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Nutritional status, feeding problems, and existing nutritional support among children with cancer, Pediatric Oncology Unit, Muhimbili National Hospital (MNH), Dar es Salaam, Tanzania; Prospective Cohort Study

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Abstract

Background: More than 85% of childhood cancers occur in developing countries, including countries in Sub-Saharan Africa. Malnutrition is a common problem among pediatric patients with cancer and ranges from 30% - to 80% globally. Weight loss is one of the most frequent and earliest symptoms in cancer patients, implying malnutrition. Malnutrition in paediatrics has negative consequences on the health of children. A chronic disease like cancer affects the nutrition of developing children either by the disease process itself or resulting from complications of treatments.

Objectives: This study aimed to describe nutritional status, feeding problems, and existing oral nutritional support for children with cancer who were admitted to the Pediatric Oncology Unit (MNH).

Methods: A hospital-based, prospective cohort study involving 246 patients was done at the Pediatric Oncology Unit (MNH). Patients with any malignancy were recruited in the study. Assessed nutrition status, feeding problems and nutritional support practices. Data was collected using Excel, and analysis was conducted using R version 4.2.3.

Result: A total of 246 participants aged 0-19 Years met the inclusion criteria and were enrolled for the study on admission. Most recruits were males, accounting for about 55.7%, followed by females, accounting for 44.3%. On follow-ups, the frequencies of males were still high compared to females across follow-up points: after 4 weeks, after 8 weeks, and after 6 months. This study has revealed that 11.8% of the participants had SAM, 28.5% had MAM and about 59.3 % had normal nutrition. Almost half of the participants reported being malnourished on admission, either moderately malnourished or severely malnourished. Age group 0 - 5 Years contributes to high frequencies of malnourished children compared to other age groups from baseline across other follow-ups. This study revealed that the majority of children present at the hospital on admission with different types of feeding problems, which complicates further 4 weeks later after starting cancer therapy. Hospital meal is the commonest nutritional support, accounting for more than 85%, followed by smoothies, then special porridge, peanuts and F75/100 is the least used nutritional intervention. Studies showed that a high percentage of patients receive nutrition education and advice from the point of admission to follow-ups throughout the treatment period.

Keywords: Cancer, Pediatric, Nutrition, Feeding problems

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Introduction

More than 85% of childhood cancers occur in developing countries, including countries in sub-Saharan Africa (Kneer et al., 2015). Malnutrition is a common problem among pediatric patients with cancer and ranges from 30% - 80% globally, in Africa up to around 46%. In the majority of tumour-bearing patients, systemic pro-inflammatory processes are activated, causing losses of appetite (anorexia) and resulting in weight loss. Malnutrition among pediatric cancer patients can result from the disease itself or complications of treatments. Weight loss is one of the most frequent and earliest symptoms in cancer patients (Arends et al., 2006) implying malnutrition.

The term malnutrition generally refers to both under-nutrition and over-nutrition; in this guide, we used the term to refer solely to a deficiency of nutrition. Many factors can cause malnutrition, most of which relate to poor diet or severe and repeated infections, particularly in underprivileged populations (Blössner et al., 2005). Malnutrition is the result of a deficiency or excess nutrition consumption; it can be under-nutrition or over-nutrition (Ladago, 2023). The 2015-16 Tanzania demographic health survey reported that one in three underfive children are stunted or too short for their age. Stunting is an indication of chronic undernutrition. Wasting (low body weight for height) is a sign of acute malnutrition and was far less common (5%). In addition, 14% of children are reported as underweight (MoHCDGEC).

Cancer is a common health threat all over the world. According to the World Health Organization Cancer is the second leading cause of death for all ages around the world, with most mortality in children and adolescents aged 0 to 19 years (Kohi et al., 2019).

Currently in Tanzania, cancer services are offered in several centres: Two in Dar es Salaam (Muhimbili National Hospital and Ocean Road Cancer Institute), one in Mwanza (Bugando Medical Centre), one in Kilimanjaro (KCMC), Sengerema District Hospital, Mnazi Mmoja Hospital (Zanzibar) , One in Dodoma (Benjamin Mkapa Hospital)), and one in Mbeya (Mbeya Zonal Hospital).

In 2014, there were approximately 21,000 reported deaths from cancer in Tanzania and 35,000 new diagnoses across (Kohi et al., 2019), consisting of both pediatric and adult cancer cases.

Tanzania is among Sub-Saharan African countries that prioritize cancer care. The government of Tanzania, through its Ministry of Health, Community Development, Gender, Elderly and Children, has a policy offering free clinical care for all patients with confirmed cancer diagnoses receiving treatment at designated government cancer treatment centres. The first public oncology children's ward was opened in 2004 and is located at the Ocean Road Cancer Institute (ORCI). In April 2011, the children's ward was shifted to the pediatric department at Muhimbili National Hospital (MNH).

The Upendo/Tumaini children's cancer ward complex is one of the specialized children's cancer wards in Tanzania, providing cancer care and free of charge chemotherapy medications. The majority of children admitted are from low socio-economic status families and have traveled long distances from all over the country (Kneer et al., 2015).

It is well documented that malnutrition is a common complication of pediatric malignancy and its treatment. Malnutrition can often be a consequence of cancer itself or a result of chemotherapy. Nutritional support aims to reverse malnutrition associated with treatment and promote weight gain and growth (Ward et al., 2015).

Nutrition is the cornerstone for the normal growth and development of children. The Nutrition Unit provides nutritional support based on the patient's needs and requirements; a nutritionist calculates the calories required of every child per age using a Nutrition Guideline/Manual named "The International Initiative for Paediatrics and Nutrition—IIPAN."

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Patients with SAM and MAM receive nitrified local milk such as F-100, smoothies, special porridge, hospital food and Ready-to-Use-Therapeutic Food (RUTF). RUTF is continued to patients admitted with MAM through donations made to the department.

In addition, the normal daily diet supplied by MNH includes porridge, rice, ugali, potatoes, beans, vegetables, or F75/F100 milk, which some may not tolerate or consider adequate to sustain these vulnerable children. The hospital provides meals three times a day alongside maize porridge, eggs, vegetables, and fruits. Internationally, supplemental nutrition is recommended as part of the best pediatric oncology practice to prevent malnutrition.

Patients feed orally, and for those who are not able to meet their daily intake requirement, we had to insert NGT. We use bolus feeds, and some are on continuous feed through a feeding pump. In addition, they do nutrition evaluations by taking anthropometric measurements every day for newly diagnosed children and every week for children with SAM and MAM.

According to the Tumaini *la Maisha* article on children with cancer in Tanzania in 2015, many children present for cancer treatment are extremely unwell and malnourished. Globally, malnutrition problems are estimated to range from 30% - 80%; little still is known about the nutritional status, feeding problems and commonly available nutritional support among children with cancer at MNH. This research was conducted to assess the nutritional status among pediatric cancer patients, associated feeding problems, and common existing nutritional support at the MNH pediatric oncology unit.

Methods

Study design

A hospital-based, prospective cohort study was conducted at the Pediatric Oncology Unit, Muhimbili National Hospital, Dar es Salaam, Tanzania. A total of 246 participants were recruited for a one-year study period (2022-2023). The sample size was then determined using a single population proportion formula based on the following assumptions: a 95% confidence level, a 5% margin of error, an 80% proportion of malnutrition from a previous study done in Kenya, and a 10% non-response rate. Study participants were finally recruited using a convenient sampling technique. All children aged 0-19 with any type of cancer admitted in the one-year study period were recruited.

We used structured questionnaires designed per our study objectives to capture nutrition information and quantify other feeding problems associated with factors; malnutrition status among the children was classified using WHO charts for weight for age, height for weight, MUAC charts, and Body Mass Index (BMI). In the context of this study, malnutrition was referred to as a deficiency of nutrition, and feeding problems were referred to as conditions affecting adequate food intake among children with cancer.

Ethical approval and a data collection permit were obtained from Muhimbili National Hospital (MNH) through the Directorate of Research, Training and Consultancy Unit, with certificate reference number MNH/IRB/2023/073. Permission to conduct the study was obtained from the Head of Clinical Research, Training and Consultancy (MNH).

Measurements

Sociodemographic information, such as age and sex, was collected using structured questionnaires/checklist guides. Nutrition status was obtained using a CRF collecting anthropometric values. The tool contains six domains: identification details (Age, diagnosis, and stage), Treatment outcomes, Physical measurements, laboratory evaluation, feeding problems reported during treatment, and oral nutritional support.

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A scoring system was used to describe the nutrition status using MUAC (Mid-Upper Arm Circumference) for age for accuracy. In most cases at the cancer unit, BMI is not a good indicator for nutritional status assessment because most children's weight is influenced by malignancies like Wilms Tumor, intra-abdominal tumours, Burkitt's Lymphomas, etc., making MUAC for age a reliable measure of degree of wasting for children with malignancy.

Since 2013, the WHO guidelines have stipulated using MUAC to screen for severe acute malnutrition at the community level. Below is the classification of MUAC For Age scores as adopted from the WHO guidelines to be used as a standard practice for describing nutrition status.
Score: -1, 0, +1, this means normal nutrition status.
Score: -2, this means Moderate Acute Malnutrition (MAM)
Score: -3, this means Severe Acute Malnutrition (SAM)
Age 6 months - 59 months <11.5 = SAM, MUAC > 11.5-12.5 = MAM, MUAC >12.5 cm = Normal.
Age 5 - 9 Yrs. <13.0 = SAM, MUAC >13.0 - 14.5 = MAM, MUAC >14.5 = Normal
Age 14 - 15 Yrs. <16 = SAM, MUAC> 16.0-18.5 = MAM, MUAC >18.5 cm = Normal.

Data analysis

Analysis was conducted using R version 4.2.3. The data, initially gathered and recorded in Excel using the CSV format for importation, underwent cleaning before being imported into R. Subsequently, R version 4.2.3 played a pivotal role as the primary tool for essential categorization, data analysis, and visualization. A hypothesis test was performed using a chi-square test to measure the association between feeding problems and nutrition status, and a p-value of less than 0.05 was considered statistically significant.

Results

Participants' profile

A total of 246 participants aged 0-19 Years met the inclusion criteria and were enrolled for the study on admission. Most recruits were males, accounting for about 55.7%, followed by females, accounting for 44.3%. On follow-ups, the frequencies of males were still high compared to females across follow-up points: after 4 weeks, after 8 weeks, and after 6 months.

On admission, almost half of the recruits were in the age group 0 - 5 Years, accounting for about 48.4%, followed by the 6-10 Years age group contributing about 26.8%. This was also revealed in follow-ups, where the age group 0-5 Years contributed the highest number to the total study population, followed by the age group 6-10 Years. (Table 1)

Table 1: All combined Frequency Table

Characteristics	Baseline	Week 4	Week 8	Month 6
Sex, no. (%)				
Male	137 (55.7)	110 (54.5)	89 (53)	53 (51)
Female	109 (44.3)	92 (45.5)	79 (47)	51 (49)
Age Category, no. (%)				
0-5	119 (48.4)	101 (50)	81 (48.2)	52 (50)
6-10	66 (26.8)	53 (26.2)	48 (28.6)	33 (31.7)
11-15	47 (19.1)	40 (19.8)	33 (19.6)	16 (15.4)
16-19	14 (5.7)	8 (4)	6 (3.6)	3 (2.9)
Age in year, summary				
Minimum Age	0.8	0.8	1	1

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Median Age	6	5.5	6	5.5
Maximum Age	19	19	17	17
Standard Deviation	4.6	4.5	4.4	4
Nutritional Status, no. (%)				
Normal	146 (59.3)	133 (65.8)	129 (76.8)	99 (95.2)
Moderate Acute Malnutrition	70 (28.5)	54 (26.7)	19 (11.3)	5 (4.8)
Overweight	0 (0)	1 (0.5)	13 (7.7)	0 (0)
Obesity	1 (0.4)	0 (0)	0 (0)	0 (0)
Severe Acute Malnutrition	29 (11.8)	14 (6.9)	7 (4.2)	0 (0)
Nutritional Oral Support, no. (%)				
F75/F100	9 (3.7)	12 (5.9)	5 (3)	1 (1)
Peanuts	51 (20.7)	53 (26.2)	50 (29.8)	29 (27.9)
Smoothie	204 (82.9)	176 (87.1)	150 (89.3)	88 (84.6)
Hospital Meal	211 (85.8)	181 (89.6)	160 (95.2)	93 (89.4)
Special Porridge	169 (68.7)	162 (80.2)	133 (79.2)	89 (85.9)
Nutritional Advice, no. (%)				
No	39 (15.9)	18 (8.9)	10 (6)	10 (9.6)
Yes	207 (84.1)	184 (91.1)	158 (94)	94 (90.4)
Feeding Problem Response, no. (%)				
No	40 (16.3)	6 (3)	81 (48.2)	81.7 (51)
Yes	206 (83.7)	196 (97)	87 (51.8)	18.3 (49)
Feeding Problem Distribution, no. (%)				
Loss of appetite or nausea	165 (67.1)	116 (57.4)	78 (46.4)	13 (12.5)
Diarrhea	11 (4.5)	45 (22.3)	7 (4.2)	5 (4.8)
Mucositis	17 (6.9)	39 (19.3)	10 (6)	4 (3.8)
Other or anatomical tumor	159 (64.6)	120 (59.4)	65 (38.7)	13 (12.5)

Some participants did not complete follow-ups, and we found a significant decrease in the number of participants across follow-up points: 17.8% missed week 4 follow-up, about 31.7% missed week 8 follow-up and 57.6% missed 6 months follow-up; some died before their follow-up date, some absconded treatments, some missed follow-up, some were loss to follow-up, some were on palliative care at home, some requested discharge to go home, some transferred to other departments, some were discharged to attend follow-up on different centers.(Table 2)

Table 2 - Missing Visits Reasons Frequency table

Missing Reasons	***Visits***					
	Week 4		***Week 8***		***Month 6***	
	Cumulative Frequency (n=202)	Cumulative Percent %	Cumulative Frequency (n=168)	Cumulative Percent %	Cumulative Frequency (n=104)	Cumulative Percent %
Absconded	1	0.4	4	1.6	6	2.4
Died	20	8.1	30	12.2	48	19.5
Discharged	2	0.8	9	3.7	15	6.1
Loss to Follow up	9	3.7	12	4.9	18	7.3
Missing Visit	5	2.0	15	6.1	41	16.7
Palliative Care	4	1.6	4	1.6	5	2.0
Request to home	2	0.8	2	0.8	2	0.8
Transferred	1	0.4	1	0.4	1	0.4

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Completed Treatment	0	0	1	0.4	5	2.0
Refused Treatment	0	0	0	0	1	0.4
Total	***44***	***17.8***	***78***	***31.7***	***142***	***57.6***

Nutrition status

In the context of this study, malnutrition is referred to as a nutritional deficiency. Children with a diagnosis of cancer are particularly vulnerable to malnutrition because they exhibit elevated substrate needs due to the disease/tumour processes and the treatment given. At the same time, children have increased nutrient requirements to attain appropriate growth and neurodevelopment. It has been demonstrated that adequate nutrition plays a decisive role in several clinical outcome measures, such as treatment response, quality of life, and cost of care (9).

This study has revealed that 11.8% of the participants had severe acute malnutrition, 28.5% moderate acute malnutrition and about 59.3 % had normal nutrition. Almost half of the participants reported being malnourished on admission, either moderately malnourished or severely malnourished. On the week 4 follow-up, about 26.7% were moderately malnourished, 6.9% were severely malnourished; on the week 8 follow-up, 11.3% were moderately malnourished and 4.2% were severely malnourished; on 6 months follow-up, more than half of participants missed this follow-up, the majority reported to be nourished about 95.2%, only 4.8% were moderately malnourished. The proportion of patients with normal nutrition is increasing while the proportion of MAM and SAM is decreasing, implying the effectiveness of treatments and nutrition interventions. (Table 3, Figure 1)

The nutrition status of children was further analyzed in age groups on which this study reported that age group 0 - 5 Years contributes to a high frequency of malnourished children compared to other age groups from baseline across other follow-ups: week 4 follow-up, week 8 follow-up and 6 months follow-up.

Table 3 - Nutritional Status Frequency table

Nutritional Status	***Visits***							
	Baseline		***Week 4***		***Week 8***		***Month 6***	
	Frequency (N=246)	Percent %	Frequency (n=202)	Percent %	Frequency (n=168)	Percent %	Frequency (n=104)	Percent %
Normal	146	59.3	133	65.8	129	76.8	99	95.2
Moderate Acute Malnutrition	70	28.5	54	26.7	19	11.3	5	4.8
Overweight	0	0	1	0.5	13	7.7	0	0
Obesity	1	0.4	0	0	0	0	0	0
Severe Acute Malnutrition	29	11.8	14	6.9	7	4.2	0	0
Total	***246***	***100***	***202***	***100***	***168***	***100***	***104***	***100***

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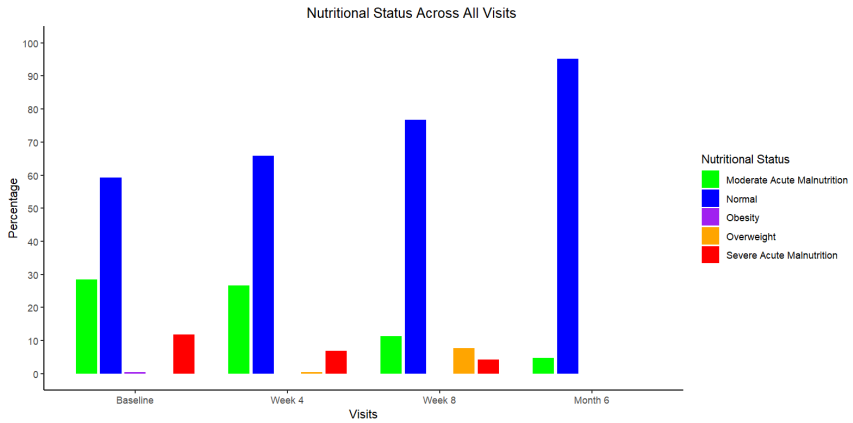

Figure 1 – Nutrition Status Distribution Across All Visits

Feeding problems

In the context of this study, feeding problems are referred to as conditions affecting the adequate intake of food among children with cancer, making it difficult for them to meet their daily nutritional requirements. This study has reported that many children present at the hospital on admission with different types of feeding problems, which complicated more than 4 weeks later after starting cancer therapy. (Figure 2)

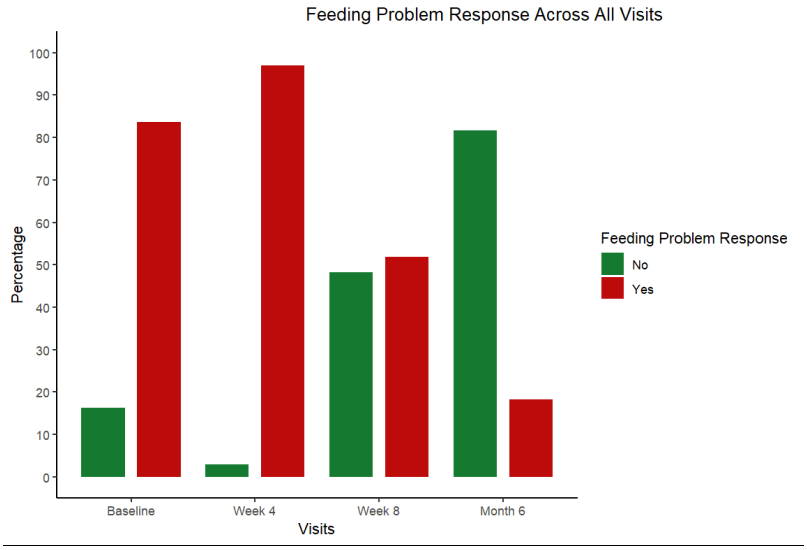

Figure 2 – Feeding Problem Response Across All Visits

The study has revealed that the most prominent feeding problems experienced by children with cancer, which significantly contribute to inadequate food intake, were loss of appetite/nausea/vomiting, followed by other factors (Anatomical Tumor causes/abdominal distension/abdominal pain, mucositis, and diarrhoea. (Table 4)

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Table 4 - Feeding Problem Distribution Frequency table

Feeding Problem	*Visits*							
	Baseline		***Week 4***		***Week 8***		***Month 6***	
	Frequency (N=246)	Percent %	Frequency (n=202)	Percent %	Frequency (n=168)	Percent %	Frequency (n=104)	Percent %
Loss of appetite or nausea	165	67.1	116	57.4	78	46.4	13	12.5
Diarrhea	11	4.5	45	22.3	7	4.2	5	4.8
Mucositis	17	6.9	39	19.3	10	6	4	3.8
Other or anatomical tumor	159	64.6	120	59.4	65	38.7	13	12.5

Oral nutritional support

This study refers to the dietary interventions for children admitted to the Pediatric Oncology Unit (MNH). It aims to describe the nutritional support provided to children who are on cancer therapy. This study has revealed that the most common dietary intervention done to children is hospital meals; it is the most typical nutritional support, accounting for more than 85%, followed by smoothies, then special porridge, peanuts and F75/100 is the least used nutritional intervention among the children who are on cancer treatments. (Figure 3)

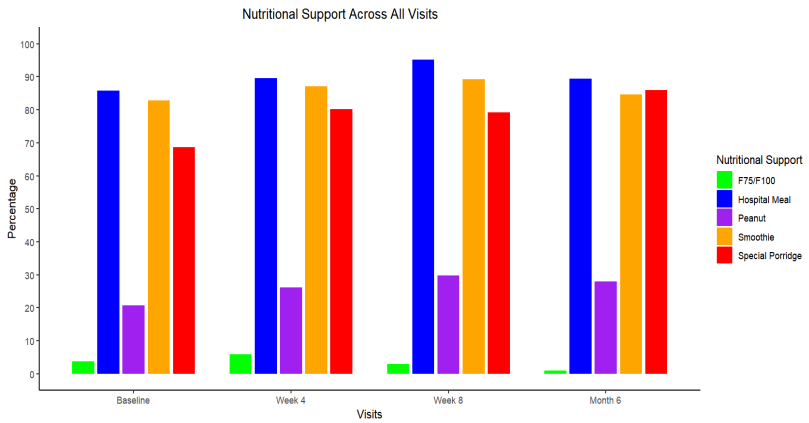

Figure 3 - Distribution of Nutritional Support Across Visits

Nutrition education/advice

Nutrition education/advice is one key practice in managing malnutrition among children with cancer. The information shared with the caregivers includes the number of calories a child needs per age, dietary goal (Kcal/day), dietary goal (Protein g/day), nutrition plan, nutrition weight goal, and feeding rates to achieve a child's daily food/calorie requirement. Each child is considered uniquely in terms of daily dietary goals. Studies showed that a high percentage of patients receive nutrition education and advice from the point of admission to follow-ups throughout the treatment period. (Figure 4)

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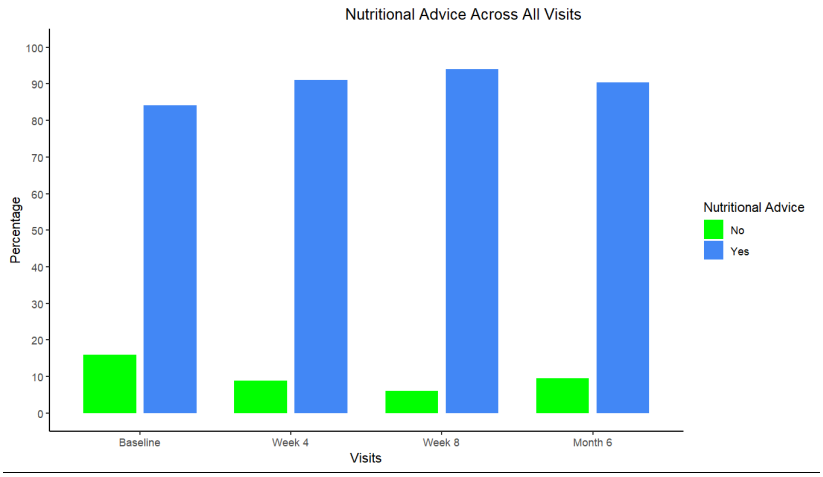

Figure 4 – Nutritional Advice Across All Visits

STATISTICAL ANALYSIS

P value < 0.05 was considered statistically significant.
During the week 4 visit, the chi-square test revealed a statistically significant association between Feeding Problem and Nutritional Status. The test produced a chi-squared statistic of 34.606, degrees of freedom (df) equal to 3, and an exceptionally small p-value of 0.0000001476.

Considering a significance level 0.05, the obtained p-value falls below this threshold, demonstrating statistical significance. The small p-value provides strong evidence to reject the null hypothesis, indicating that Feeding Problems and Nutritional Status are not independent variables. Consequently, we infer that during the week 4 visit, there is a significant association between Feeding Problems and Nutritional Status. This suggests that the occurrence of Feeding Problems is related to the Nutritional Status of the participants at this specific time.

Discussion

In this study, we explored nutrition status, associated feeding problems, and nutritional support provided to children admitted to the Pediatric Oncology Unit at Muhimbili National Hospital, Dar es Salaam, Tanzania.

The overall prevalence of nutrition status, feeding problems, and oral nutritional support were assessed from the point of admission, after 4 weeks, after 8 weeks, and after 6 months. On admission, this study showed that 28.9% (71) had moderate acute malnutrition, 11.8% (29%) had severe acute malnutrition, and 58.9% (145) had normal nutrition status; almost half of the study population reported to be malnourished. Age group 0-5 reported to contribute high frequency on malnourished children from admission across follow—up points. This prevalence is more than what has been observed in a study conducted in the Netherlands, consisting of 269 childhood cancer survivors reported at diagnosis; 5.2 % of all patients were malnourished. These patients showed worse survival than those well-nourished (Loeffen et al., 2015). This difference in prevalence might be associated with the difference in the study population and late presentation, as in Tanzania, the majority comes with advanced disease, used tools and the setting where studies were conducted.

This prevalence is more or less similar to what has been observed in a study conducted in Kenya among pediatric cancer survivors undergoing chemotherapy, where 41.2% of the respondents

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below 5 years were moderately wasted, 11.8% were severely wasted, and only 47.10% were well nourished. This study has reported that children aged 0 - 5 Years make a high frequency of moderately malnourished children compared to the other age groups (OJ Nyamboke, 2017). Socio-economic similarities could also explain this, both falling under LMIC categories.

This study has revealed that the most typical dietary interventions done to children is hospital meals accounting for more than 85%, followed by smoothies, then special porridge, peanuts and F75/100, which is the least used nutritional intervention among children with cancer at the unit; results are closely similar to other follow-up points where study reported that hospital meal is the most everyday nutritional support available followed by smoothie and special porridge.

This study has reported that many parents or caregivers received nutritional education/advice from admission to follow-up visits throughout the treatment period. Patients who cannot feed orally must insert the Nasogastric tube (NGT) to support their feeding and meet daily nutrition requirements for positive nutrition outcomes. In addition, Total Parenteral Nutrition (TPN) presents an alternative to NG tube feeding for children with frequent vomiting and vulnerable oral mucosa. However, cost-effectiveness remains a challenge. There is a need for more studies about common dietary interventions done among children with cancer in lower-middle-income African countries, as this area is less explored. Research done in Sweden showed that oral diet counselling is considered the most straightforward and preferred dietary intervention method in children at low nutritional risk. Attempts to increase oral food intake may fail or be insufficient in children undergoing intensive chemotherapy. Nutritional support via nasogastric (NG) tube may improve nutritional status, and it has been found to be safe and cost-effective (Skolin, 2005).

This study has reported children are admitted with different types of feeding problems, which aggravates more after starting cancer treatments. The most prominent feeding problems experienced by children with cancer were loss of appetite/nausea/vomiting, followed by other factors (Anatomical Tumor causes/abdominal distension/abdominal pain), mucositis and diarrhea are the common feeding problems hindering the adequate intake of food among the children with malignancy.

Results are more or less similar in terms of most prevalent feeding problem comparing two studies, firstly to what were observed through a study done in Turkey; assessing nutritional problems among children with cancer which revealed that the most prominent nutritional problems experienced by children were loss of appetite (85.5%), nausea (84.1%), vomiting (81.2%), fatigue (79.7%), and mucositis (66.7%) (Arpaci et al., 2018). Secondly, a study conducted in Kenya; among Pediatric patients with cancer diagnosis undergoing Chemotherapy, the three feeding problems associated with treatments were diarrhea (69.2%), decreased appetite (80.8%) and vomiting (94.3%).

This study also reported a significant association between Feeding Problems and Nutritional Status, implying that the occurrence of Feeding Problems is related to the Nutritional Status of the participants; hence, nutrition is one of the components requiring attention during cancer management among children with cancer. Nutrition should be adequately integrated in managing cancer while making clinical decisions and ensuring that key nutrition interventions are easily accessible. Nutrition support must be included in the Treatment of childhood cancers.

Limitations

The nature of the study does not allow establishing the relationship of other possible co-founders associated with malnutrition on admission i.e., lack of enough food before cancer, other chronic illness, genetic factors and developmental abnormalities hindering feeding. In addition to above,

during follow-ups, it was difficult to control the environment of some recruits, outpatients, to understand their adherence to nutrition plan/supplement use to achieve desired outcome.

Conclusion

The study has shown that most children experience at least one feeding problem. The pediatric oncology team has significant responsibility for monitoring, evaluating, and managing these children's nutrition to achieve the desired outcome.

Ethics statement

The ethical review board of the Muhimbili National Hospital reviewed and approved the study [Ref. MNH/IRB/2023/073]

Conflict of interest disclosures

The authors declare no conflicts of interest.

Author contributions

All authors contributed to the writing and approval of the final report.

Data sharing statement

We will provide any primary data access to the research committee anytime when requested during the review process or for editorial decisions.

Role of the Funder/Sponsor

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