

Pre-existing malnutrition and treatment outcome in children with acute Lymphoblastic Leukaemia

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Abstract

Objective: To assess the effects of pre-existing malnutrition on the treatment outcome of children with acute lymphoblastic leukaemia.

Methods: One hundred and sixty three patients with Acute Lymphoblastic Leukaemia (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 calculated with respect to total expired, relapses and completed treatment.

Results: In Group-I (UNC) 46% completed treatment and were alive, 9.8% relapsed and 45% expired. In Group-II (WNC) 59% completed treatment and were alive, 21.3% relapsed and 19% expired. Overall, in WNC group 13.5% completed treatment and were alive, 8% relapsed and 7.3% expired. In UNC group 28.8% completed treatment and were alive, 6% relapsed and 27% expired.

Conclusion: Pre-Existing malnutrition adversely effects the treatment outcome in children with Acute Lymphoblastic Leukaemia (ALL) (JPMA 56:171;2006).

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 (return of the disease after it has once spent its course) and mortality rates of undernourished children with Acute Lymphoblastic Leukaemia (ALL) are higher during the continuation phase of the chemotherapy and are apparently related to a poor tolerance of ablative (removal) chemotherapy.¹ Viana et al, (1994) suggested that socioeconomic and nutritional factors should be considered in the prognostic evaluation of children with leukaemia in developing countries. Clinical trials on children with acute lymphoblastic leukaemia have shown that malnutrition is an adverse prognostic factor in the outcome of treatment in the patients with standard-risk ALL. The reason why undernourished children do poorly as compared with well-nourished children is that mal-nutrition leads to diminished bone marrow reserves thus making it necessary to deliver subop-

timal doses of maintenance chemotherapy.²

Yu et al. concluded that mild/moderate malnutrition is common in leukaemia 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 The objective of our study was to investigate the treatment outcome in children of developing countries as Pakistan, where malnutrition is prevalent on a large scale affecting medical treatment of cancer patients. Moreover, studies on oncology nutrition are scarce and it is necessary to explore the methods for improving the treatment outcome of cancer patients along with the quality of life.

Patients and Methods

This prospective study was conducted in Paediatric and Nutrition Clinic of Shaukat Khanum Memorial Cancer Hospital and Research Centre, Lahore from May 1995 to June 2000. Initially 220 patients were included in the

sample consecutively. Later 57 were excluded due to being lost to follow up missing data. One hundred and sixty three patients upto the age of 14 or below with acute Lymphoblastic Leukaemia were included in the final phase of the study. Baseline data on height, weight and FAB morphology were recorded at the time of diagnosis. Patients were observed for total remission, completion at treatment and being alive, total relapses and total deaths during treatment phase.

Malnutrition Classification

Malnutrition status were determined at the baseline by Waterlow classification which provides a better ratio of weight-for-age.

Study Parameters

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. Calculation was done by simple mathematics and the percentages determined for various parameters.

Results

A total number of 163 patients below the age of 14 years were included in the study from the pediatric patients recently diagnosed with acute lymphoblastic leukaemia from May 1995 to June 2000. 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 com-

prised of well-nourished children(WNC). There were total 102 (62.5%) under-nourished children (UNC) and 61 (37.5%) were well-nourished children (WNC). The frequency of relapses 10(9.8%) and expired 44 (45%) cases were higher in Group I (UNC). In Group-II the frequency of relapses 13 (21.3%) was higher and deaths 12 (19%) were less than in Group-I. The frequency of completed treatment and alive cases 47 (46%) was less than Group-II 36 (59%).

Discussion

Malnutrition impacts negatively on treatment outcome of hospitalized patients and results in increased morbidity and mortality in them. Malnourished patients have up to 20 times more complications than wellnourished patients.⁷ As many as 42% of hospitalized patients with severe malnutrition experience major complications. Even those who are moderately malnourished experience somewhat high complication rates (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.⁸ Specific manifestations of malnutrition have also been associated with higher mortality rates. In one large-scale sampling 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.⁹ Reilly et al.¹⁰ reported that weight for height does have an influence on outcome in ALL, but the mechanism is unclear and the finding requires confirmation by larger scale prospective studies. Lobato and Ruiz¹¹ found that undernourishment is an adverse prognostic factor in the outcome of treatment of patients with ALL. It has also been experienced that 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. Five year DFS was 83% for well nourished children and 26% for undernourished children.² Mejia-Arangure et al¹ confirmed in their case-control study the prognostic value of malnourishment in children with ALL and suggest that undernourishment may also influence early mortality during the induction-to-remission phase of the treatment. Malnutrition in our sample was a bit higher than that reported in the medical researches conducted in the western nations.¹ In eight studies involving more than 1,347 hospitalized patients, 40-50% were found to be either malnourished or at risk for malnutrition.¹²⁻¹⁸ Our study supports the hypothesis that undernourishment negatively

Table 1. Treatment outcome in Leukemic children with different nutrition status

Nutrition status	Complete Treatment and alive	Relapsed	Expired	Total
G-I(UNC).	47 (46%)	10 (9.8%)	44 (45%)	102
G-II(WNC)	36 (59.5%)	13 (21.3%)	12 (19%)	61

Table 2. Overall Treatment outcome in Leukemic children

Nutrition status	Complete Treatment and alive	Relapsed	Expired	Total
G-I	47 (28.8 %)	10 (6 %)	44 (27 %)	102 (62.5 %)
G-II	22 (13.5%)	13 (8 %)	12 (7.3 %)	61 (37.5%)
Total	69 (42.33%)	23 (14%)	56 (35%)	163

G-I comprised of Mal-Nourished Children (MNC) and G-II Comprised of Well-Nourished Children (WNC)

effects treatment outcome although the frequency of relapses was higher in WNC (Group II). This can be explained by the fact that many patients with normal nutritional status at the time of admission become malnourished during the various intensive therapies. Simultaneously, few undernourished patients improve nutritional status with the help of aggressive nutrition support during treatment.

The study concluded that pre-existing malnutrition negatively effects the treatment outcome in children with ALL. Underweight children with ALL are less likely to complete their treatment and are at high risk of relapses and mortality as compared to normally grown children.

Recommendations

Pediatric oncology wards should have nutrition and metabolic support teams. Nutrition and metabolic support must be initiated as soon as possible along with the medical treatment especially for undernourished children. Even in healthy children, nutrition should be monitored and adequately supported to maintain a normal status.

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