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Nutritional Profile and Management of Pediatric Oncology Patients at a Tertiary Care Hospital from Kashmir : Where do we Stand?

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Abstract

Introduction: Malnutrition is an adverse prognostic factor in children with cancer and its prevalence is highly variable. The nutritional status of children with cancer has been found to have an impact on the tolerance to chemotherapy and overall survival. **Materials and Methods:** The study was conducted at the department of Medical oncology, (SKIMS) sher-i-kashmir institute of medical sciences, Srinagar. Retrospective data of all new pediatric oncology patients <18 years of age treated from May 2018 to December 2019 was analyzed. Details on age, gender, diagnosis and anthropometry were collected from case records. Anthropometry records were collected within 24 to 48 hours of admission for every patient. Anthropometry includes weight, height, MUAC (mid upper arm circumference) and OFC (occipital frontal circumference)/ HC (head circumference) (up to the age of 3 years). Weight was measured daily while the patient is in hospital and during each outpatient visit and height was assessed after every month. **Results:** In this study 35.2% of children were diagnosed leukemia, 16.8% lymphoma and 48% solid tumors. A total no. of 125 pediatric patients were enrolled in the analysis. Data on weight for age were available for 125 patients at diagnosis. There were 83/125 (66.4%) male patients and 42/125 (33.6%) female patients. Majority of the patient's belonged to the BPL (below poverty line). It was seen that 44/125(35.2%) were diagnosed leukemia, Lymphoma 21/125 (16.8%) and other solid tumors 60/125(48%).**Conclusion:** Nutrition assessment is important as childhood cancer survivors have been seen to have major issues related to nutrition. Both under nutrition and obesity can affect treatment outcome. Anticancer treatment in children is often very intense and may affect the nutritional status of children and therefore their physical and psychological development. Proper nutritional assessment is important for timely nutritional intervention and prevention of complications associated with malnutrition.

Keywords: cancer, nutrition, pediatric, anthropometry, MUAC, OFC, HC.

Introduction

Cancer is the name given to a collection of related diseases. In all types of cancer, some of the body's cells begin to divide without stopping and spread into surrounding tissues. Cancer can start almost anywhere in the human body, which is made up of trillions of cells. Normally, human cells grow and divide to form new cells as the body needs them. When cells grow old or become damaged, they die and new cells take place.When cancer develops, however, this orderly process breaks down. As cells become more and more abnormal, old or damaged cells survive when they should die, and new cells form when they are not needed. These extra cells can divide without stopping and may form growths called tumors. Many cancers form solid tumors, which are masses of tissue. Cancers of blood such as leukemia generally do not form solid tumors. In the United States in 2020, an estimated 11,050 new cases of cancer will be diagnosed among children from birth to 14 years, and about 1,190 children are expected to die from the disease. Although cancer death rates for this group have declined by 65 % from 1970 to 2016, cancer remains the leading cause of death from disease among children [1]. The most common types of cancer diagnosed in children ages 0-14 years are leukemia's, brain and other central nervous system (CNS) tumors and lymphomas.

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There are many types of cancer treatment. The types of treatment that you receive will depend on the type of cancer you have and how advanced it is. Some people with cancer will have only one treatment. But most people have a combination of treatments, such as surgery with chemotherapy and/or radiation therapy. The nutritional status of cancer patients needs to be actively monitored and effective nutritional interventions needs to be made to prevent malnutrition [2]. Among the various routes of feeding, the oral route is the first and best approach to nutritional support and this might not be sufficient if the child's dietary intake is less or not meeting the nutrient requirements[3]. Many cancer patients don't meet nutrient requirements due to the side effects of chemotherapy and might need Enteral Nutrition Support[4]. Proper nutritional status during cancer therapy has been recognized as being integral to a variety of health outcome measures, including overall survival, treatment tolerance, and quality of life. The prevalence of malnutrition, defined by WHO as either under nutrition or over nutrition, among children and adolescents with cancer is reported to be as high as 75%. Yet, over the past two decades there have been limited advances in elucidating the underlying pathophysiological drivers of malnutrition in this population. The nutritional status of children with cancer has been found to have an impact on the tolerance to chemotherapy and overall survival. The prevalence of under-nutrition in children in resource-poor countries such as India is very high and accounts for increased infant and child mortality rates. It is important to obtain data on the prevalence of malnutrition in pediatric cancer patients from India so that strategies can be devised for active nutritional intervention thereby improving tolerance to chemotherapy and survival.

Aim

To assess the nutritional status of the patients by their anthropometric measurements and compare it with standards.

Materials And Methods

The study was conducted at the department of Medical oncology, (SKIMS) sher-i-kashmir institute of medical sciences, Srinagar. Retrospective data of all new pediatric oncology patients <18 years of age treated from May 2018 to December 2019 were analyzed. Details on age, gender, diagnosis and anthropometry were collected from case records. Anthropometry records were collected within 24 to 48 hours of admission for every patient. Anthropometry includes weight, height, MUAC (mid upper arm circumference) and OFC (occipital frontal circumference)/ HC (head circumference) (up to the age of 3 years). Weight was measured daily while the patient is in hospital and during each outpatient visit and height was assessed after every month. Anthropometrics can provide a considerable amount of nutritional information about the patient. Patients falling above -2SD (standard deviation) and above the median of the reference population are classified as being globally well nourished, below -3SD severely malnourished, between -3SD and -2SD moderately malnourished and >2SD obese. Below 6 years of age and patient's with solid tumor, their grade of nutrition was done on the basis of MUAC (mid upper arm circumference) and above 6 years on the basis of BMI (Basal metabolic index). Patients were provided ration basket for every month, nutritional supplements and in-meal (like banana, milkshake, peanut or chikki) by NGO (Cuddles Foundation) during their treatment duration. However, it is important to have trained individual or nutritionist performing the anthropometry to ensure that the measurements are taken accurately and precisely.Inappropriate measurements by untrained professionals can provide misleading information on nutritional status.

Tools used for anthropometry: weighing machine, infantometer, sadiometer, shakir's tape and non-stretching measuring tape.

Results

A total no. of 125 pediatric patients were enrolled in the analysis. Data on weight for age were available for 125 patients at diagnosis. There were 83/125 (66.4%) male patients and 42/125 (33.6%) female patients. Majority of the patient's belonged to the BPL (below poverty line). It was seen that 44/125 (35.2%) were diagnosed leukemia, Lymphoma 21/125 (16.8%) and other solid tumors 60/125 (48%). Anthropometric measurements were calculated using age standards from World Health Organization (WHO). Height-for-age, weight-for-height, weight-for-age, BMI-for-age are the indices derived from anthropometric measurements and interpreted by determining the extent to which they deviate from those of the standard population of healthy well fed children. 58/125 (46.4%) were normal, 31/125 (24.8%) were mildly underweight, 20/125 (16%) were moderately malnourished, 10/125 (8%) were severely malnourished and 6/125 (4.8%) patients were obese. The nutrient requirements of the patients were calculated using WHO equations for Resting Energy Expenditure (REE) and the fluid requirements were calculated by Holiday-Segar method. 24 hour dietary recall method is most commonly used to assess the dietary intake of the children. In this study majority of the patients 24 hour recall was meeting 0n 50-60% of the daily requirement.

Management and outcome: Patients with cancer need to maintain a healthy body weight and eat nutritious foods. The side effects of cancer treatment can cause a person to eat less and lose weight. Losing weight without trying can make you weak and malnourished. On the other hand, some treatments may cause weight gain (like in steroids). We were able to show a significant improvement in nutritional status of our patients during the course of treatment. At our hospital we the nutritionists of NGO (Cuddles foundation) conducted PSG on alternative months where education on hygiene and nutrition is given to parents and reinforced throughout the treatment course. Parents are encouraged to provide fresh cooked food prepared at home and avoid unhygienic street food. Dietary myths and misconceptions are also allayed. Elemental and semi-elemental formulas, calorie dense foods (like chikki and peanuts) are regularly provided to the patients in addition to the hospital food. Nutritionists recommended scheduled eating times, instead of relying on hunger based cues, which may be blunted or absent. Patient's nutritional assessment is done within 24-48 hours of admission in ABCD format.

A: Anthropometry measurements

B: Biochemical assessment

C: Clinical assessment

D: Dietary assessment

Discussion

Nutritional status of children is a sensitive indicator of changes in the health status and food availability. In this study nutritional status was a useful tool as an early warning of distress and ill health within the cancer patients. Children with cancer often undergo treatment for prolonged periods of time depending on disease state and response to therapy. Regular nutritional monitoring during and after treatment, is essential to ensure adequate growth and development, provide appropriate interventions when required, and prevent worsening of a child's nutritional state. The nutritional risk changes with time according to duration and intensity of treatment. The patient's follow-up with a nutritionist/ dietitian should conform to the intensity of treatment and consist of a nutritional support strategy adapted to individual nutritional needs, nutritional status, gastrointestinal function and current or expected side effects of treatment. Viani,et al. (2020) carried out a study on assessment of nutritional status in children with cancer and study revealed that patients receiving periods of intensive treatment require follow-up at a maximum interval of 3 weeks. Children on less intensive treatment need to be optimally evaluated three monthly, and 6 to 12 monthly intervals while on the maintenance phase of treatment. The intensity of treatment can be evaluated according to the intensity of treatment rating scale [5]. Ideally, we suggest that all patients be provided with routine follow-up assessments as constant nutritional monitoring consults are important opportunities to provide the home caregiver with continuing nutrition education. However, this may not be

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feasible for many pediatric cancer units, since repeated visits require resources and trained personnel. It is recommended that, depending on institutional nutritional infrastructure, nutritionally at risk patients should be followed up as a priority, when possible, on a consistent schedule[6]. The nutritional status is dynamic and nutritional changes in survivors are often overlooked because of lack of follow-up. Nutritional assessment and guidance should start soon after the oncological diagnosis and extend through survivorship. This aids in preventing or reversing nutritional deficiencies, preserves lean body mass, minimizes nutrition-related side effects and improves the quality of life of future survivors [7]. The relationship of the nutritional status before, during and after treatment on survival is required for the advancement of nutritional science. Childhood cancer survivors are known to have a predisposition toward obesity and metabolic syndrome. Sarcopenia obesity has been identified in approximately 40% of survivors of acute lymphoblastic leukemia[8]. Supplementation is delivered by the oral, enteral or parenteral route is dictated by the individual clinical situation, though the "7-10 days rule" is a useful guide to avoid over-utilization of parenteral nutrition, and the "re-feeding syndrome" can be prevented by introducing nutritional supplementation slowly [9]. Given the prevalence of malnutrition in the India population, it is not surprising that studies of nutritional status have been undertaken in children with cancer in several parts of the country. In addition to those reported at the SIOP symposium in Mumbai in September 2014, Kumar et al. from Chandigarh observed that 88% of children with ALL were malnourished at diagnosis when arm anthropometry was added to weight-for-age as defining measures [10]. Moreover, loss of mid-upper arm muscle area occurred in 56% of this small sample (n= 25) during remission induction.

Three studies had addressed the impact of nutritional status on survival. Barman et al. from Kolkata studied 700 children at diagnosis and found that a serum albumen of <3 g /100 ml and MUAC <3rd percentile were associated with shorter disease-free survival duration [11]. Vora et al. in Mumbai, studying patients with non-metastatic Ewing sarcoma (n= 343), observed that a serum albumin of <4 g/ 100 ml was associated with an event-free survival (EFS), at a median follow-up of 24 months, of 43% compared to those with higher levels (EFS 68%)[12]. As there are large populations of incident cases of cancer in childhood presenting to numerous institutions in India, there is an obvious opportunity to undertake well- designed studies, including trials of nutritional intervention, especially if performed collaboratively. Indeed, India could lead the way in these endeavors and even rise to the challenge of measuring health-related quality of life in this context; an area of study that is essentially unexplored [13].

Conclusion

Nutrition assessment is important as childhood cancer survivors have been seen to have major issues related to nutrition. Both under nutrition and obesity can affect treatment outcome. Anticancer treatment in children is often very intense and may affect the nutritional status of children and therefore their physical and psychological development.Proper nutritional assessment is important for timely nutritional intervention and prevention of complications associated with malnutrition.

References

1. www.cancer.org
2. Marx W, Kiss N, McKavsnagh D, Isenring L. Chemotherapy-induced nausea and vomiting: a narrative review to inform dietetics practice. J AcadNutr Diet. 2016; 116:819-27
3. Viani K. Parenteral and enteral nutrition for pediatric oncology in low and middle-income countries. India J Cancer. 2015; 52:182-4
4. Rogers PC, Melnick SJ, Ladas EJ, Halton J, Baillargeon J, Sacks N. Children's oncology Group (COG) Nutrition Committee. Children's Oncology Group Nutrition Committee. Pediatr Blood Cancer. 2008; 50(2 suppl):447-50
5. Kazak AE, Hocking MC, ittenbach RF, Meadows AT,Hobbie W, DE Rosa BW et al. A revision of the intensity of treatment rating scale: classifying the intensity of pediatric cancer treatment. Pediatric Blood Cancer. 2012; 59:96-99
6. Ladas EJ, Arora B, Howard SC, Rogers PC, Mosby TT, Barr RD. A frame work for adapted nutritional therapy for children with cancer in low and middle-income countries: a report from the SIOP PODC Nutrition working group. Pediatr Blood Cancer. 2016; 63:1339-1348
7. Cohen JE, Wakefield CE, Cohn RJ. Nutritional interventions for survivors of childhood cancer treatment.Pediatr Blood Cancer. 2012; 59:96-99
8. Roy MoulikN, Kumar A, Agrawal S, Mahdi AA. Folate deficiency in north India children undergoing maintenance chemotherapy for acute lymphoblastic leukemia-implications and outcome. Pediatr Blood Cancer, 2017:1
9. Wells JCK. Using body composition assessment to evaluate the double burden of malnutrition. Ann Nutr Metab. 2019;75:103-108
10. Kumar R, Bhakka AK, Gulati M. Protein energy malnutrition and skeletal muscle wasting in childhood acute lymphoblastic leukemia. India Pediatr. 2000; 37:720-6
11. Barman B, Ghosh R, Saha K et al. Assessment of nutrition for children in childhood cancer- A study from a developing country. Int Soc Pediatr Oncol, 2008:1
12. Vora T, Kurkure P, Arora B et al. Baseline serum albumen- an independent prognostic factor in non-metastatic Ewing sarcoma family of tumors. A prospective study in 343 patients from India. Pediatr Blood Cancer. 2011; 57:766-7
13. Bauer J, Jurgens H, Fruhwald MC. Important aspects of nutrition in children with cancer. AdvNtr. 2011; 2:67-77

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