PERSPECTIVE

Role of nutrition in cancer patients

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ABSTRACT

Children with cancer are at a significant risk of having nutritional difficulties as a result of their underlying condition and the adverse effects of multimodal therapy. Nutritional status (NS) can impact a variety of clinical outcomes, including Overall survival (OS) and Event-Free Survival (EFS), therapy tolerance, infection risk, and Quality of Life (QoL). However, the role of diet in cancer children is largely underappreciated. This review focuses on NS changes in children undergoing cancer therapy. In the paediatric cancer population, there is currently a lack of a systematic strategy and conventional recommendations for nutritional management. According to a review of the literature, it is critical to define the NS and handle any changes in a timely way to ensure optimal growth and development.

Key Words: *Cancer; Enteral nutrition; Malnutrition; Nutrition*

INTRODUCTION

Undernutrition is defined as an insufficient Nutritional Status (NS) . It is caused by an imbalance between the energy and nutrients provided and those required by the organism.

Advances in supportive care areas such as pain management, emesis control, and infection prevention and treatment have led not only to increased survival in high-income nations, which now exceeds 80%, but also to a higher quality of life for children receiving cancer treatment. Children with cancer are at a significant risk of nutritional deficiencies due to the disease itself, the toxicity of medicines, and their increased physiological needs. However, the role of diet in cancer children is largely underappreciated.

NS during cancer treatments has an impact on numerous clinical outcomes, including Overall Survival (OS) and Quality Of Life (QoL). NS increases the risk of morbidity and death before and after cancer therapy, affecting survivors' long-term health. Undernutrition has been established as a risk factor for infection development.

The Gut Microbiome (GM) has received a lot of attention in recent years as a factor in the onset and development of various disorders. The microbiota appears to be crucial in oncological pathogenesis. Chemotherapy produces Gastrointestinal (GI) damage by altering the natural bacterial flora, resulting in dysbiosis and contributing to the patient's malnutrition.

Nutritional follow-up should become an intrinsic element of the care route for all of the reasons stated above. In the paediatric cancer population, there is currently a lack of a systematic strategy and conventional recommendations for nutritional management. This review focuses on NS changes in children undergoing cancer therapy. We examined the pathophysiology of malnutrition in children with cancer, as well as how NS impacts treatment tolerance and response, the immune system, and infection risk.

METHODS FOR ASSESSING NUTRITIONAL STATUS IN CANCER CHILDREN

It is critical to assess NS at diagnosis and to follow NS during therapy and survival. This is because if the initial evaluation is not performed immediately after diagnosis, the procedures and therapies utilized may affect the results. The goal is to guarantee good NS and consistent growth.

Nutritional evaluation should take into account the patient's NS, GI function, treatment intensity, and existing or anticipated adverse effects and advocated a schedule of nutritional evaluation during paediatric cancer therapy in a recent consensus statement.

Nutritional examination and counselling should continue during survival. NS should be assessed on a regular basis to prevent missing any changes in survival and to identify patients who require advanced nutritional assistance and established a nutritional evaluation approach for paediatric cancer survivors.

The A-B-C-D technique is a standardized instrument that is suggested for NS screening in cancer-affected children. Anthropometric measurements (A), biochemical examinations (B), clinical evaluation

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(C), and nutritional intake (D) are all included. The use of anthropometric measures is used to evaluate NS. Traditional anthropometric parameters, such as BMI, are deemed insufficient indications of NS in cancer children. Fluid balance in these individuals may be disrupted, especially if there is edoema from therapy and an abdominal tumour mass, such as neuroblastoma, Wilms tumour, or hepatoblastoma.

In many circumstances, arm anthropometry provides more sensitive data on NS than BMI. Triceps Skinfold Thickness (TSFT) represents fat mass, whereas Middle-Upper Arm Circumference (MUAC) represents lean body mass. It is also necessary to examine head circumference in children under the age of three, which is critical for optimal neurodevelopmental outcome, but we must note that it may be affected in patients with brain tumours. Lean body mass is vital for appropriately assessing NS since it is the most metabolically active component of the body.

Both paediatric cancer patients and survivors have reduced muscle health and function. CHT and RT administered at a critical time of physiological development cause musculoskeletal consequences such as loss of mass and strength in cancer patients. Hand-Held Dynamometry (HHD) is a low-cost and quick approach for obtaining a basic measurable assessment of strength.

To detect indicators of malnutrition, clinical assessment is required. In children with undernutrition, assessing subcutaneous fat loss or excess, muscle wasting, skin and hair changes, recent weight fluctuation, presence of edoema, mucous membrane dryness, and evidence of vitamin and mineral deficiencies is critical. It is also critical to assess the impact of cancer therapy on oral food intake, such as vomiting, lack of appetite, diarrhea, constipation, flatulence, belching or indigestion, mucositis, nausea, dysphagia, taste aversions, xerostomia, and difficulty chewing and swallowing.

An appropriate nutritional history should be obtained at the initial examination and thereafter reevaluated to detect usual side-effects altering food intake. Food aversions, allergies or intolerances, present eating patterns, changes in physical activity level, family behavior, and food hygiene at home should all be explored. A food diary that records all consumption for three to seven days is a helpful tool in this process. This examination should be carried out by experts in the field, such as dietitians or clinical nutritionists.

Several nutritional screening techniques have been created to determine a child's risk of malnutrition. However, there is insufficient evidence to favour one over the other. Strong Kids is a simple screening tool for hospitalised children that takes into account four factors: subjective clinical evaluation, high-risk condition, nutritional intake and losses (diarrhoea, nausea, vomiting), and weight loss or poor weight growth.

It would be beneficial to create an illness-specific nutrition score that considers both the ailment and the severity of therapy. To better describe the NS of children with cancer, it is required to incorporate anthropometric measurements, laboratory data, body composition testing, caloric intake evaluation, and energy expenditure.

Prevalence of undernutrition in different cancer types

The research on the prevalence of undernutrition (both overnutrition and undernutrition) in paediatric cancer patients are quite variable. The occurrence of NS varies according to the kind of tumour (its localization/staging and biological activity), the type of treatments, the age of the patients, and the methodologies and cut-off points used to assess NS.

Patients with Acute Lymphoblastic Leukaemia (ALL), lymphomas, and non-metastatic local malignancies had a decreased rate of undernutrition, as did patients in remission taking maintenance treatment. According to the research, the incidence of undernutrition in leukaemia is 5%-10% at diagnosis and up to 5% during treatment, 50% at diagnosis and 20%-50% during treatment in neuroblastoma patients, and up to 30% in other malignant tumours at diagnosis and during therapy.

Two retrospective investigations on leukaemia patients were undertaken. The first research discovered that 7.6% of male and 6.7% of female ALL patients were undernourished at the time of diagnosis, whereas 2.6% of males and 3.2% of females were overnourished. This study also proposed utilising the BMI as an initial nutrition screening tool to promptly identify and address undernutrition.

Consequences of undernutrition in children with cancer

Undernutrition during therapy can have a deleterious influence on CHT tolerance, OS, EFS, infection risk, and QoL. Indeed, both directly and indirectly, malnutrition can have a significant influence on the QoL of cancer patients. It can lower bone mineral density (BMD) and raise the risk of chronic illnesses including cardiovascular disease, diabetes, and metabolic syndrome. Furthermore, malnutrition might render patients more vulnerable to infections and affect medication metabolism, resulting in higher toxicity.

Targeting undernutrition

It is difficult to treat NS in paediatric cancer patients. Patients who are at high risk of malnutrition should be constantly followed. Nutritional counselling by a professional dietician is deemed sufficient if a patient is sufficiently nourished, not losing weight, and consumes at least 50% of the necessary nutritional intake. Nutritional counselling is also required for overweight and obese patients at the time of diagnosis or throughout therapy, with specific emphasis paid to patients on extended courses of steroids who are at risk of developing sarcopenic obesity (ALL patients). When the patient does not have high-risk traits and is unable to fulfil 50% of the daily needs orally, nutritional assistance, beginning with oral supplements, is required. The GI tract is the best route to nourish children with cancer, and it also has the significant benefit of preserving intestinal function and mucosal gut integrity.

Because of adverse effects including as nausea, vomiting, and mucositis, oral nutrition cannot usually be administered in patients undergoing CHT or HSCT. If oral feeding is not possible, alternate nutrition routes and the dangers associated with them should be explored with parents and patients.

CONCLUSIONS

The modification of NS is a modifiable risk factor that may be addressed with proper and prompt management to enhance the QoL, immunological state, treatment response, and survival of children with cancer. Despite sometimes taking a second place to other oncological therapies and evaluations, assessing NS is becoming a key component of cancer care therapy. Changes in NS can have a negative impact not just at diagnosis, but also during survival . Routine evaluations are required throughout and after cancer treatment to guarantee normal growth and development and to monitor the beneficial effects on outcomes.