to the control group after the program except pain and anxiety related to the medical procedure. The differences in the results between the two studies that **Van Dijk-Lokkart, et al 2016** reported most of the studied adolescents had optimal psychological and social levels of functioning before the program implementation, furthermore, the study also mentioned the adolescents were markedly improved from the hospital cancer treatment that let the intervention not markedly make sense in the experimental group compared to the control group.

Studying the association between knowledge about palliative care, symptoms management, anxiety and depressive symptoms, and social interaction, there was a strong correlation between knowledge among the studied adolescents and the ability to manage their symptoms. Meanwhile, there was a moderate negative correlation between adolescents' knowledge and their psychosocial aspects. It means that the more they increase knowledge among the studied adolescents, the less they have anxiety and depressive symptoms.

This result was supported by **Arslan et al., 2013** who assessed “the quality of life and chemotherapy-related symptoms of Turkish cancer children” and found that improving knowledge about managing physical symptoms among children is an important factor in decreasing pain intensity, nausea, and vomiting as well as relieve stress, anxiety and depressive symptoms associated with the aggressive effects of chemotherapy. Also, the current study agreed with the study of **Van Dijk-Lokkart et al., 2016** who found a significant relationship between psychoeducation and children’s psychosocial functions such as decreasing levels of anxiety and depressive symptoms and increasing social relations with their family and peers after the program. Moreover, another study that explored “symptom management during chemotherapy” was in the same line with the current study (**McCulloch, et al., 2018**) and mentioned that physical symptoms among adolescents are not separate from the other psychosocial aspects, they are interrelated to each other. The previously mentioned study also recommended the importance of implementing the holistic approach of palliative care to improve the patient’s biopsychosocial functions.

Conclusion:

Based on the findings, the present study concluded that the palliative care program has a significant effect on adolescents’ symptoms management and their psychosocial health. The studied adolescents improved their mean scores regarding knowledge, symptoms management, anxiety and depressive symptoms, and social interaction after implementing the palliative care program.

Recommendations:

- As palliative care can enhance an adolescent’s condition and survival with illness, it should be implemented as an intervention protocol at the time of cancer diagnosis and take a part of an essential role at the time of terminal illness.
- Conducting a palliative care program based on biopsychosocial needs by using innovative technology to be accessible to all adolescents with cancer.

- Conducting palliative care program focusing on spiritual care and social support efforts.
- Further research should be applied to evaluate the long-term palliative care program on a large scale of adolescents with cancer to ensure its benefits.

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