

DOES WEIGHT FOR AGE HAVE PROGNOSTIC SIGNIFICANCE IN CHILDREN WITH ACUTE LYMPHOBLASTIC LEUKEMIA?

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ABSTRACT

Objective: To assess the effects of nutrition status (Weight for Age) of leukemic children on the treatment outcome.

Design: A prospective study from May, 1996 to June, 1999.

Setting: Shaukat Khanum Memorial Cancer Hospital and Research Centre, Lahore.

Patients and Methods: One hundred patients with Acute Lymphoblastic Leukemia (ALL) below the age of 14 years with L1 and L2 FAB morphology were included in this study. Treatment protocol used was FBM. Patients were classified according to waterlow classifications of malnutrition (1976). Group-I, as Under-Nourished children (UNC) and Group-II as Well-nourished children (WNC). Percentages in both groups were found out with respect to total expired, Relapses and completed treatment.

Results: In Group-I (UNC) 44.5% completed treatment and are alive, 9.5% relapsed and 46% expired. In Group-II (WNC) 59.5% completed treatment and are alive, 5.5% relapsed and 35% expired. Overall, in WNC group 22% completed treatment and are alive, 2% relapsed and 13% expired. In UNC group 28% completed treatment and are alive, 6% relapsed and 29% expired. Our data was not significant ($P=0.791$) to prove the hypothesis that the malnutrition (Anthropometrical) adversely effects the treatment outcome in Pakistani children with Acute Lymphoblastic Leukemia (ALL).

Conclusion: Weight for age does not has prognostic significance in children with Acute Lymphoblastic Leukemia (ALL) and should not be considered as prognostic factor.

KEY WORDS: Malnutrition, Acute lymphoblastic leukemia, Children, Prognosis.

Pak J Med Sci April - June 2006 Vol. 22 No. 2 167 - 170

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- * Received for Publication: April 13, 2005
Revision Received: July 13, 2005
Accepted: December 1, 2005

INTRODUCTION

Cancer is the rapid and unrestrained multiplication of body cells. Nutrition problems often result from malignancies and aggressive multimodal treatment. It has been shown that both the relapse and mortality rates of under-nourished children with ALL are higher during the continuation phase of the chemotherapy and are apparently related to a poor tolerance of ablative chemotherapy.¹ Viana et al, suggested that socioeconomic and nutritional factors should be considered in the prognostic evaluation of children with leukemia in developing countries. Clinical trials on children with acute lymphoblastic leukemia have shown that malnutrition is an adverse prognostic factor in the outcome of

treatment in patients with standard-risk acute lymphoblastic leukemia. The reason why undernourished children do poorly as compared with well-nourished children is that malnutrition leads to a diminished bone marrow reserves thus making necessary the delivery of suboptimal doses of maintenance chemotherapy.²

Yu et al, concludes that mild/ moderate malnutrition is common in leukemia patients at diagnosis.³ Marin et al, suggested that malnutrition might be included as an adverse prognostic factor in the outcome to treatment of children with ALL in the developing countries.⁴ Nash et al, observed that cancer seen in the underdeveloped countries where widespread malnutrition, dehydration and epidemic infections are present. In the western world, it is sometimes found in immunosuppressed adults with predisposing conditions such as leukemia and infection associated with malnutrition.⁵

The objective of our study was to test the hypothesis that the malnutrition (Weight for age) negatively effects the treatment outcome and may be considered as a prognostic factor in children with ALL.

PATIENTS AND METHODS

This study was conducted in Pediatric and Nutrition Clinic of Shaukat Khanum Memorial Cancer Hospital and Research Centre, Lahore from May 1996 to June 1999. Shaukat Khanum Cancer Hospital is 85-bedded tertiary care cancer hospital. Initially 140 patients were included in the sample consecutively. 40 patients were dropped from the study either because they were lost to follow up or some data were missing. One hundred patients upto the age of 14 or below years with acute lymphoblastic. Leukemia were included in the final phase of the study. Baseline data on Height, weight, FAB morphology were recorded at the time of diagnosis. Patients were observed for total remission, Complete treatment and alive, total relapses and total deaths during treatment phase.

Nutritional classification: Of the various anthropometric indices that can be used to assess child growth status, the following provide a comprehensive description: height-for-age portrays performance in terms of linear growth, and essentially measures long-term growth faltering; weight-for-height reflects body proportion, or the harmony of growth, and is particularly sensitive to acute growth disturbances; and weight-for-age represents a convenient synthesis of both linear growth and body proportion Clinically.⁶ PEM has three forms: dry (thin, desiccated), wet (edematous, swollen), and a combined form between the two extremes. The form depends on the balance of nonprotein and protein sources of energy. Each of the three forms can be graded as mild, moderate, or severe. Grade is determined by calculating weight as a percentage of expected weight for length using international standards (normal, 90 to 110%; mild PEM, 85 to 90%; moderate, 75 to 85%; severe, < 75%). Nutritional status of all patients are determined on the basis of weight for height and age, according to the waterlow malnutrition classification.⁷ Malnutrition status were determined at the baseline and relationship of undernourished and well-nourished state of patients on total relapses, deaths and complete treatment were examined. At the end of the study period outcome treatment were recorded as total deaths, total cured and total relapses.

RESULTS

A total number of 100 patients below the age of 14 years were included in the study from the pediatric patients recently diagnosed with acute lymphoblastic leukemia from May 1996 to June 1999. Baseline data were collected at presentation in the out patient clinic. The sample was divided into two groups. Group-I comprised of Under-Nourished children (UNC) patients based on weight for age. Group-II comprised of Well-Nourished Children (WNC). There were total 63% Under-Nourished Children (UNC) and 37 % were Well-Nourished Children (WNC). The frequency of relapse (9.5%) and mortality 46%

higher in Group-I (UNC). Group-II the frequency of relapse (5.5%) and mortality 35% was less than the Group-I. The frequency of complete treatment and alive cases (44.5%) was less than Group-II (59.5%).

DISCUSSION

Malnutrition has a negative impact on treatment outcome of hospitalized patients and results in increased morbidity and mortality in such patients. Malnourished patients have up to 20 times more complications than well-nourished patients.⁸ As many as 42% of hospitalized patients with severe malnutrition experience major complications. Even those who are moderately malnourished experience somewhat high complication rate (9%). The effects of malnutrition on patient's outcomes are dramatically demonstrated in morbidity and mortality studies. A study of individuals with colorectal cancer who were undergoing abdominal surgery found significantly higher Morbidity (52%) and mortality (12%) among malnourished patients. well-nourished patients had 31% morbidity and 6% mortality.⁹ Specific manifestations of malnutrition have also been associated with higher mortality rates. In one large-scale study of more than 4380 adults undergoing a wide range of elective surgeries, patients experiencing an absolute weight loss of more than 10 pounds had a 19-fold increased incidence of mortality.¹⁰ Reilly et al, reported that weight for height does have an influence on outcome in ALL, but the mechanism is unclear and the finding requires confirmation by large scale prospective studies.¹¹ Lobato and Ruiz have reported that undernourishment is an adverse prognostic factor in the outcome of treatment of patients with ALL in as much as malnourished children, due to diminished bone-marrow reserve, receive approximately 50% of the optimal doses of maintenance chemotherapy, thus leading into frequent bone marrow leukemia relapses and into a shortened disease free survival-DFS (5 year DFS was 83% for well nourished children and only 26% for undernourished children.¹² Mejia-Arangure

et al confirmed in their case-control study the prognostic value of malnourished in children with ALL and suggest that undernourishment may also influence early mortality during the induction-to-remission phase of the treatment.¹ In eight studies involving more than 1,347 hospitalized patients, 40%-50% were found to be either malnourished or at risk for malnutrition.¹³⁻¹⁹ The prevalence of malnutrition is substantially lower in industrialized countries and in patients with ALL in particular (in contrast to solid tumors).²⁰ Studies regarding the effect of malnutrition on outcome, even from developing countries, have yielded conflicting results.²¹ A study examining more than 1000 children with ALL treated in the united kingdom did not find a relationship between nutritional status (measured by body mass Index) and outcome.²² Our findings are in line with those of reported studies in which malnutrition shows no effect on prognosis in children with ALL. Malnutrition may be associated with increased morbidity and diminished tolerance of chemotherapy. While malnutrition is likely to play a role in survival in developing countries but it is unlikely to be taken as prognostic factor.

CONCLUSIONS

Thus it is concluded that weight for age does not have prognostic significance in children with ALL. Although underweight children with ALL are less likely to complete their treatment and are at high risk of relapses and mortality during treatment as compared to normally grown children.

RECOMMENDATIONS

Despite the non-significance of malnutrition as a prognostic factor Pediatric oncology wards should have nutrition and metabolic support teams. Nutrition and metabolic support must be initiated as soon as possible alongwith the medical treatment especially for undernourished children. Even in healthy children, just as a physician does not wait for the patient to become dehydrated, similarly one should not wait for the patient to become

malnourished during hospitalization. Therefore, nutrition support should be in place before the malnutrition occurs.

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