

Chemotherapy-related side effects in childhood cancer in Hiwa Hospital Sulaimani city/Kurdistan region, Iraq

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Abstract

Cancer cells tend to grow fast, and chemo drugs kill fast-growing cells. However, since such drugs move to almost all part of the body, they might have an influence on healthy cells which are normal and grow fast. If healthy cells are damaged, there will be several side effects. The side effects of chemotherapy in children are reported by cancer treatment teams; however, only little evidence is available on the routine clinical care. The present study aimed to assess chemotherapeutic side effects in children with cancer. A single chemo drug can treat cancer; however, in order to come up with better and quicker results, sometimes a number of drugs are used in a specific order or combination which is referred to as combination chemotherapy. More cancer cells can be killed using different drugs which have different working mechanisms. As a result of this method, the cancer will have more limited chances to become resistant to an of the chemo drugs.

The present descriptive study consisted of 300 children who underwent chemotherapy, and interviews were carried out with them. The severity of side effects was calculated according to three grades: low, moderate, and high. The collected data was collected through direct interview with the child greater than 6 years old on side

effects of chemotherapy on physical health.

Chemotherapy affects the entire cell inside the body among children. The results demonstrated that chemotherapy commonly affects the gastrointestinal tract and musculoskeletal system.

Keywords: *chemotherapy, childhood cancer, side effects, routine clinical care, oncology, hematology*

1. INTRODUCTION

According to its definition, cancer is as a group of diseases characterized by uncontrolled proliferation and metastasis of abnormal cells [1]. As reported by the World Health Organization (WHO), cancer is a major public health issue in Iraq and worldwide and is the second leading cause of deaths among children. There are different types of cancer which are different in many aspects, such as diagnosis and response to treatment [2]. Different methods such as surgery, radiation, and chemotherapy have been proposed as the effective treatment methods for cancer. Chemotherapy is a systemic approach in which certain types of drugs are utilized in order to stop or slow down abnormal cell growth, aimed at controlling or preventing the spread of abnormal cells and also relieve cancer symptoms such as pain, especially in children in the end-stage (palliation). Treating any disease through any drugs is referred to as chemotherapy. However, most people interpret and understand the word chemotherapy as using certain drugs to treat cancer. "Chemo" is the short form for chemotherapy which is widely utilized. Treating cancer through radiation therapy and surgery can lead to damage to and removal of cancer cells in some particular areas, while chemotherapy can affect the body as a whole and influence all its parts. As a result, by utilizing chemotherapy, all cancer cells which have spread to and affected other body parts that are far from the main tumor (metastasized) can be eradicated. Moreover, chemotherapy affects both normal and abnormal cells because it has effect on cellular activity during the various phases of the cell cycle [3]. Despite the abovementioned advantages of chemotherapy, it can be associated with some certain disadvantages and cause some side effects. As far as some cancers are concerned, children are prone to develop numerous side effects while they undergo chemotherapeutic treatment. These side effects might have a significant impact on the treatment, management, morbidity, and mortality. The side effects of chemotherapy remain a major concern for patients with cancer specially children. As a result of undergoing chemotherapy, the receivers will confront a number of changes in their lives, body, emotional state. Moreover, there will be some changes in their and their family members' daily routines. Although the type and dose of the chemo drug can significantly affect and promote its collateral impacts, the most widely reported influences include diarrhea, vomiting, nausea, mucositis, epistaxis and mouth bleeds, bruising, alopecia, weight loss, appetite loss, and apathy. Neutropenia is one of the most significant collateral effects which has been reported to result in a highly remarkable rise in mortality and morbidity among the patients with the disease because it is associated with several infectious processes. Such patients usually undergo feelings of depression, anxiety, fear, and sadness. However, although chemotherapy is associated with some adverse effects, it has been considered as an essential method to help people get back to life and restart doing their daily activities. New approaches to improve tolerance and reduce sequel of cancer chemotherapy are urgently needed and the present research topics focus on this issues and highlights several areas of .Given the frequent use of chemotherapy as number one treatment method of cancer and because of its negative effects on different aspects of the patients' lives and health, the present study was aimed at finding out the prevalence of different side effects of chemotherapy among children with cancer in Sulaimani city, the Kurdistan Region of Iraq.

2. METHODS AND MATERIALS

The setting of the study:

In order to obtain the optimum results, the current study was carried out in two main settings as follows. Hiwa Hospital was the first setting where presents as a department of internal medicine since (1993-1994) where later was established Hiwa hospital in (2007) in Qrga / sulaimani city / Kurdistan region of Iraq.

Actually, this setting consists of two major parts first for adult's client and the second one for pediatric clients where medical cares as well as medical hematological and oncological are provided.

Data collection

The present quantitative descriptive study was conducted from September 20, 2017 to July 18, 2018 in Hiwa Hospital, Sulaimani, the Kurdistan Region of Iraq. In order to take the ethical considerations into account, the approval for the study was obtained from the health authorities in the Hiwa Hospital. In addition, informed oral consent was obtained from the parents of the children with cancer after they were provided with sufficient explanations about the purpose, objectives, and duration of the study. They were also made sure that their information would be kept confidential.

Sampling of the study

The study sample consisted of 300 children who were chosen through a non-probability purposive sampling method. The children aged less than 6 years. Children in poor medical conditions with mental disability or any other chronic disease were excluded from the study. Direct interviews were carried out with the children in order to collect the required data. Each of the interviews lasted for an average of 30 to 35 minutes.

Tool of data collection

The required data were collected using a questionnaire which was designed by the researcher through extensive revision of the relevant international and local literature.

The questionnaire contained information regarding the sociodemographic characteristics of children with cancer, such as age, gender, nationality, and residency. The other parts were designed to gain information regarding the types of cancer, birth order, number of siblings, age at diagnosis, and the effect of the child's condition on school attendance. The last part of the questionnaire sought information about the different side effects of chemotherapy on physical health, including gastrointestinal, neurological, integumentary, musculoskeletal, respiratory, cardiovascular, and urological effects. The frequency of side effects of chemotherapy on the physical health of the children was never, sometimes, and always.

The effects were distributed as low (1–1.66), moderate (1.67–2.33), and high (2.34–3.0).

Statistical analysis

All of the collected data were analyzed using SPSS version 23, and the results are presented in relative frequency.

This section must include a good technical information to allow the experiments to be repeated. The sources of all media (like name and location of manufacturer) or components of a new formulation must be provided.

3. RESULTS

Table 1: Sociodemographic attributes of the sample (300 cancer patients) in Hiwa Hospital

Items	Children's socio-demographic characteristics	F	%
Age group (years)	7–10	161	53.7
	11–14	121	40.3
	15–18	18	6.0
Gender	Male	160	53.3
	Female	140	46.7
Ethnicity	Kurdish	277	92.3
	Arabic	23	7.7
Residency	Urban	110	36.7
	Suburban	184	61.3
	Rural	6	2
	Total	300	100

The results of analyzing the collected demographic data of the patients are presented in Table 1. As demonstrated in this table, the age of the majority of the child cancer patients in the sample was 7–10 years (53.7%), followed by the age group 11–14 years (40.3%), while the 15–18 year age group was the least represented (6.0%). Males represented 53.3% of the sample, and the male-to-female ratio was 1.41:1. The majority of the sample consisted of Kurdish individuals (92.3%), while a limited number of them (7.7%) were Arabs. Moreover, most of the patients were from suburban areas (61.3%), followed by 36.7% living in cities, and 2% in villages. The cohort also consisted of children who were second in birth order and those with 1–4 siblings.

Table 2: Clinical characteristics of 300 cancer patients in Hiwa Hospital

Items	Clinical conditions of children	F	%
Types of cancer	ALL	128	42.7
	Neuroblastoma	37	12.3
	Ewing sarcoma	26	8.7
	Osteosarcoma	23	7.7
	Rhabdomyosarcoma	20	6.7
	Medulloblastoma	17	5.7
	AML	10	3.3
	Nasopharyngeal carcinoma	10	3.3
	Astrocytoma	8	2.7
	Non-Hodgkin lymphoma	7	2.3
	Ependymoma	6	2
	Wilms' tumor	5	1.7
	Hodgkin's lymphoma	3	1
Birth order	1 st	75	25
	2 nd	109	36.3
	3 rd	81	27

	4 th	21	7
	5 th	8	2.7
	6 th	2	0.7
	7 th	4	1.3
Number of siblings	1-4	252	84
	5-8	48	16
Age at diagnosis/years	1-9	163	54.3
	10-18	137	45.7
Children's condition affecting school attendance	Yes	300	100
	Total	300	100

The results of analyzing the data collected on the patients' clinical characteristics are indicated in Table 2 which shows the distribution of children according to the types of cancer, indicating that the majority of the patients (41.7%) have acute lymphoblastic leukemia (ALL), followed by neuroblastoma (12.3%), and in the declining order of prevalence by Ewing sarcoma (8.7%), osteosarcoma (7.7%), Rhabdomyosarcoma (6.7%), Medulloblastoma (5.7%), AML (3.3%), Nasopharyngeal carcinoma (3.3%), Astrocytoma (2.7%), Non-Hodgkin lymphoma Ependymoma (2.3%) and Wilms' tumor (1%). Second in birth order was reported to be 36.3% of the participants, followed by third in order (27%) and firstborn (25%). Most of the children (84%) had 1-4 siblings, and 16% had 5 to 8 brothers or sisters. The majority of the patients were diagnosed before 10 years of age (63%), while the remaining were diagnosed later. All the child cancer patients in the sample had experienced problems during schooling, and their condition had affected the school attendance.

Table 3: Side effects of chemotherapy on the physical health of children with cancer

No.	Side effects of chemotherapy on the child's physical health	Always		Sometimes		Never		Mean of score	Severity
		F	%	F	%	F	%		
A. Gastrointestinal tract									
1	Abdominal pain	54	18	61	20.3	185	61.7	1.56	Low effect
2	Taste change	105	35	123	41	72	24	2.11	Moderate effect
3	Loss of appetite	124	41.3	119	39.7	57	19	2.22	Moderate effect
4	Nausea	116	38.7	101	33.7	83	27.7	2.11	Moderate effect
5	Vomiting	43	14.3	89	29.7	168	56	1.58	Low effect
6	Sore mouth or ulcer	42	14	62	20.7	196	65.3	1.48	Low effect
7	Diarrhea	6	2	23	7.7	271	90.3	1.11	Low effect
8	Bloating	25	8.3	29	9.7	246	82	1.26	Low effect
9	Constipation	21	7	21	7	258	86	1.21	Low effect
B. Neurological system									
1	Headache	61	20.3	90	30	149	49.7	1.7	Low effect
2	Drowsiness	15	5	113	37.7	172	57.3	1.47	Low effect
3	Sleep disturbance	43	14.3	100	33.3	157	52.3	1.62	Moderate effect
4	Numbness	58	19.3	49	16.3	193	64.3	1.55	Low effect
5	Convulsion	21	7	47	15.7	232	77.3	1.29	Low effect
C. Integumentary									
1	Itching	0	0	74	24.7	226	75.3	1.24	Low effect
2	Sweating	12	4	50	16.7	238	79.3	1.24	Low effect

3	Skin dryness	8	2.7	44	14.7	248	82.7	1.2	Low effect
4	Skin ulceration	7	2.3	19	6.3	274	91.3	1.11	Low effect
5	Skin discoloration	21	7	21	7	258	86	1.21	Low effect
D.	Musculoskeletal								
1	Muscle spasm	116	38.7	68	22.7	116	38.7	1.97	Moderate effect
2	Muscle pain	150	50	80	26.7	70	23.3	2.26	Moderate effect
3	Joint pain	143	47.7	86	28.7	71	23.7	2.24	Moderate effect
4	Back pain	112	37.3	92	30.7	96	32	2.05	Moderate effect
E.	Respiratory system								
1	Cough	34	11.3	64	21.3	202	67.3	1.44	Low effect
2	Dyspnea	6	2	14	4.7	280	93.3	1.08	Low effect
3	Cyanosis	1	0.3	7	2.3	292	97.3	1.03	Low effect
F.	Cardiovascular system								
1	Palpitation	1	0.3	19	6.3	280	93.3	1.07	Low effect
2	Tachycardia	1	0.3	5	1.7	294	98	1.02	Low effect
3	Bradycardia	2	0.7	6	2	292	97.3	1.03	Low effect
4	Fever	34	11.3	82	27.3	184	61.3	1.5	Low effect
5	Chill	10	3.3	31	10.3	259	86.3	1.17	Low effect
G.	Urological system								
1	Difficulty in urination	6	2	1	0.3	293	97.7	1.04	Low effect
2	Dysuria	3	1	9	3	288	96	1.05	Low effect
3	Edema	1	0.3	1	0.3	298	99.3	1.01	Low effect

The results of analyzing the side effects of chemotherapy are presented in Table 3. As shown in this table, chemotherapy protocol can be associated with the different side effects on the physical health of children in terms of effects on different body systems.

According to Table 3, the highest score for the effects of chemotherapy on the musculoskeletal system was based on the moderate effect scores (2.26–1.97). Among these symptoms, the highest score (2.26) was reported for muscle pain, followed by that for joint pain (2.24), back pain (2.05), and muscle pain (1.97).

Moreover, the next highest scores for the children's complaints of side effects from chemotherapy were for the gastrointestinal tract. The most prevalent complaint was loss of appetite (81%), recording a moderate score of (2.2), followed by nausea and change in taste, both recording a moderate effect of severity (2.11). The remaining symptoms, such as vomiting, abdominal pain, sore mouth, diarrhea, bloating, and constipation recorded scores for low severity (1.58, 1.56, 1.48, 1.11, 1.26, and 1.21, respectively).

Also, the neurological complaints also exerted effects on children receiving chemotherapy; approximately, half of them complained of sleep disturbance, which recorded a moderate effect of severity (1.26). Subsequently, numbness in the extremities was scored at 1.55, followed by drowsiness (1.47). About 20% of the children complained of convulsions scored at 1.29 with a low severity effect. Finally, the headache recorded a low effect score (1.7), and about half of the children complained of headache (50.3%).

Among the side effects representing other systems, cough was most prevalent, recording a low effect score of (1.44), followed by dyspnea (1.08) and cyanosis (1.03).

Next, the integumentary system included itching and sweating in terms of low effect severity of the side effects (1.24), followed by skin dryness and skin discoloration (1.2), and finally skin ulceration (1.11).

In terms of the effects of chemotherapy on the cardiovascular system, an increase in the child's body temperature had a low effect scored at 1.5 and chill at 1.17. The feeling of palpitation was scored at 1.07, while tachycardia and bradycardia recorded low severity effects at 1.02 and 1.03, respectively.

Finally, regarding the urological system, difficulty in urination received a low effect score of 1.04, followed by dysuria (1.05) and edema (1.01).

4. DISCUSSION

The present study found that childhood cancer was more prevalent in males (53.7%) than in females. This finding was in agreement with the reports published by the American Cancer Society declaration. Similarly, Dorak at (2012) pointed out that very few cases of cases are more prevalent among females, while males are more prone to most types of cancer [4].

According to the results of the present study, ALL was the most prevalent type of cancer observed among the studied child patients with cancer. This finding is in good agreement with the reports published by the Institute of Medicine, National Research Council and National Cancer Policy Board in USA at (2003) which postulated that ALL is the most prevalent type of cancer [5]. Siegel in (2017) also reported that acute lymphoblastic leukemia (ALL) is the most prevalent type of cancer [6].

As revealed by the results of the present study, cancer affected the lives of the children in the study sample, especially their school attendance. This finding is in line with previous studies. For example, the results of the study carried out by Parsons at (2012) revealed that the nature of the disease affected education and work of more than 72% of adolescents and young adults [7]. This finding is also similar with the one reported by Tsimicalis at (2018) who reported that children with cancer are most affected by cancer in terms of their school attendance [8]. Most children and families consider hospitalization as an anxiogenic situation that can have its own effects and manifestations in the future, depending on the patient's familial relationship and his/her family members; the level of emotional, cognitive and physical development; the patient's adaptive capacity; the medical procedures; the severity of the disease; and the frequency and length of the hospitalization. Children and teenagers usually have a dual attitude toward hospital, such that they feel that hospital causes suffering, while it is a place for receiving treatment. Therefore, for them, hospital is a place to receive medical examinations and treatment, helping them save their lives and regain their wellbeing and health.

Strikingly, the present study demonstrated that many children experience persistent side effects during chemotherapy. The moderate score in a subset of kids emphasized the significance of tracking side effects throughout therapy. The results also revealed that maximal side effects were reported for the gastrointestinal and musculoskeletal systems; this finding is in agreement with previously published reports Chui in (2008) [9]. To the best of our understanding, this is the first study to comprehensively describe the experiences of local cancer children with side effects related to chemotherapy. Therefore, an in-depth insight into the backgrounds of patients can enable the healthcare experts to introduce an efficient approach to manage the side effects related to chemotherapy and provide significant data. About two-thirds of the kids undergoing the last cycle of chemotherapy experience nausea, taste shift, and appetite loss. Studies conducted by Schnell in (2003) and Farrell in (2013) discovered similar results [10, 11]. Similarly, Sullivan in (2018) concluded that children with cancer have various symptoms such as diarrhea, abdominal cramps, weight loss, change in the way food tastes, lack of appetite, nausea, and dry mouth [12]. As mentioned above, chemotherapy can lead to big changes in the everyday lives and activities of the children and teenagers; however, it is the responsibility of their families to attempt to keep their children's lives on the normal routine prior to the final diagnosis and help them stop feeling dependent, powerless or incapacitated because the symptoms of chemotherapy usually cause the children to feel and even believe that the cancer is "more real" in their lives [13], resulting in enormous changes in their family routines including restrictions and losses [14].

4. CONCLUSION

The most common side effects of chemotherapy were recorded for the gastrointestinal and musculoskeletal systems. As a result, checklists are essential to monitoring every child who has undergone chemotherapy in order to set up appropriate therapeutic interventions. However, the side effects that influence children with cancer are not frequently documented, and therefore, there is a lack of data and guidance on optimal management of the disease.

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