

Evaluation Of Children's Nutritional Status With Beta Thalassemia Major Based On BMI

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Abstract

Background: The severe anemia that characterizes beta thalassemia major is a genetic blood condition. Children who have this illness often struggle with their diet. To better understand and meet their nutritional requirements, this research will use BMI classification based on WHO guidelines to evaluate their nutritional status.

Objective: To evaluate the children with significant thalassemia's nutritional condition using the WHO-based BMI categorization system at the Pediatric department of MMC Mardan

Study Design: A Cross-sectional study

Place and Duration of Study: This study was conducted at the pediatric department of MMC Mardan from Jan 2020 to Dec 2020

Materials and Methods: Children with Thalassemia major who visited the pediatric department or Thalassemia unit between the ages of 0 and 215 months were included by successive non-probability sampling. After determining their height and weight, the BMI was computed. The nutritional status of 0-60 months old children was classified according to BMI based WHO classification for 0-60 months age group as obese, overweight, regular, moderate acute malnutrition (wasting), and severe acute malnutrition (severe wasting), while the nutritional status for 59-212 months old children was classified according to BMI based WHO classification for 5-19 years age group as obese, overweight, normal, thin and severely thin.

Results: There were 165 cases in all, ranging in age from 0 to 212 months, and 81 (54%) of them were male. 84 (56.22%) of the 70 cases in the 0-60 month age group were male. In the 'normal' BMI categorization group, there were 39 (55%) instances; of these, 22 (54.22%) were male, and 17 (55.74%) were female (p-value 0.8190). In the category of 60–215 months old, there were 80 instances; 43 (53.12%) of them were male. Twenty-six cases (16.5%) fell into the BMI categorization group labeled as "normal," of which 12 cases 16 were female and 14 cases (16.94) were male (p-value 0.8991).

Conclusion: Children with thalassemia major often have undernutrition, which becomes worse as they get older, regardless of gender.

Key Words: Thalassemia, Body mass index (BMI), Nutritional status.

INTRODUCTION

Major beta thalassemia is one of the most prevalent genetic diseases affecting the human population. The expression of clinically variable severity of anemia as thalassemia minor (also known as beta-thalassemia trait), thalassemia intermedia, and thalassemia major is linked to decreased production of hemoglobin beta chains. When thalassemia major initially

appears, it often manifests as severe anemia in the first two years of life.¹ 1.5% of people have the illness, compared to 5-7% in Pakistan^{3, 4}. In close family members of thalassemia patients, this carrier condition may increase by 62.2%.⁵ One of the well-known characteristics of thalassemia major is growth issues. The pathogenesis of it is complex. Reduction in the amount of nutrients consumed, hypermetabolism, heart failure, hypoxia in the gut leading to malabsorption and poor appetite, reduced liver synthesizing activity, anomalies in the GH-IGF-1 axis regulation, endocrinologic disorders (delayed puberty, hypogonadism, hypothyroidism, emotional issues)⁶. Growth and nutrition may be measured using a variety of techniques, such as weight for age, height for age, and weight for height. The most widely used method for determining a child's nutritional status—whether underweight, average weight, overweight, or obese—is the body mass index or BMI. BMI is calculated by dividing height in meters squared by weight in kg. Regarding the categorization of nutritional status, BMI in adults has set values, but in children (2–20 years old), it is dependent on age and sex.

Additionally, a number of institutions such as the Centers for Disease Control and Prevention and the World Health Organization (WHO) (CDC), among others, have released their own BMI-based classifications. Very little information is available on the nutritional health of thalassemic children based on their BMI, domestically (12,13) and globally (8–11). According to these studies, 58.69%–11.3% of people were underweight^{8–13}. Most of this research is based on the CDC-based BMI classification, which does not apply to those below two years of age, whereas the WHO-based BMI classification is available from birth. This study was developed because thalassemic children with a BMI of less than average have a high prevalence of the disease in our community, and there is currently no research on this topic. The study aims to evaluate the nutritional health of the children at pediatric department of MMC Mardan using a BMI categorization system based on the World Health Organization. The information collected from the research will aid us in making suggestions to enhance growth monitoring and thereby increase the quality of life in thalassemic youngsters.

MATERIALS AND METHODS

From January 2020 to December 2020, the Department of Pediatrics at MMC Mardan conducted this cross-sectional investigation. Parents or guardians gave their informed permission after the institutional ethics committee authorized the research. By successive non-probability sampling, children with Thalassemia major who visited the pediatric department or Thalassemia unit between 0 and 215 months were included. Patients with hemoglobinopathies other than thalassemia major or those whose parents declined to participate in the research were not allowed to participate. We measured the child's weight, height, and length if they were older than two years old or younger than two years old. The BMI was computed using the following formula: weight in kg / [height in meter]². The BMI was plotted according to age and gender.

BMI charts for children aged 0 to 59 months according to WHO child growth standards are accessible at <https://www.who.int/childgrowth/en/>, and the WHO Growth reference BMI charts are accessible at <https://www.who.int/growthref/en/> for children aged 60 to 212 months. The BMI-based WHO classification for the 0-60-month age group was used to categorize the nutritional status of children aged 0-60 months as follows: Age-specific BMI greater than +3 standard deviations (SD) of the median is considered obese. BMI over +2 SD but below or equal to +3 SD of the median for age is considered overweight. Everyday is an age-specific BMI equal to or higher than +2 SD but less than –2 SD of the median. BMI for a period less than –2 SD but equal to or greater than –3 SD of the median indicates moderate acute malnutrition (wasting). A BMI of less than -3 SD of the median indicates severe acute malnutrition, also known as severe wasting. The WHO classification system for the 5-19 year age group¹⁵, which is based on BMI, was used to categorize the nutritional status of children aged 59-212 months as follows: A BMI of more than +2 SD indicates obesity. Overweight: BMI for age more than +1 SD but equal to or less than +2 SD. Normal: BMI for age is greater than or equal to -2 SD but less than or equal to +1 SD. Thin: BMI for less than -2 SD but equal to or more than -3 SD. Severely lean: BMI for age is less than -3 SD. The data was input and analyzed with SPSS version 23. A chi-square test was done to compare qualitative data, and a P value less than 0.05 was deemed significant.

RESULTS

There were 165 cases in all, ranging in age from 0 to 212 months; 81 (54%) were male and 84 (56%) were female. Table 1 displays the nutritional status of thalassemic children aged 0-60 months based on WHO child development standards BMI charts. Of the 70 cases in the 0-60-month-old category, 61 (22.57%) were female, and 84 (56.22%) were male. In the regular BMI group, there were 17 (55.74%) females and 22 (54.22%) men (p-value 0.8190).

Demographically chart

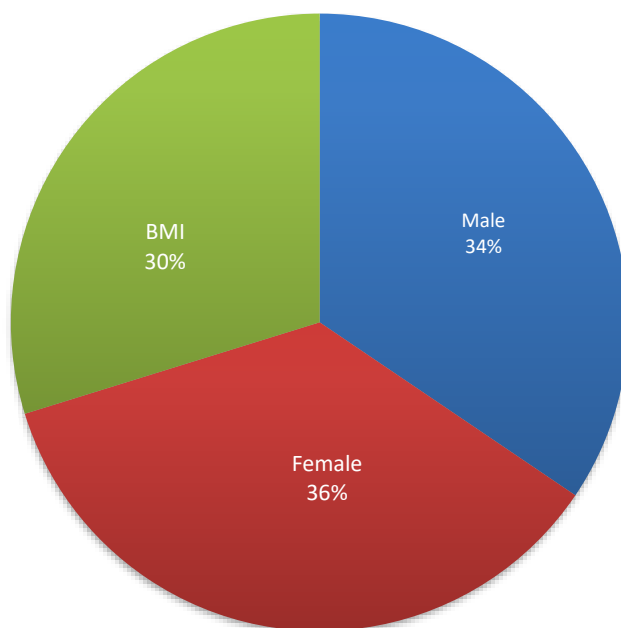


Table No.1: The nutritional state of thalassemic children aged 0 to 60 months, as determined by WHO child growth criteria BMI charts for children aged 0 to 60 months

BMI category	0-23 months Total cases 49			12-59months Total cases 91			Total cases 70		
	Male patients (%)	Female cases (%)	Real cases (%)	Male cases (%)	Female patients (%)	Real cases (%)	Male patients (%)	Female patients (%)	Total cases (%)
Severe acute malnutrition (Severe wasting)	0(0)	0(0)	0(0)	2(4)	2(4.88)	4(4.4)	2(2.53)	2(3.14)	4(2.86)
Moderate acute malnutrition(Wasting)	5 (17.12)	4(20)	9 (18.37)	18(36)	15(36.58)	33(36.26)	23(29.11)	19(31.15)	42(30)
Normal	20(84.97)	14(70)	17(69.39)	23(46)	20(48.78)	22(47.25)	22(54.22)	17(55.74)	39(55)
Overweight	3(10.17)	2(10)	5(10.2)	5 (10)	3 (7.16)	8 (8.84)	8(10.13)	5(8.2)	13(9.14)
Obese	1(3.45)	0 (0)	1(2.04)	2(4)	1 (2.44)	3(3.3)	3(3.8)	1(1.63)	4(2.86)
Total	29	20	49	50	41	91	33	47	70

Table No.2: Thalassaemic children aged 59-212 months: their nutritional condition according to WHO child growth criteria BMI graphs for growth reference data for the age range of 5 to 19

Male BMI category	60-122months Total cases 110			144-215months Total cases 50			Total cases 80		
	Male cases (%)	Female cases (%)	Total cases (%)	Male cases (%)	Female cases (%)	Total cases (%)	Male cases (%)	Female cases (%)	Total cases (%)
Severely thin	5 (8.47)	5 (9.8)	10 (9.09)	1 (3.43)	1 (4.16)	2 (4)	6 (7.06)	6 (8)	12 (7.5)
Thin	33 (55.93)	14 (54.9)	61 (55.45)	17 (65.38)	16 (66.67)	33 (66)	26 (58.81)	22 (58.67)	94 (58.75)
Normal	20 (33.9)	17 (33.33)	37 (33.64)	8 (30.39)	7 (29.17)	15 (30)	07 (16.94)	12 (16)	26 (16.5)
Overweight	1 (1.69)	1 (1.96)	2 (1.81)	0 (0)	0 (0)	0 (0)	3 (1.18)	2 (1.33)	2 (1.25)
Obese	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Total	59	51	110	26	12	50	40	40	80

The nutritional status of 59-212-month-old thalassaemia children based on WHO child growth reference BMI charts are shown in Table 2. There were 80 cases in 60-215 215-month-oldup, out of which 43 (53.12%) were male and 75 (46.87%) female. There were 14 (16.94%) males and 12 (16%) female in the normal category of BMI (p value 0.8991).

DISCUSSION

In this region of Pakistan, thalassaemia major is a chronic, prevalent hematological condition. In this condition, growth failure is very common^{6,12}. This is the first study based on WHO growth standards and WHO Growth Reference for the growth assessment based on the WHO BMI classification. This study showed that undernutrition is a widespread problem, while overnutrition is uncommon in Thalassaemic children. There were 55% of children in the 'normal' category in the 0-60 months age group, while 16.5% were in the 59-212 months age group^{13,14}. The only other study that used WHO BMI charts was by Moiz et al. ¹⁴, and even this study did not include children below five years of age¹⁵. It showed 23% thin and 19% severely thin patients. Obesity was not observed in any of the patients, and the same was the result in our study in this age group¹⁶. Sheikh et al. conducted a survey of growth assessment in Thalassaemic children of this area based on CDC-based BMI data, which excluded children less than two years of age¹⁷. This study also showed a high rate of undernutrition¹⁸. There was an increasing tendency of undernutrition with increasing age in our study¹⁹. A similar pattern was found in other studies¹⁹. Our study showed no difference in the undernutrition rate between the two sexes. Similar results were found in other studies, al. There were 54% males in our study²⁰. Further studies showed 26-63% of males²¹.

CONCLUSION

Children with thalassaemia major often suffer from undernutrition, which becomes worse as they get older, regardless of gender.

Conflict of Interest: The study has no conflict of interest to declare by any author.

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