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Evaluation of Nutritional Status in Kashmiri Children with Acute Lymphoblastic Leukemia (ALL)

Toyeeba Hassan[1], Sajad Geelani[2],Parveena Firdous[1], KamranNissar[1,3], Bashir A. Ganai[1*]

[1]Centre of Research for Development (CORD), University of Kashmir, Srinagar, Jammu and Kashmir, India-190006

[2]Department of Clinical Hematology, SKIMS, Srinagar Jammu and Kashmir, India-190011

[3]Department of Clinical-Biochemistry, University of Kashmir, Srinagar, Jammu and Kashmir,190006, India

*Corresponding author:
Prof. Bashir A. Ganai
email: bbcganai@gmail.com

Abstract:

Long-standing awareness and ongoing documentation of malnutrition in adult and paediatric cancer patients has been a topic of discussion among health professionals and. Although the predictive value of nutritional status in cancer patients is still being debated, it is widely accepted that nutritional support is an essential component of medical treatment. The purpose of the study was to assess the nutritional health of children with acute lymphoblastic leukemia. The study included 50 ALL patients ranging in age from (0-14 year). The whole medical history of each patient was gathered, including details on their primary complaint, previous eating habits, diagnostic tests, and measurements. In the newly diagnosed stage, malnutrition was more prevalent than in the remission and relapsed stages: 50% (weight-for-age), 28.6% (height-for-age), 42.9% (weight-for-height), 28.6% (MUAC-for-age), and 7.1% (according to the findings) (severe malnutrition). Furthermore, of the 50 ALL patients, 65.9% were men and 34% were women. The majority of participants (51.2%) were aged 0 to 5. During the study, more than half of the participants (54.9%) were in remission. The findings revealed that, out of the 50 participants, 19 (39.5%) were underweight for weight-for-age, 9

(14.2%) were stunted for height-for-age, 16 (29.4%) were wasted for weight-for-height, and 8 (16.9%) had malnutrition for (mid upper arm circumference) MUAC-for-age. Malnutrition affected a large proportion of children with acute lymphoblastic leukemia. Sufficient nutrition is critical to ensuring the best possible treatment and prognosis for such children.

Keywords: Lymphoblastic Leukemia; malnutrition; Paediatric cancer; obesity; children

1.Introduction

According to research, nutritional status has a significant impact on a child's prognosis for paediatric Acute Lymphoblastic Leukemia (ALL) in poor countries, either directly or indirectly. The two characteristics that stand out the most among them are the child's parents' low socioeconomic position (SES) and poor educational level, and they may be connected in some way. This supports the idea that one of the main mechanisms driving the negative adverse prognostic impact of poor socioeconomic position is noncompliance with standard treatment (Jaime Pérez et al., 2008). Cancer, or more specifically cancer treatment, can result in starvation, vomiting, or maldigestion/malabsorption, which reduces food absorption and leads to malnutrition (Sgarberiet al., 2006). It is debatable how important and significant the nutritional state is at the time of the diagnosis of (ALL) (Jaime-Pérez et al.,2008). Some children were documented to have malnutrition at the time of diagnosis, and their malnutrition worsened during treatment, especially if the malignancy required severe chemotherapy or a bone marrow transplant. (Pietsch and Ford, 2000). Treatment of underprivileged children with this condition can be difficult because, in addition to the well-known potential factors (age, white blood cell count at the time of treatment, clinicopathologic, karyotypic, and molecular profiles), nutritional status and socioeconomic status have been identified as key predictors of outcome. Communication, transportation, lab tests, and medical care are just a few socioeconomic factors that may influence how well people with ALL respond to therapy (Gómez- Almaguer et al., 1998). Adequate nutrition is a major concern in children with ALL because malnourishment and loss of weight are common and are caused by a variety of factors including the tumour, the host's reaction to the tumour, such as infection, and the pharmacokinetics of chemotherapy medications (Marwaha et al., 2000). When ALL patients are diagnosed, they are frequently malnourished. In Mexico and Brazil, for example, 20 to 50% of children meet the criteria for undernutrition based on their

weight or height for their age (Lobato-Mendizabalet al., 1991; Go'mez-Almagueretal., 1995).Primary malnutrition is a risk for children in impoverished countries. Children undergoing cancer treatment are more likely to develop secondary malnutrition, which includes obesity and a slowing of growth. To complete the nutritional analysis, data that is both objective and subjective must be used. Physical and medical history examinations, haematological and biochemical information, Anthropometric evaluations, and past dietary and nutritional habits are all components of nutritional evaluation. Malnutrition can weaken the immune system, especially in people who already have weakened immune systems; it can also delay wound healing and slow medication metabolism. Furthermore, it can play a role in fatalities and poor prognoses (Bechard et al., 2006; Kadir et al., 2017). In hospitalized patients, malnutrition increases the risk of morbidity, including slower wound healing, more infectious problems, impaired immunological function, weakened muscles, and longer hospital stays. Apathy and melancholy are also symptoms of acute malnutrition, whereas delayed neurodevelopment is a symptom of chronic malnutrition. The nutrition literature in paediatrics backs up these findings (Kadir et al., 2017). We report our findings in the current study after analysing the data. To accomplish this, clinical, laboratory, and dietary data were gathered. The goal of this study was to compare and contrast the nutritional status of children with leukemia at the time of disease diagnosis. It would be beneficial to investigate preventive nutritional methods that should be implemented in order to improve the quality of life for children with leukemia. The main purpose of the nutritional evaluation in children is to prevent nutritional problems and the associated increase in morbidity and mortality.

2. Subject Selection and Methods

50 ALL-diagnosed children under the age of 15 were recruited from the Department of Clinical Haematology at SKIMS (Sheri-Kashmir Institute of Medical Sciences), Soura Srinagar, Jammu and Kashmir-190011.

ALL patients with confirmed clinical pathology reports and no history of other malignancies were enrolled in this study, and their nutritional status was evaluated at the time of diagnosis and at each subsequent visit after informed consent was signed by their parents. A detailed food frequency questionnaire was administered to the mother and/or child as part of the nutritional evaluation. This study's ratings were all completed, which is necessary for consistency.

The evaluation of the questionnaire variables was used to calculate the total daily kilocalories (kcal) consumed by the child, as well as the structure of the healthy balanced diet

and the precise contribution of the diet's key constituents to total calorie consumption. Name, gender, ethnicity, birthdate, diagnosis date, treatment plan, and risk category were all recorded. Each individual's body mass index (BMI), which is calculated as weight/height2, was recorded, as well as their height or length (m), weight (kg), and height. When the height was greater than 120 cm, the weight-for-length charts were used to calculate the weight-for-length percentile. Data were entered for each patient into the overall study system as well as onto an individual record to allow for follow-up and serial charting for comparison with age-appropriate standard reference charts. Nutritional assessment is the quantitative assessment of nutritional status.

An extensive nutritional assessment consists of following components:

1. Anthropometric measurements, growth, and body composition measurements.

2. Examination of the body.

3. Tests in the lab.

4. Monitoring and intervention (Kadir et al., 2017).

Statistical analysis

For statistical analysis, the SPSS program and Microsoft Excel were used, and the results were reported as means, percentages, and standard deviations.

3. RESULTS

The food-frequency questionnaire used to diagnose patients revealed that the average daily calorie intake was 1,350 kcal, with median values of 725 kcal (54%) for carbohydrates, 325 kcal (24%) for proteins, and 300 kcal (22%) for fats. The average calorie deficit per day was 285 calories. **Table 1** shows the gender, age range, and disease status of 50 leukemia patients. The men outnumbered the women by 65.9% to 34%. The age groupings were as follows: 0 to 4 years, 5 to 10 years, and 11 to 15 years. The majority of the participants (51.2%) were between the ages of 0 and 5.Over fifty percent of the participants (54.9%) experienced remission at the time of the study. Based on anthropometric measurements, **Table 2** displays the prevalence of malnutrition among leukaemia patients. The findings revealed that, out of the 51 participants, 19 (39.5%) were underweight for weight-for-age, 9 (14.2%) were stunted for height-for-age, 16 (29.4%) were wasted for weight-for-height, and 8 (16.9%) had malnutrition for (mid upper arm circumference) MUAC-for-age. According to the various

stages of treatment, **Figure 1** depicts the prevalence of malnutrition among leukaemia patients. According to the findings, people in the newly diagnosed stage had a higher prevalence of malnutrition than those in the remission and relapsed stages: 50% (weight-for-age), 28.6% (height-for-age), 42.9% (weight-for-height), 28.6% (MUAC-for-age), and 7.1% (severe malnutrition).

Table 1. Characteristics of study subjects

S.No.	Characteristics	Frequency	Percentage (%)
1.	**Sex**		
	Male	33	66.8
	Female	17	33.2
2.	**Age Group**		
	0-4	20	42.3
	5-10	14	24.2
	11-15	16	33.5
3.	**Disease Status**		
	Newly Diagnosed		24.5
	In Remission		56.8
	Relapsed		18.7

Table 2. Prevalence of malnutrition in children with Acute Lymphocytic Leukaemia

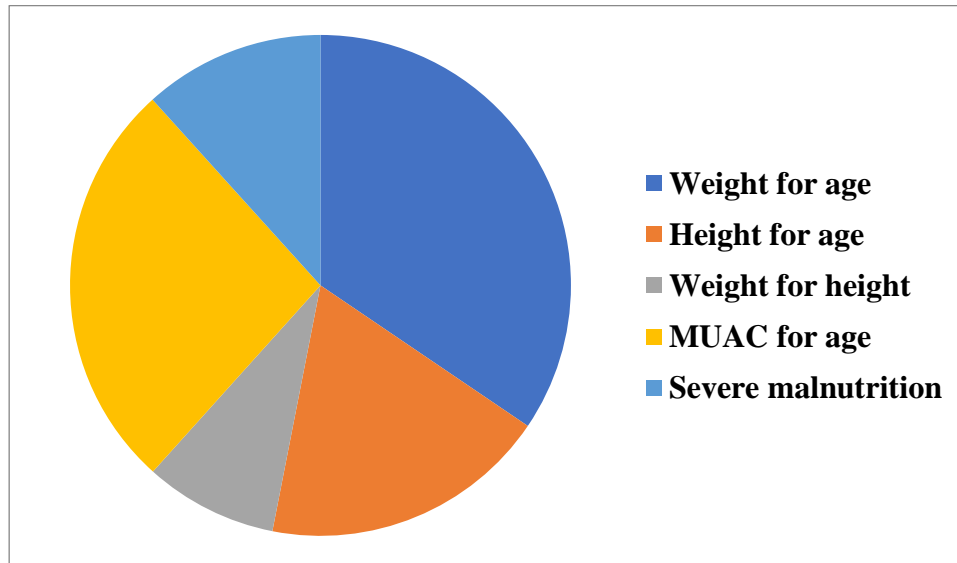| S.No	Indicators	Nutritional status	Frequency	Percentage (%)
1.	Weight-for-age < 2 SD	Underweight	19	37.3
2.	Height-for-age < 2 SD	Stunting	9	17.6
3.	Weight-for-height < 2 SD	Wasting	16	31.4
4.	MUAC-for-age < 2SD	Malnutrition	8	15.7
5.	Serum albumin <21g/dl	Severe malnutrition	2	20.0
6.	Hemoglobin<11.5 mg/dl	Anemia	51	100

Figure 1

Figure 1: Percentage of patients with malnutrition according to treatment stages

4. Discussion

Since it has been established that children's nutritional and socioeconomic status have a significant impact on how well ALL therapy works, nutritional intervention in future protocols for treating this disease in underprivileged children is now possible. Culture, as well as the financial and nutritional status of the patients and their families, must be considered when determining the best course of treatment for these individuals. It is necessary to develop protocols to investigate various nutritional intervention strategies and how they may affect ALL patients' pharmacology, drug tolerance, and long-term outcomes. To improve the chances of a cure for impoverished children with ALL, it is critical to assess the effects of poverty and illiteracy on treatment compliance and adherence, particularly with regard to oral drugs. Nutritional evaluation and intervention decisions were made in this trial as soon as the ALL diagnosis was made.

This study, conducted in the clinical haematology department at SKIMS, observed that nutritional deficiencies identified by the clinical nutritionist should be corrected by providing a diet appropriate for the child's age and clinical status in order to maximize the chances of improved health.

5. Conclusion

Nutritional assessment is critical for enabling proper and timely nutritional intervention in ALL patients. It is simple, adaptable to the institution's resources, and easy to implement. Because young cancer survivors have been shown to have serious nutritional issues, both undernutrition and overnutrition have been shown to have negative effects on the progression of paediatric cancers. Future research may concentrate on the role of diet in paediatric cancer. The current study is intended to inform and provide guidance on nutritional assessment of cancer children. The findings of this study provide convincing evidence for the importance of understanding the role of nutritional status in juvenile solid tumours. Because nutritional status is a condition that may be modified and because there is a frame of opportunity to change the dose of cancer treatment to accurately represent underlying individual metabolism, future research should focus on the role of body composition. Prospective, current research is required to fully comprehend the mechanical changes occurring beneath the surface. Knowing about these changes will allow for early intervention and improved outcomes.

Consent for publication

The SKIMS Kashmir ethical committee approved the study under research protocol number SIMS 1 131/1EC-SKIMS/2018-321.

Conflict of interest

There are no conflicts of interest stated by the authors.

Acknowledgment

Author Contribution

Prof. B.A. Ganai and T. Hassan designed the study; T. Hassan performed the research, wrote the paper, and conducted literature review. P. Firdous performed final proof reading; B.A.

Research Paper

Ganai, and S. Geelani reviewed the manuscript for important intellectual content; K. Nissar reviewed the manuscript; and T. Hassan and Prof. B.A. Ganai have primary responsibility for the final content.

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