

# Assessment of Nutritional Status of Children with Beta Thalassemia Major with BMI

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## ABSTRACT

**Objective:** To assess the nutritional status of the children with thalassemia major by WHO based BMI classification at Bahawal Victoria Hospital Bahawalpur.

**Study Design:** Cross sectional study

**Place and Duration of Study:** This study was conducted at the Bahawal Victoria Hospital Bahawalpur from April to July 2019.

**Materials and Methods:** Children aged 0-215 months of either sex with Thalassemia major visiting Pediatric department/ Thalassemia unit by consecutive non probability sampling were included. Their weight and height were taken and subsequently BMI was calculated. The nutritional status for 0-59 months old children was classified according to BMI based WHO classification for 0-59 months age group as obese, overweight, normal, moderate acute malnutrition (wasting) and severe acute malnutrition (severe wasting) while the nutritional status for 60-215 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:** Total 300 cases with age 0-215 months were included, out of which 164 (54%) were male. There were 140 cases in 0-59 months old group, out of which 79 (56.43%) were male. There were 77 (55%) cases in the 'normal' category of BMI classification, out of which 43 (54.43%) were males and 34 (55.74%) female (p value 0.8775). There were 160 cases in 60-215 months old group, out of which 85 (53.12%) were male. There were 52 (32.5%) cases in the 'normal' category of BMI classification, out of which 28 (32.94) were males and 24 (32) female (p value 0.8991).

**Conclusion:** The under nutrition in children with thalassemia major is very common and increases with advancing age irrespective of sex.

**Key Words:** Thalassemia Major, body mass index (BMI), WHO child growth standards, WHO Growth reference, Nutritional status, world health organization (WHO).

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## INTRODUCTION

Beta thalassemia major is one of the commonest hereditary disorders of the human race. It is associated with decreased production of hemoglobin beta chains that results in the expression of clinically variable severity of anemia as thalassemia minor (also known as beta-thalassaemia trait), thalassemia intermedia and thalassemia major. The usual age of onset with thalassemia major usually present within the first two years of life with severe anemia<sup>1</sup>. The carrier rate of the disease is 1.5%<sup>2</sup> while 5-7% in Pakistan<sup>3,4</sup>.

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This carrier state may rise up 62.2% in the close family relatives of patients suffering from thalassemia<sup>5</sup>. Growth problems in thalassemia major are well recognized features. Its pathogenesis is multifactorial. There is decreased nutrients intake, hypermetabolism, heart failure, hypoxia of gut causing poor appetite and malabsorption, impaired liver synthetic activity, abnormalities in regulation of the GH-IGF-1 axis and endocrinologic disorders (delayed puberty, hypogonadism, hypothyroidism, emotional problems<sup>6</sup>). There are various methods available to measure growth and nutrition which include height for age, weight for age, and weight for height. The body mass index also called as BMI is the most commonly used method for the assessment of a child nutritional status whether he is underweight, normal weight, overweight or obese. BMI is weight in Kg divided by the square of height in meters. BMI in children (2-20 years) is both age and sex based while it has fixed values in adults for the classification of nutritional status<sup>7</sup>. Moreover various organizations like world health organization (WHO) and the Centers for Disease Control and Prevention (CDC) etc have issued their own BMI value based classifications.

There is very little data present on nutritional status of thalassemic children based BMI both internationally<sup>8-11</sup> and nationally<sup>12,13</sup>. These studies showed that 11.3%-58.69% were underweight<sup>8-13</sup>. Most of these studies are based on CDC based BMI classification which is not applicable below two years of age while WHO based BMI classification applicable since birth.

Since thalassemia major is not uncommon in our area and no study is available on WHO BMI based growth assessment of thalassemic children, so this study is planned. The objective of the study is to assess the nutritional status of the children with thalassemia major by WHO based BMI classification at Bahawal Victoria Hospital Bahawalpur. The information collected gathered from the study will guide us in developing recommendations to develop growth monitoring and thus improving quality of life in thalassemic children.

## MATERIALS AND METHODS

This cross sectional study was conducted at Bahawal Victoria Hospital Bahawalpur from 1<sup>st</sup> April to 31<sup>st</sup> July 2019. The study was approved by the institutional ethical committee and the informed consent was taken from the parents or guardians. Children aged 0-215 months of either sex with Thalassemia major visiting Pediatric department/ Thalassemia unit by consecutive non probability sampling were included. The patients having any other systemic illness or any hemoglobinopathy other than thalassemia major and patients whose parents refused to take part in the study were excluded. The weight and the height (if the child was above 2 years of age)/ length (if the child was less than 2 years of age) were taken. The formula: weight in Kg / [height in meter]<sup>2</sup> was used to calculate BMI.

The BMI was plotted on age and sex specific WHO child growth standards BMI charts for 0-59 months old children available at

<https://www.who.int/childgrowth/en/> and WHO Growth reference BMI charts for 60-215 months old children available at <https://www.who.int/growthref/en/> The nutritional status for 0-59 months old children was

classified according to BMI based WHO classification for 0-59 months age group as<sup>14</sup>:

Obese: BMI for age greater than +3 standard deviations (SD) of the median.

Overweight: BMI for age greater than +2 SD but equal or less than +3 SD of the median.

Normal: BMI for age equal or less than +2 SD and but equal or more than -2 SD of the median.

Moderate acute malnutrition (Wasting): BMI for age less than -2 SD but equal or more than -3 SD of the median

Severe acute malnutrition (Severe wasting): BMI for age less than -3 SD of the median.

The nutritional status for 60-215 months old children was classified according to BMI based WHO classification for 5-19 years age group<sup>15</sup> as:

Obese: BMI for age more than +2 SD.

Overweight: BMI for age more than +1 SD but equal or less than +2 SD.

Normal: BMI for age equal or more than -2 SD but equal or less than +1 SD.

Thin: BMI for age less than -2 SD but equal or more than -3 SD.

Severely thin: BMI for age is less than -3 SD.

The data was entered and analyzed through SPSS version 20. Chi-square test was applied to compare qualitative data and P value less than 0.05 was taken as significant.

## RESULTS

Total 300 cases with age 0-215 months were included, out of which 164 (54%) were male and 136 (45.33%) were female. The nutritional status of 0-59 months old thalassemic children based on WHO child growth standards BMI charts for 0-59 months old children is shown in table-1. There were 140 cases in 0-59 months old group, out of which 79 (56.43%) were male and 61 (43.57%) female. There were 43 (54.43%) males and 34 (55.74%) female in the normal category of BMI (p value 0.8775).

**Table No.1: Nutritional status of 0-59 months old thalassemic children based on WHO child growth standards BMI charts for 0-59 months old children Total cases 140**

BMI category	0-23 months Total cases 49			24-59months Total cases 91			Total cases 140		
	Male cases (%)	Female cases (%)	Total cases (%)	Male cases (%)	Female cases (%)	Total cases (%)	Male cases (%)	Female cases (%)	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(3.28)	4(2.86)
Moderate acute malnutrition (Wasting)	5 (17.24)	4(20)	9 (18.37)	18(36)	15(36.58)	33(36.26)	23(29.11)	19(31.15)	42(30)
Normal	20(68.97)	14(70)	34(69.39)	23(46)	20(48.78)	43(47.25)	43(54.43)	34(55.74)	77(55)
Overweight	3(10.34)	2(10)	5(10.2)	5 (10)	3 (7.32)	8 (8.79)	8(10.13)	5(8.2)	13(9.28)
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	79	61	140

**Table No.2: Nutritional status of 60-215 months old Thalassemic children based on WHO child growth standards BMI charts for Growth reference data of 5-19 years Total children 160**

Male BMI category	60-143months Total cases 110			144-215months Total cases 50			Total cases 160		
	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 (3.85)	1 (4.16)	2 (4)	6 (7.06)	6 (8)	12 (7.5)
Thin	33 (55.93)	28 (54.9)	61 (55.45)	17 (65.38)	16 (66.67)	33 (66)	50 (58.82)	44 (58.67)	94 (58.75)
Normal	20 (33.9)	17 (33.33)	37 (33.64)	8 (30.77)	7 (29.17)	15 (30)	28 (32.94)	24 (32)	52 (32.5)
Overweight	1 (1.69)	1 (1.96)	2 (1.82)	0 (0)	0 (0)	0 (0)	1(1.18)	1(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	24	50	85	75	160

The nutritional status of 60-215 months old thalassemic children based on WHO child growth reference BMI charts are shown in table-2. There were 160 cases in 60-215 months old group, out of which 85 (53.12%) were male and 75 (46.87%) female. There were 28 (32.94%) males and 24 (32%) female in the normal category of BMI (p value 0.8991).

## DISCUSSION

Thalassemia major is chronic common hematological disorder in this part of Pakistan. Growth failure is very common in this condition<sup>6,12</sup>. This is the first study based on WHO growth standards and WHO Growth Reference for the growth assessment based on WHO BMI classification.

This study showed that undernutrition is very common problem while overnutrition is uncommon event in Thalassemic children. There were 55% children belonging to 'normal' category in 0-59 months age group while 32.5% in 60-215 months age group. Only other study that used WHO BMI charts was by Moiz et al<sup>11</sup> and even this study did not include children below 5 years of age. It showed 23% thin and 19% severely thin patients. Obesity was not observed in any of the patients and same was the result in our study in this age group. Sheikh et al<sup>13</sup> conducted a study on growth assessment in Thalassemic children of this area based on CDC based BMI data which excluded children less than 2 years of age. This study also showed high rate of undernutrition.

There was increasing tendency of undernutrition with increasing age in our study. The similar pattern was found in other studies<sup>11,13,16-20</sup>. There was no difference of undernutrition rate between two sexes in our study. Similar results were found in other studies al.<sup>11,17</sup> There were 54% males in our study. Other studies showed 52-63% males<sup>(11,17,18,21)</sup>.

## CONCLUSION

The under nutrition in children with thalassemia major is very common and increases with advancing age irrespective of sex.

### Author's Contribution:

Concept & Design of Study: Imran Qaisar  
 Drafting: Abdul Rehman  
 Data Analysis: Khawar Saeed Jillani  
 Revisiting Critically: Imran Qaisar, Abdul Rehman  
 Final Approval of version: Abdul Rehman

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

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