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Nutritional Status of Children with Beta Thalassemia Major

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ABSTRACT

Background. Children with beta thalassemia major are at risk for poor nutritional status, which can lead to significant health problems. It is essential to evaluate the level of malnutrition among individuals.

The aim. To assess the nutritional status of children with beta thalassemia major using body mass index.

Methods. This cross-sectional study was conducted at the District Branch of the Indian Red Cross Society in Ahmedabad, Gujarat. The purposive sampling technique was used to select 119 children with beta thalassemia major as participants. The nutritional status of children aged 8 to 18 years was assessed from September 2021 to December 2021.

Results. Out of the 119 participants, 56 (47%) were female and 63 (53%) were male. The mean height was 150.82 ± 22.44 cm, the mean weight was 34.71 ± 11.62 kg, and the mean BMI was 15.28 ± 4.25. Out of a total of 119 patients, 62.18% were underweight, 31.93% were healthy, and 5.88% were overweight. 55% of females and 68% of males were underweight. There is a statistically significant association between age and nutrition status (P=0.04). The data depicts a statistically significant association between family monthly income and nutrition status (P=0.013).

Conclusion. Results of this study showed that the majority of the children with thalassemia were underweight. There is a statistical association between age, economic status, and nutritional status. There is a need to raise awareness about food and nutrition for children with beta thalassemia major.

Keywords: thalassemia major, body mass index (BMI), underweight, nutrition.

INTRODUCTION

Thalassemia is an autosomal recessive blood disease characterised by anaemia that develops due to impaired synthesis of one or more of the haemoglobin chains. When categorising thalassemia based on the clinical situation, patients with minimal or no anaemia despite having atypical erythrocyte structure are classified as thalassemia minor (carrier, heterozygous). Patients whose anaemia does not require regular transfusion are classified as thalassemia intermedia (patient, homozygous). Patients with significant clinical symptoms and severe anaemia are categorised as thalassemia major (patient, homozygous) (Origa, 2017, Prathyusha et al., 2019).

India has the largest number of children with Thalassemia major in the world about 100,000 to 150,000, and almost 42 million carriers of ß (beta) thalassemia trait. About 10,000-15,000 babies with thalassemia major are born every year (National Health Mission, Ministry of Health and Family Welfare, Government of India, 2016). Thalassemia major is one of the main causes of anaemia in Mediterranean countries. Thalassemia major is a significant public health issue that is inherited from parents to children. It can be prevented through screening programs and has severe consequences when left untreated. Thalassemia major also has a negative impact on the quality of life and reduces life expectancy (Yeşilipek, 2014).

Thalassemia major manifests clinical symptoms between 6 months and 2 years of age. Damage arises in the heart, liver, lungs, and endocrine organs due to anaemia and iron overload (Taher, A. T., Weatherall, D. J., & Capellini, M. D. (2018). Patients with thalassemia may experience growth retardation, facial and cranial shape changes, as well as dental issues caused by bone deformities. They may also develop cardiac and hepatic complications, experience delayed puberty, and be at risk for diabetes mellitus, hypothyroidism, and hypoparathyroidism. The treatment of thalassemia major includes erythrocyte transfusion, iron chelation therapy, surgical interventions like splenectomy, as well as the management of related complications through follow-up care, psychological support, and stem cell transplantation (Yeşilipek, 2014; Sharma, Seth, Chandra et al., 2016; Kleanthous, 2019). Prenatal screening counselling can indeed help identify couples at risk of having a child with thalassemia major. This allows them to make informed decisions about family planning and consider in vitro fertilisation or preimplantation genetic diagnosis to prevent the birth of an affected child. In addition to prenatal screening, it's crucial to provide education and support to parents and children living with thalassemia major. This includes providing information about proper nutrition and diet plans, as individuals with thalassemia may be at an increased risk of malnutrition due to factors such as poor appetite and nutrient malabsorption. Ensuring that children with thalassemia receive adequate nutrition is important for their growth and development. Moreover, complications associated with thalassemia major, such as iron overload and bone deformities, further emphasise the need for regular monitoring and preventive measures. By regularly assessing and managing these complications, healthcare professionals can help improve the quality of life for children with thalassemia major. Overall, a comprehensive approach that includes prenatal screening, genetic counselling, education, and appropriate medical management is essential in preventing the birth of a baby with thalassemia major and providing optimal care for those affected by the condition. The aim of the study was to assess the nutritional status of children with beta thalassemia major using body mass index.

METHODS

Organisation. The cross-sectional study conducted from September 2021 to December 2021 aimed to measure the height and weight of children with thalassemia major admitted to the Indian Red Cross Society, District Branch, Ahmedabad. The study obtained ethical approval from the registered ethics committee of Rudraksh Hospital, and informed consent was obtained from the parents and children who agreed to participate.

Participants. A total of 119 children were selected for the study. Weight was measured using a digital weighing machine, while height was measured using a wall-mounted stadiometer. Body Mass Index (BMI) was calculated by dividing weight in kilograms by height in square meters. The calculated BMI values were plotted on age and sex-specific CDC BMI charts, which were sourced from http://www.cdc.gov/growthcharts/clinical_charts.htm.

The nutritional status of the participants was categorised based on BMI percentiles as follows: less than 5th percentile (underweight), 5th–84th percentile (healthy weight), 85th-94th percentile (overweight), and equal to or greater than the 95th percentile (obesity). The BMI values were plotted on age- and sex-specific CDC charts.

Statistical analysis. The data analysis procedure included calculating the mean and standard deviation for height, weight, and BMI at enrolment. Frequency and percentages were also calculated for different BMI categories (obese, overweight, normal, and underweight). A chi-square analysis was performed to determine any associations. Additionally, stratification was done based on age groups (8–10 years, 10–12 years, 12–14 years, 14–16 years, and 16–18 years), duration of the disease at enrolment (1–5 years, 5–10 years, and 10–15 years), and gender to control for any potential effect modification.

The collected data, along with the demographic profile of the patients, was entered into a pre-designed format for analysis.

RESULTS

Out of the 119 children, 56 (47%) were female and 63 (53%) were male. The overall mean and standard deviation (SD) of height was 150.82 ± 22.44 cm, weight was 34.71 ± 11.62, and BMI was 15.28 ± 4.25. Out of the total number of children 78(65.54%) were underweight, 38 (31.93%) were healthy, and7 (5.88%) were overweight. No children from the selected samples were obese, but there were underweight children: 55% of females and 68% of males.

Table 1. **Analysis and interpretation of the demographic data**

Demographic Data (n=119)		**Frequency**	**Percentage**
Gender	Male	63	53
	Female	56	47
Age in years	08–10	26	22
	10–12	12	10
	12–14	9	8
	14–16	20	17
	16–18	52	43
Duration of illness	0–5 yrs.	86	73
	5–10 yrs.	22	18
	10–15 yrs.	7	6
	Above 15 yrs.	4	3
Family Income	Less than 10000	68	58
	10000–20000	30	40
	20000–30000	9	12
	More than 30000	12	9

Table 2 shows that there is a statistically significant association between nutrition status and selected demographic variables among children with thalassemia major. The data shows that the chi-square value computed between the perception regarding age and nutrition status among children with beta thalassemia major was found to be statistically significant (P=0.04). In the statistical data for the age group, the degree of freedom was (df=8), the calculated value for chi-square was (x2=16.143), and the tabulated value at a significance level of 0.04 was also 16.143. Therefore, the calculated value is greater than the tabulated value, indicating an association between age and nutrition status. The data depicts a statistically significant association between family monthly income and nutrition status (P=0.013). There is no statistically significant association between the nutritional status of children with beta thalassemia major and other sociodemographic variables, such as gender and duration of illness.

Table 2. **Association of nutritional status with demographic variables**

Under Weight		Scores			Total	Chi-Square	DF	P Value
		Normal	Overweight					
Gender	F	43	17	3	63			
	M	31	21	4	56	2.105	2	0.348
Age	8–10	15	6	5	26			
	10–12	9	3	0	12			
	12–14	8	1	0	9			
	14–16	13	6	1	20			
	16–18	29	22	1	52	16.143	8	0.040
Detection of Thalassemia Major at the Age of	0–5 years	52	28	3	83			
	05–10 years	16	7	2	25			
	10–15 year	4	2	1	7			
	Above 15 years	2	1	1	4	4.672	6	0.586
Family Monthly Income	Less than 10000	38	12	1	51			
	10000–20000	25	13	1	39			
	20000–30000	6	7	2	15			
	More than 30000	5	6	3	14	15.959	6	0.013

DISCUSSION

Beta thalassemia patients often experience growth problems and disturbances (Skordis, & Kyriakou, 2011; Kattamis, Liakopoulou, & Kattamis, 1990). BMI, or body mass index, is one method used to assess whether children are underweight, healthy, overweight, or obese. This cross-sectional study conducted at a healthcare facility aimed to determine the prevalence of malnutrition in children with beta thalassemia major. In the present study, more than half (62%) of the participants were malnourished, which was higher than the prevalence reported in the study by

Trehan et al (2015), Pemde et al. (2011), Mirhosseini et al. (2013) and Fahim et al. (2013) respectively 26.7%, 24.2%, 44.3% and 43.0%. However, it was lower than the prevalence (91.8%) reported in the study by Kumari et al. (2012) and similar (64.3%) to the prevalence reported in the study by Sheikh et al. (2017). The variability in these findings may be attributed to differences in the participants' characteristics. age, ethnicity, and geographical plausibility.

In the present study, we observed a significant association between the age of study participants and their malnutrition status. This finding is consistent with the results of a study conducted by Sheikh et al. (2017) and another study conducted by Mirhosseini et al. (2013). Additionally, we found that family monthly income had a significant impact on the level of malnutrition in children. There is no statistically significant association between malnutrition and other demographic variables, such as gender and duration of illness.

CONCLUSION

Results of this study showed that the majority of the children with thalassemia were underweight. There is a statistically significant association between the nutritional status and the age of children with thalassemia, as well as their economic status. Gender and duration of illness did not affect the nutritional status of children with thalassemia.

Ethics Declaration and Consent. The Rudraksh Hospital registered ethics committee reviewed this study and granted ethical approval. Consent has been obtained from all participants.

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Vaikų, sergančių didžiąja beta talasemija, mitybos būklė

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SANTRAUKA

Tyrimo pagrindimas. Vaikams, sergantiems didžiąja beta talasemija, gali būti nustatoma prasta mitybos būklė, kuri gali sukelti rimtų sveikatos problemų. Labai svarbu įvertinti šių asmenų nepakankamos mitybos lygį.

Tikslas – įvertinti didžiąja beta talasemija sergančių vaikų mitybos būklę, naudojant kūno masės indekso skaičiuoklę.

Metodai. Vienmomentinis skerspjūvio tyrimas atliktas Indijos Raudonojo Kryžiaus draugijos rajono skyriuje, Ahmedabade, Gudžarato valstijoje. Taikant tikslinės atrankos metodą buvo atrinkta 119 tyrimo dalyvių – vaikų, sergančių didžiąja beta talasemija. Vaikų, kurių amžius – nuo 8 iki 18 metų, mitybos būklė buvo vertinama nuo 2021 m. rugsėjo mėn. iki 2021 m. gruodžio mėn.

Rezultatai. Iš 119 dalyvių 56 (47 proc.) buvo mergaitės ir 63 (53 proc.) berniukai. Vidutinis ūgis buvo 150,82 ± 22,44 cm, vidutinis svoris – 34,71 ± 11,62 kg, o vidutinis KMI – 15,28 ± 4,25. Iš 119 pacientų 62,18 proc. svėrė per mažai, 31,93 proc. – sveiki, o 5,88 proc. turėjo antsvorį. 55 proc. mergaičių ir 68 proc. berniukų svėrė per mažai. Nustatytas statistiškai reikšmingas ryšys tarp amžiaus ir mitybos būklės ($p = 0,04$). Remiantis gautais duomenimis, nustatytas statistiškai reikšmingas ryšys tarp šeimos mėnesinių pajamų ir mitybos būklės ($p = 0,013$).

Išvados. Šio tyrimo rezultatai įrodo, kad dauguma vaikų, sergančių talasemija, svėrė per mažai. Nustatytas statistinis ryšys tarp amžiaus, ekonominės padėties ir mitybos būklės. Būtina didinti vaikų, sergančių didžiąja beta talasemija, informuotumą apie maistą ir mitybą.

Raktažodžiai: didžioji beta talasemija, kūno masės indeksas (KMI), nepakankamas svoris, mityba

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