



PREVALENCE OF MALNUTRITION IN PEDIATRIC β -THALASSEMIA MAJOR PATIENTS ADMITTED TO A TERTIARY CARE CENTER

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ABSTRACT

Background: Thalassemia is a group of hereditary hemoglobinopathies having varied clinical presentations and complications. Malnutrition is commonly seen to affect the pediatric patients of β -thalassemia major.

Aims and objectives: To estimate the prevalence of malnutrition in the pediatric patients of β -thalassemia major.

Materials and methods: A record based retrospective study was conducted involving 122 β -thalassemia major patients between 1 to 12 years of age, receiving regular blood transfusions with or without iron chelation therapy. The anthropometric data were analyzed using WHO growth standards.

Results: 30.23% of the total patients were underweight, 9.84% were wasted and 4.92% were wasted and stunted. Patients in the age group of 11 to 12 years seem to be most affected.

Conclusion: The prevalence of underweight in pediatric β -thalassemia major is 34.43%. The prevalence of acute malnutrition is 9.84% and that of chronic malnutrition is 4.92%.

KEYWORDS : Anthropometry, Malnutrition, Prevalence, Thalassemia

INTRODUCTION

Amongst the many causes of malnutrition in children, chronic health conditions such as hemoglobinopathies, form an important cause and a contributing factor.(1) Thalassemias are a group of hereditary hemoglobinopathies characterized by a deficient synthesis of one or more haemoglobin polypeptide chains, α and β , leading to α and β -thalassemia respectively.(2) β -thalassemia can present in major, minor and intermedia forms. β -Thalassemia major is the most severe form that usually presents within the first two years of life with severe anaemia, requiring regular transfusions of red blood cell (RBC).(3) The pathologic features shared by all the types of Thalassemias are: chronic-hemolytic, microcytic, hypochromic anaemia with ineffective erythropoiesis.(4)

Patients with thalassemia suffer from complications such as growth retardation, skeletal deformities, opportunistic infections, iron-overload etc. Malnutrition is also a common finding in these patients which contributes to growth-retardation and low immunity.(5)

WHO and CDC have given standard growth charts to define and classify malnutrition, which is a broad category comprising 4 sub-forms: underweight, wasting, stunting and micronutrient deficiencies. Underweight is defined as the weight-for-age at or below 2 standard deviations from the mean. An underweight child could be wasted, stunted or both. Wasting is the result of acute malnutrition, which could be either moderate (MAM, weight-for-height between -2SD to -3SD) or severe (SAM, weight-for-height below -3SD). Stunting results from chronic malnutrition and is defined as the height-for-age at or below -2SD from the mean.(6)(7)

Body Mass Index (BMI) is also an important index of nutritional assessment. It is measured as the weight in kg divided by the square of the height in meters. BMI correlates with the severity and prevalence of several health problems such as diabetes, hypertension etc. in adults as well as in children.(8) CDC has provided the standard growth charts with BMI-for-age distribution in the age-group of 2 to 12 years. The BMI-for-age between 5th to less than 85th percentile is considered as healthy weight, below 5th percentile is underweight, between 85th to less than 95th percentile is overweight and 95th or above is obese.(9)

The prevalence of pediatric malnutrition in the general population is well known; however, malnutrition has not been studied

adequately in thalassemia patients. Hence, we conducted this study to estimate the prevalence and severity of malnutrition in the patients of β -thalassemia major, in the age-group of 1 to 12 years, receiving regular blood transfusions and iron chelation therapy, in Sassoon General Hospital, a tertiary care teaching hospital in Maharashtra, India.

MATERIALS & METHODS

We conducted a record-based retrospective study in Sassoon General Hospital, a tertiary care, teaching hospital, from 1st of January 2018 to 1st of April 2018. Patients of β -thalassemia major, in the age group of 1 to 12 years, receiving regular blood transfusions and iron chelation therapy, were enrolled in the study. The study population consisted of 122 patients, 55 girls and 67 boys. The anthropometric data of the patients were collected and their weight-for-age, weight-for-height, height-for-age and BMI-for-age were calculated. The data were analyzed using WHO and CDC standard growth charts. Patients were divided into 6 age groups and the prevalence and severity of malnutrition in each were assessed. Chi-square test was used for statistical analysis.

RESULTS

The study involved 122 β -thalassemia major patients, 55 females & 67 males in the age-group of 1 to 12 years. The mean age of all the patients was 6.56 ± 0.27 years; that of females was 6.52 ± 0.40 years and that of males was 6.51 ± 0.36 years. The mean weight of all the patients was 17.90 ± 0.50 kg; that of females was 17.55 ± 0.64 kg and of males was 18.19 ± 0.75 kg. The mean height of all the patients was 108.21 ± 1.48 cm; that of females was 107.6 ± 2.02 cm and of males was 108.7 ± 2.13 cm. The mean BMI of all the patients was 14.95 ± 0.14 kg/m²; that of females was 14.91 ± 0.17 kg/m² and of males was 14.98 ± 0.22 kg/m² (table 1).

We found that 30.23% (N=122) of the total patients, 34.54% (N=55) of females and 26.86% (N=67) of males were underweight (table 1).

We observed that 9.84% (N=122) of the total patients, 12.73% (N=55) of females and 7.46% (N=67) of males, were wasted but not stunted. 5.45% (N=55) of females and 4.48% (N=67) of males had severe wasting whereas 7.27% (N=55) of females and 2.98% (N=67) of males had moderate wasting (table 1).

We saw that 34.43% (N=122) of the total patients, 32.73% (N=55) of females and 35.82% (N=67) of males, were stunted. We found that

4.92% (N=122) of the total patients, 3.63% (N=55) of females and 5.97% (N=67) of males, were wasted in addition to being stunted whereas, 29.51% (N=122) of the patients, 29.09% females (N=55) and 29.85% males (N=67), were only stunted (table 1). The prevalence of stunting without wasting was significantly higher than that of stunting with wasting ($p < 0.0001$).

We found that the highest number of underweight patients fell in the age-group of 11 to 13 years (table 1). The highest number of chronically malnourished patients was also seen in the age-group of 11 to 13 years whereas; that of acutely malnourished was seen in 9 to 11 years age-group. The highest burden of severe acute malnutrition was seen in the age-group of 1 to 3 years whereas; that of moderate acute malnutrition was seen in the age-group of 7 to 9 years (table 1).

We excluded the patients below the age of 2 years for the calculation of BMI-for-age since the BMI-standards for that age-group were not available. We observed that 71.68% (N=113) of the total patients, 73.08% (N=52) of females and 70.49% (N=61) of males, were healthy weight. 25.66% (N=113) of the total patients, 25% (N=52) of females and 26.23% (N=61) of males, were underweight whereas 2.65% (N=113) of the total patients, 1.92% (N=52) of females and 3.28% (N=61) of males, were overweight. No patient was found to be obese (table 2).

DISCUSSION

The study has shown that the prevalence of underweight in β -thalassemia major in the age-group of 1 to 12 years is 30.23%. The prevalence is more in female than in male thalassemia patients. The prevalence of acute malnutrition is 9.84% whereas the prevalence of chronic malnutrition is 4.92% (table 1).

In our study, we found 34.43% of the patients to be stunted. We also found that the prevalence of stunting without wasting (29.51%) was significantly higher than that of stunting with wasting (4.92%) ($p < 0.0001$). This finding may suggest that malnutrition has a minor contribution to the growth failure in thalassemia patients besides other factors such as iron-overload induced endocrinopathy, skeletal defects, chronic hypoxia etc.

We also observed that the prevalence of acute malnutrition (9.84%) was surprisingly higher than that of chronic malnutrition (4.92%); however, the difference was not statistically significant (table 1).

We found that the apparent differences in the prevalence of malnutrition between female and male patients were not statistically significant. This is in contrast to the study conducted by Tienboon et al. in which they found that the prevalence of malnutrition in thalassemia patients was significantly higher in female than in male patients.(10) This disparity may be due to the differences in the sample size and the age-group of the patients enrolled in the two studies.

We observed that the prevalence of underweight and that of chronic malnutrition was highest in the age group of 11 to 13 years. Our findings are supported by the study done by Asadi-Pooya et al. which showed that in thalassemia patients, underweight is significantly more common in children older than 10 years of age ($p < 0.000001$)(11) contradictory to the study conducted by Tienboon et al. which stated that malnutrition affected the younger age-groups more commonly.(10)

On analyzing the data for the BMI-for-age index, we found that the majority of the patients (71.68%) fell in the healthy weight category. 25.66% were underweight and surprisingly 2.65% of patients were found to be overweight. Our findings are supported by the study done by Mirhosseini et al. which showed that the thalassemia patients in the age-group of 8 to 18 years have low BMI.(12)

In conclusion, our study has found the prevalence of underweight in patients with β -thalassemia major, in the age-group of 1 to 12 years to

be 30.23%. The prevalence of acute malnutrition is 9.84% whereas the prevalence of chronic malnutrition is 4.92%. Malnutrition has a minor contribution to the growth failure in thalassemia patients besides other factors. Male and female patients are equally affected with malnutrition. The patients in the age group of 11 to 13 years seem to be most affected. We recognize a small sample size and a short duration of the study as our limitations.

TABLE 1: Anthropometric and prevalence data of malnutrition in pediatric patients with β -thalassemia major in the age-group of 1 to 12 years.

Parameters	Total Patients	Females	Males	P value
	(N=122)	(N=55)	(N=67)	
Mean age (years)	6.56 \pm 0.27	6.52 \pm 0.40	6.51 \pm 0.36	0.9952
Mean weight (kg)	17.90 \pm 0.50	17.55 \pm 0.64	18.19 \pm 0.75	0.5279
BMI (kg/m ²)	14.95 \pm 0.14	14.91 \pm 0.17	14.98 \pm 0.22	0.4237
Mean height (cm)	108.21 \pm 1.48	107.6 \pm 2.02	108.7 \pm 2.13	0.7197
Prevalence of underweight	30.23%	34.54%	26.86%	0.3605
Prevalence of stunting	34.43%	32.73%	35.82%	0.7219
Prevalence of stunting without wasting	29.51%	29.09%	29.85%	0.9273
Prevalence of wasting without stunting	4.92%	9.09%	1.49%	0.0544
Prevalence of stunting with wasting	4.92%	3.63%	5.97%	0.5536
Prevalence of acute malnutrition	9.84%	12.73%	7.46%	0.3327
Severe Acute Malnutrition	4.92%	5.45%	4.48%	0.806
Moderate Acute Malnutrition	4.92%	7.27%	2.98%	0.2774
Age-group with the highest prevalence of underweight	11 to 13 years	11 to 13 years	11 to 13 years	
Age-group with the highest prevalence of chronic malnutrition	11 to 13 years	11 to 13 years	11 to 13 years	
Age-group with the highest prevalence of acute malnutrition	11 to 13 years	11 to 13 years	9 to 11 years	
Age-group with the highest prevalence of severe acute malnutrition	11 to 13 years	7 to 9 years	1 to 3 years	
Age-group with the highest prevalence of moderate acute malnutrition	11 to 13 years	11 to 13 years	7 to 9 years	

TABLE 2: Categories of nutritional status according to BMI-for-age of pediatric patients with β -thalassemia major in the age-group of 1 to 12 years.

Nutritional Status	%Total	%Females	%Males	P value
Underweight	25.66	25	26.23	0.8819
Healthy weight	71.68	73.08	70.49	0.7617
Overweight	2.65	1.92	3.28	0.6554
Obese	0	0	0	-

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