

Chemotherapy Associated Side Effects among Children with Cancer

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ABSTRACT

The use of chemotherapy is the basic approach to cancer treatment. These therapeutic agents lead to multiple symptoms because these agents cannot selectively distinguish between cancerous and non-cancerous cells. As a result, children undergoing chemotherapy may have cytotoxic and severe side effects. The author investigated the frequency and severity of common symptoms based on previous literature among children undergoing chemotherapy.

Materials and methods: Seventy five (75) children undergoing chemotherapy along with their parents were enrolled as participants. Therapy associated side effects of children were reported in a scale of 0 to 5 to assess the severity of the side effects.

Results: The findings of the present study revealed that 80% of the study participants reported therapy-related symptoms. The most frequent symptoms were changes in taste (95%), loss of appetite (88%), nausea (87%), vomiting (72%), and dry mouth (71%). Gastrointestinal symptoms and fatigue were seen severely in most of the participants. According to the severity level, 9% of the participants had severe, 29% had moderate and 62% of them had mild severity of the therapy related symptoms. The study also suggested that there was a significant association between severity of the side effects and duration of treatment (0.029), chemotherapy phase (<.00001) and drug regimen (0.015).

Conclusions: The present study concluded that children undergoing chemotherapy experienced lots of distress due to the nature of the treatment. Changes in taste are the most persistent therapy-related symptom reported by children. Other frequent Gastro-intestinal symptoms were loss of appetite, nausea, vomiting, dry mouth, and weight loss.

Keywords: Childhood Cancer, Side effects of Chemotherapy, Severity of the side effects

INTRODUCTION

The term 'Cancer or Neoplasm' uses to describe a syndrome involves an asymmetrical and abnormal proliferation of the body's cells and tissues, which further leads to infiltration and proliferation of these cells to other systems of the body. Childhood cancer is frequently used to designate cancer which develops in children before 18 years of age. The most common cancer in childhood is leukemia which is about one third of all cancer in childhood. The other common malignancies in childhood are lymphomas and the central

nervous system's tumors. According to WHO, cancer is the pre-eminent cause of deaths and in 2018 the maximum number of deaths occurred (9.6 million) due to cancer. It is accountable for one in six deaths. In all types of cancer, childhood cancer is the six root cause responsible for the mortality rate and the 9th leading factor of childhood illness globally.

Multimodal therapy such as chemotherapy, surgery, and radiotherapy has played a prominent role in the survival of children with malignancy. However, these treatment plans can also interfere with

the health status as well as the general well-being of the child through a variety of side effects¹. These therapeutic agents cannot selectively distinguish between cancerous and normal body cells as result destruction of normal cells also occurs. The rapidly growing cells such as marrow cells, cells present in the gastric mucosa, and the skin cells easily get affected. As a result, there may be several cytotoxic effects and organ-specific drug toxicities seen in the children undergoing chemotherapy. The different effects of chemotherapy are categorized as acute, delayed, and chronic. Acute effects take place during and just after administering the regimen such as nausea and vomiting, anaphylactic, hypersensitivity, and cardiac dysrhythmias. Delayed effects are delayed nausea- vomiting, mouth ulcers, hair loss, skin rashes, suppression of bone marrow, alteration in bowel and bladder function (constipation and loose stool), neurotoxicity's, chronic effects include multi-organ damage¹.

In a previous study by Wolfe et al, parents reported that 89% of children who diagnosed and died with cancer had at least 1 symptom which distressed them a lot in their last month of life.

The role of the nurse in the treatment regimen is much respected and the wealth of his/her knowledge helps to reduce and minimize the episodes of adverse effects. Implementing appropriate strategies is effective to manage these adverse effects and improve a child with cancer outcomes. Nurses help families to avoid unrecognized and possibly unsafe "remedies" by encouraging their families to discuss doubts and problems in public with healthcare providers. The present study was intended with the aim of identifying the common side effects of chemotherapy among children undergoing chemotherapy only.

The objectives of the study were to assess the occurrence of side effects of

chemotherapy among children with cancer and its severity of the side effects also to find association between severity levels of side effects of chemotherapy of children with their selected socio-demographic variables.

MATERIALS AND METHODS

A descriptive study was conducted. 75 children undergoing chemotherapy along with their parents were recruited as study participants. All children who were receiving chemotherapy and their parents were selected as sample. Children who were sick and going for Bone marrow transplantation were excluded from the study. Before conducting the study Ethical Permission was obtained from the Ethics Committee and Written Informed Consent as well as assent was taken from the participants. A socio-demographic and clinical data sheet was filled by interviewer. Therapy related symptoms of children were reported by their parents with a scale of 0-5. 0 indicates no distress and 5 indicates severely distressed.

RESULTS

The result revealed that the average age was 9.6 ± 4.3 years. Childhood cancer was more predominant in males (53%) and because of diagnosis and treatment process education status was also affected because majority of the children (68%) were not able to attend school. Majority (36%) of the mothers were not educated, whereas maximum (28%) of the father's completed their higher secondary education. More than half 58.6% of fathers were self-employed. The majority of the study participants 35(47%) family income were in the group of 21,001-30,000 Rs. and 61% of the participants resided in the rural area.

Table No.1: Frequency and Percentage distribution of Socio-Demographic variables of study participants N=75

S.No	Socio-Demographic Variables	Frequency and Percentage
1.	Age of Child in years <ul style="list-style-type: none"> • 2years-8years • >8years-18years 	37 (49) 38 (51)
2.	Gender <ul style="list-style-type: none"> • Male • Female 	40 (53) 35 (47)
3.	Attending School at present (n=74) <ul style="list-style-type: none"> • Yes • No 	06 (10) 68 (90)
4.	Number of Siblings <ul style="list-style-type: none"> • 0-1 • 2-3 • 4-6 	03 (4) 64 (85) 08 (11)
5.	Mother's age in year (n=74) <ul style="list-style-type: none"> • 26-38 • 39-51 	57 (76) 17 (24)
6.	Father's Age in years <ul style="list-style-type: none"> • 28-44 • 45-61 	61 (80) 14 (20)
7.	Education Status of Mother <ul style="list-style-type: none"> • No formal Education • Primary Education • Secondary Education • Higher Secondary • Graduation and above 	27 (36) 11 (15) 11 (15) 18 (24) 08 (10)
8.	Education Status of Father <ul style="list-style-type: none"> • No formal Education • Primary Education • Secondary Education • Higher Secondary • Graduation and above 	11 (14.6) 09 (12) 14 (18.6) 21 (28) 20 (26.6)
9.	Occupation of Father <ul style="list-style-type: none"> • Self Employed • Job 	44 (59) 31 (41)
10.	Family Type <ul style="list-style-type: none"> • Nuclear Family • Joint Family • Extended Family 	37 (49) 29 (39) 09 (12)
11.	Family Income in Rupees <ul style="list-style-type: none"> • 10,000-20,000 • 21,001-30,000 • 31,001-40,000 • 41,001-50,000 • 51,001-60,000 	22 (29) 35 (47) 14 (19) 03 (4) 01 (1)
12.	Area of Living <ul style="list-style-type: none"> • Rural • Urban • Semi-Urban 	61(81.3) 10 (13.4) 04 (5.3)

Table 2 showed majority of the children were diagnosed blood cancer (68%) followed by organ cancer (32%). Above data shows that in blood related cancer ALL (62%) were commonly diagnosed, followed by AML (14%), Non-Hodgkin lymphoma (14%), Hodgkin lymphoma (8%) and multiple myeloma (2%). Organ cancer was seen in 32% children. Ewing sarcoma (25%), Medulloblastoma (17%), retinoblastoma (12.5%), germ cell tumor (12.5%), Nephroblastoma (12.5%), Osteoblastoma

(8.3%), Rhabdomyosarcoma (8.3%) and Neuroblastoma (4%) were seen in children with organ cancer. The majority of the children were taking treatment since 1 year. Out of 75 children 35 children were taking chemotherapy cycle and 45 were taking chemotherapy cycle. Regarding family history, out of 75 participant 1 children had family history of cancer. The population was then studied for BMI according to height and weight. The data shows 44% of the children were underweight, where 8% of them were overweight. 56% of them were

receiving 2 drugs, 24% were more than 2 drug regimen. and only 20% of them were receiving single

Table No 2: Frequency and Percentage distribution of Clinical data of the children undergoing chemotherapy. N=75

S.No	Clinical Data	Frequency (Percentage)
1.	Diagnosis Blood Cancer <ul style="list-style-type: none"> • ALL • AML • Non- Hodgkin Lymphoma • Hodgkin lymphoma • Multiple Myeloma Organ Cancer <ul style="list-style-type: none"> • Ewing sarcoma • Medulloblastoma • Retinoblastoma • Germ cell tumor • Nephroblastoma • Osteosarcoma • Rhabdomyosarcoma • Neuroblastoma 	51(68) 32 (62) 07 (14) 07 (14) 04 (8) 01 (2) 24 (32) 06 (25) 04 (17) 03 (12.5) 03 (12.5) 03 (12.5) 02 (8.3) 02 (8.3) 01 (4)
2.	Duration of the Treatment <ul style="list-style-type: none"> • Up to 6 months • 7-12 months • 13-18 months • 19-24 months • 25-30 months 	23 (31) 24 (32) 07 (9) 13 (17) 08 (11)
3.	Chemotherapy Cycle (n=35) <ul style="list-style-type: none"> • 1-4 • 5-8 	11 (31) 24 (69)
4.	Chemotherapy Phase (n=40) <ul style="list-style-type: none"> • Induction • Consolidation • Maintenance 	06 (15) 16 (40) 18 (45)
5.	Family history of Cancer <ul style="list-style-type: none"> • Yes • No 	01 (1.3) 74 (98.7)
6.	BMI based on Weight and Height <ul style="list-style-type: none"> • Normal • Underweight • Overweight 	36 (48) 33 (44) 06 (8)
7.	Drugs <ul style="list-style-type: none"> • Single Drug Regimen • Combination of two drugs • Combination of more than two drugs 	15 (20) 42 (56) 18 (24)

Therapy Related Symptoms

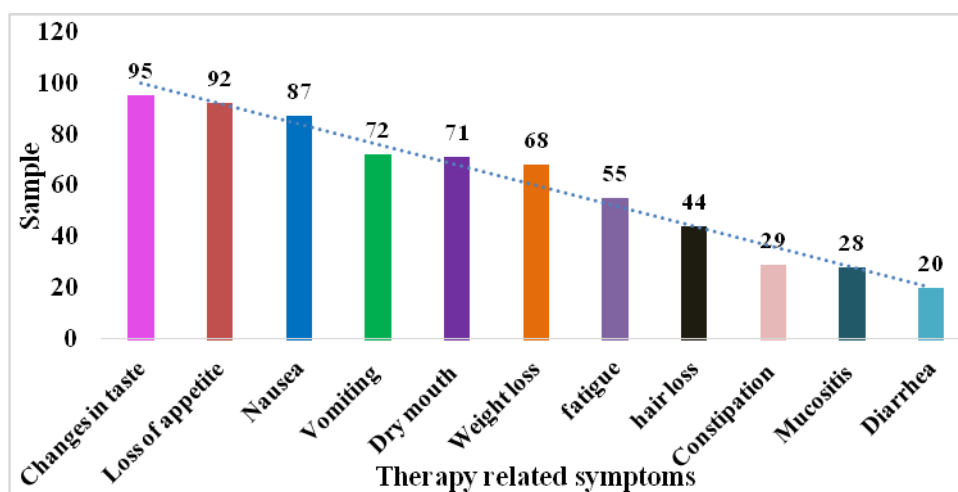


Fig No. 1 Shows Therapy Related Side effects among children undergoing Chemotherapy

Fig No.1 showing Bar diagram of percentage of therapy-related symptoms of children undergoing chemotherapy. The most reported therapy related symptom were loss of appetite (95%), loss of appetite (92 %), nausea (87%) and least reported symptoms were diarrhea (20%).

Severity of the Therapy related symptoms or side effects of Children undergoing Chemotherapy, N=75

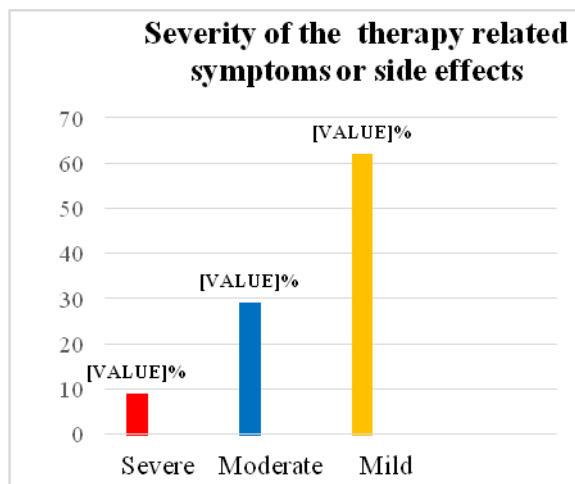


Fig No.2 shows 9% children were suffering side effects severely, 29 % of children were suffering moderate and 62 % were suffering mild side effects.

Table no 3: Association between Side Effects of Chemotherapy and Clinical data, N=75

S.No	Clinical data	Mild 1-6	Moderate 7-12	Severe 13-18	Chi-square	p-value
1.	Diagnosis • Blood cancer • Organ cancer	24 09	24 12	03 03	1.26	.532
2.	Duration of treatment taken • Up to 6 month • >6-12month • >12- 18month • >18month-24month • >24month-30month	07 09 03 10 04	11 15 04 02 04	05 00 00 01 00	17.07	0.029*
3.	Chemotherapy cycle(n=35) • 1-4 • 5-8	03 11	06 12	02 01	2.408	0.299
4.	Chemotherapy Phase (40) • Induction • Consolidation • Maintenance	02 04 03	00 12 15	04 00 00	28.148	<.00001*
5.	Family history • No • Yes	32 1	36 00	06 00	1.29	0.524
6.	BMI based on weight and height • Normal • Underweight • Overweight	10 07 04	19 22 02	07 04 00	6.568	0.160
7.	Drugs • Single drug regimen • Combination of 2 drugs • Combination of more than 2 drugs	04 11 11	08 29 07	03 02 00	12.25	0.015 *

As shown in above table, severity of the side effects of chemotherapy is significantly associated with duration of treatment (0.029), chemotherapy phase (<.00001) and drug regimen (0.015).

DISCUSSION

The result showed that the average age was 9.6±4.3 years. It was consisted with other report (Jankowaska B. et al; (2019). This study included total 75 children; of which 40 (53%) were male and 35 (47%) were female. Findings were parallel with the findings of Galal SB.et al (2019). This

study depicts that leukemia (52%) was the most prevalent type of pediatric cancer observed among all the participants followed by lymphomas, medulloblastoma, retinoblastoma, nephroblastoms, neuroblastoma, and sarcomas whereas, germ cell tumors, and melanoma were rarely seen. This findings is in similar to an article published by Pandey A. et al. in Patna (2020), they have found that ALL (31%) was the most prevalent childhood cancer, Hodgkin lymphoma was the second most common childhood cancer among cancer. In organ cancer, Wilms tumor, germ cell

tumor, and Ewing sarcoma were commonly seen among children. During the time of data collection we found that 44% were underweight and 8% were overweight during treatment. The finding is nearly similar to another study conducted by Soto-Vega et al. they found that two-thirds of the study participants were of unhealthy weight status. This study was conducted with the aim of identifying chemotherapy related symptoms, findings of this study suggested that most frequent therapy related were gastrointestinal symptoms (changes in taste, loss of appetite, nausea followed by vomiting, dry mouth and weight loss). Other distressing symptoms were fatigue, hair loss, constipation, mucositis, and loose stool.

The present study findings were also in line with a study carried out by **Chias B.J. Et al; (2019)** to investigate the oral adverse effects of chemotherapy. It was found that dry mouth (73.4%), changes in taste (61.8%), and dry lips (54.2%) were mostly reported by the patients. Another study undertaken by **Torres V. et al; (2019)** on frequency of chemotherapy related side effects where it was found that the most persistent symptoms were fatigue (52%), nausea (51%), and loss of appetite (44%) among children. A cohort study carried out by **Ye Z. J et al (2019)** on symptoms stated by children with cancer during treatment in China. Analysis of the study showed the most common and frequent symptom was fatigue (93.7 %) followed by pain (87.3%) and poor appetite (76.1%). The other symptoms were nausea, vomiting and diarrhea in children. Strikingly, this study also demonstrated the severity of side effects of chemotherapy among children with cancer. A Likert scale used a comprehensive tool to assess the severity of side effects. It would be helpful for medical personnel to implement needful intervention that could alleviate these side effects. Majority of the children experienced mild but some of them experienced severe level of side effects due to chemotherapy. The statistical data shows that there is significant

association between severity level of side effects of chemotherapy and duration of treatment, chemotherapy phase and drug regimen. A similar report published by **Amal Hegazy et al; (2019)**, where they have found that children suffered more severe side effects within 6 month of initiating treatment. A similar study was done by **Joanna Zawitkowska et al;** studied the toxicity Profiles during Therapy. They have found that children in induction phase experienced more toxicity due to therapy.

CONCLUSION

Cancer treatment is always lengthy, troubling, and painful for children because of side effects. Therefore, continuous effort should be made to minimize the distress level as well as keep the child in a positive state of mind. The present study concluded that children undergoing chemotherapy experienced distress due to the severity of the symptoms which affect their life quality. In this challenging period of life, Nurses can play a significant role by helping the children and their parents. There is a need to support and reinforce the parents to involve in the care, it improves their knowledge regarding the symptoms.

Further local studies should be conducted in the induction phase, which will help to understand the intensity and severity of the side effects and study on chemotherapy related symptoms management. Educative sessions related to side effects and their management for parents should be given to the parents before and during the treatment.

The only limitation of this was children were also included from daycare and OPD, which might affect the experience of symptom severity. The present study aids the Nurses to organize an educational session for caregivers regarding the common adverse effects of therapy and management techniques of therapy-related symptoms, enhance the participation of caregivers in care and help them to develop the confidence to manage the side effects.

ACKNOWLEDGEMENT

The authors would like to thank all the children and their parents who participated in this study. We are grateful to the Nursing staff who helped in accessing participants for data collection.

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How to cite this article: Rawat N, Chanu SE, Chauhan V. Chemotherapy associated side effects among children with cancer. *Int J Health Sci Res*. 2021; 11(2):236-242.
