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Original Research Article

A Tertiary Hospital Based Clinical Study on Thalassemia Patients in Relation to Onset of Blood Transfusions

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Abstract

Background: Among the hemoglobin disorders Thalassemia is considered as the frequently encountered disorder all over the world. Studies on clinical spectrum are varying.

Aim of the study: To record the population prevalence and spectrum of thalassemia diseases. The objectives were to observe the epidemiological and social factors of this disease.

Materials: Prospective and descriptive study for two years in a tertiary care Hospital included 71 Thalassemia children between 02 to 15 years. Interview with formulated questionnaire proforma consisting of social and demographic variables was used. Children given blood transfusion 08 years after and 08 years before diagnosis were grouped as A &B. Variables used: BMI, Hb, MCV, MCH and RDW-CV levels, Hb chromatogram: (HbA2 and Hb F levels) and spleen size.

Results: Among 71 children 44 (61.97%) males and 27 (38.02%) were female. 77.46% of the total children belonged to below 5 years to 11 years. The mean age was 07.32±2.85 years. The mean age of diagnosis of Thalassemia was 2.36±2.05 years. 60.56% children were from rural background and 39.43% from urban. 22.53% children belonged to upper class of social status, 49.29% belonged to middle class and 20 (28.16%) of children belonged to lower social class.

Conclusion: The incidence of Thalassemia was in concurrence with the national figures. >75% children were diagnosed before 11 years. Commencement of blood transfusions was not significant as the BMI and hematology profiles were same in all the children.

Keywords: Hemoglobin, BMI, social factors, epidemiology, spectrum of disease.

Introduction

Thalassemias occur due to defects in β-globin chain of hemoglobin. [1] They are a heterogeneous group with autosomal recessive inheritance feature. [2]. Defective erythropoiesis with reduced hemoglobin A formation occurs due to imbalance in α and non- α- globin chains. [3] Thalassemia major children require repeated blood transfusions from childhood, [4,5] which was combined by iron chelation therapy (ICT) to prevent cardiac, hepatic and endocrine dysfunctions. [5] Unlike

Thalassemia major, Thalassemia intermedia children show features in between carriers and major disease; moderate Anemia, hemolysis, ineffective erythropoiesis, pulmonary hypertension and ulcers. [6] But the mortality and morbidity are found to be same as in major Thalassemia children. [7] Even though Thalassemias was found to be most common in the Mediterranean region, India has about 1 to 1.5 lakhs children and 42 million carriers of ß (beta) thalassemia trait. About 10,000 -15,000 babies with thalassemia major are born every year. [8] According to WHO 2008 reports 40,000 children are born every year with thalassemia disease and among them 25,000 are dependent upon blood transfusion. [9] The reported prevalence rate in India varies from 1.25% to 1.66% in India. [10] The present study was conducted to record the population prevalence and spectrum of thalassemia diseases. The objectives were to observe the epidemiological and social factors of this disease.

Materials

A prospective and descriptive study was conducted for two years at a tertiary care Hospital in Andhra Pradesh wherein 71 children with Thalassemia disease were registered for treatment. A prior ethical committee approval was taken to undertake the study. Parents were interviewed with a written proforma approved by the institutional ethics committee. The proforma contained preformed questions related to the demographic, social and economic variables. Physical parameters of the children were measured such as height, weight and spleen size. 5 ml venous blood was drawn for hematologic analysis. Liquid Chromatography analysis was done to detect type of Hemoglobin using Variant II Biorad analyzer. Size of the spleen was measured by ultrasonography (USG). Children were grouped as group 'A' in whom blood transfusion started after 08 years and group 'B' in whom blood transfusion started before 08 years of age. Variables such as BMI, hematologic criteria: Hb, MCV, MCH and RDW-CV levels, Hb chromatogram: (HbA2 and Hb F levels) and spleen size were observed in both the groups. Using PSPP a comparison was made between variables of the two groups, in terms of average and standard deviation. P value < 0.05 was considered statistically significant. Data were tabulated, verified and analyzed using standard statistical methods like mean, average, standard deviation, percentage and significance was tested using student t test.

Results:

Among the 71 patients there were 44 (61.97%) male children and 27 (38.02%) female children. Children aged below 5 years and those aged 06 to 11 years together were 55 (77.46%) of the total children. The mean age was 07.32±2.85 years. The mean age of diagnosis of Thalassemia was 2.36±2.05 years. 43 (60.56%) children were from rural background and (39.43%) children were from urban areas. 44/71 (38.40%) children were males and 27/71 (38.02%) children were females. The male to female ratio was 1.62:1. The youngest child was 14 months old and the eldest child was 07 years and 06 months. 16 (22.53%) children belonged to upper class of social status, 35 (49.29%) belonged to middle class and 20 (28.16%) of children belonged to lower social class **(Table 1).** The parents of the children were educated up to Intermediate in 43 (42.25%), 30 (30.98%) parents were educated up to graduation and 19 (26.76%) of the parents were educated up to post graduation **(Table 1).** 59.15% of the children were diagnosed before reaching 1 year, 23.94% of the children were diagnosed between 2nd and 8th year. 16.90% of the children were diagnosed between 9th and 15 the year **(Table 1).** The mean age of diagnosis among the rural children was 02.85±0.95

and among the urban children, it was 02.40± 1.25 years. 08.45% of children had history of death their sibling in the family earlier.

Table 1: Showing the demographic details of the subjects (n-71).

Observation	Male-44	Female-27	Total	Percentage
Age				
0 to 05 years	19	13	32	45.07
06 to 10 years	15	08	23	32.39
11 to 15 years	10	06	16	22.53
Location				
Rural	21	22	43	60.56
Urban	19	09	28	39.43
Social status				
Upper	11	05	16	22.53
Middle	24	11	35	49.29
Lower	09	11	20	28.16
Education				
No	17	13	30	42.25
Primary	14	08	22	30.98
Secondary	13	06	19	26.76
Diagnosed at Age				
< 1 year	31	11	42	59.15
2 to 8 years	08	09	17	23.94
9 to 15 years	05	07	12	16.90
Death in siblings	04	02	06	08.45

Among the 71 children 37 (52.11%) were given blood transfusion before they reached 08 years and 34 (47.88%) children were given blood transfusion after attaining 08 years of age. The data of the variables of both the groups were tabulated in **Table 2.** There was statistical significance in variables like, age at which the diagnosis was made, age at first transfusion and the size of spleen between the two groups divided on the basis of starting of blood transfusions that is less than 08 years and above 08 years. (t test results showed p value <0.05), **(Table 2)**

Table 2: Shows the spleen size and hematology parameters of thalassemia children with early or late onset of blood transfusion administration (n-71). (RDW-CV: Red cell distribution width, BMI=Basal metabolic index, MCH- mean corpuscular hemoglobin, MCV-Mean corpuscular volume.)

Variables	A group Transfusion after 08 Yrs Mean ± SD	B group Transfusion before 08 Yrs Mean ± SD	P value
Age at diagnosis in months	35.84±4.23	16.31±3.15	**0.002**
Age at first transfusion in months	33.10±2.50	04.78±2.65	**0.001**
Blood transfusions per year	09.75±2.35	08.95±2.85	**0.621**
BMI	19.95±2.32	20.47±3.10	0.415
Hb	8.24 ± 7.24	7.51 ± 6.85	0.732
MCV	70.29±5.45	71.85±3.18	0.551

MCH	21.54±3.29	20.75±1.75	0.684
RDW-CV	25.39±3.69	23.21±2.51	0.901
HbA2	27.49±14.58	26.41±12.30	0.568
Hb F	7.67±4.12	8.41±3.58	0.753
Spleen **3- 10 Cm** **>10 Cm**	 18.30% 81.69%	 17.45±2.80 81.69%	 **0.001**
Spleenectomy	-	02	**0.0001**

Types of hemoglobin observed following Hb spectrogram were type Hb E in 53.52%, type A in 38.02%, type S in 05.63% and type H in 02.81% in the study (Table 3). There was a male preponderance in all types of Thalassemias in the study. Male predominance was noted in every type of thalassemia.

Table 3: Showing the types of Hb noted in the subjects (n-71).

Type of Hemoglobin	Males Number- Percentage	Females Number- Percentage	Total
Hb E	**23**	**15**	**53.52**
Hb A	**15**	**12**	**38.02**
Hb S	**03**	**01**	**05.63**
Hb H	**01**	**01**	**02.81**

Discussion

The present study was a demographic nature and descriptive study conducted among the 71 children with Hb spectrograph identification of different hemoglobin from their blood. Children aged below 5 years (45.07%) and those aged 06 to 11 years (32.39%) together were 55 (77.46%) of the total children. Other studies revealed the common age being < 10 years. [11] 44/71 (61.97%) children were males and 27/71 (38.02%) children were females. The male to female ratio was 1.62:1. Other studies also showed the male preponderance of Thalassemia disease. [12 and 13] The mean age was reported as 6± 3.66 years by the same authors; whereas the mean age in the present study was found to be 07.32±2.85 years. Male children were commonly affected by all the types of Thalassemia disease in this study. Preponderance in males was also reported by many studies. [14, 15 and 16] In this study 55 (77.46%) of the total children aged below 5 years and those aged 06 to 11 years were diagnosed with Thalassemia before they attained 5 years. Similar finding was reported by Mallik S et al, Riewpaiboon A et al. [17,18] The mean age observed in this study was 07.32±2.85 years. The mean age of diagnosis of Thalassemia was 2.36±2.05 years. Mean age of diagnosis of thalassemia of our patients was 1.6 years (± 1.53). In countries such as Thailand and Iran the mean age of Thalassemia patients was diagnosis was 9.52± 2.68 years. The mean age of diagnosis of thalassemia in those patients was 3.25±1.10 years. [18, 19] This variation in the mean age between these countries may be due to the diverse clinical presentation and types of Thalassemia reported there. [20] Death among the siblings of the children of this study was 08.45% when compared to other studies the rate of death among the siblings was higher; 11.35%. [21, 22] 42.25% of the children did not receive education, 30.98% of the children received primary education and the remaining 26.76% of the children reached secondary education in the study, unlike in another study where 32.9% children did not reach the age of

primary education, 34.3% children were on primary education and the remaining 10% children were on secondary education. [23] Types of hemoglobin observed following Hb spectrogram were type Hb E in 53.52%, type A in 38.02%, type S in 05.63% and type H in 02.81% in the study (Table 3). There was a male preponderance in all types of Thalassemias in the study. Male predominance was noted in every type of thalassemia. In a study by Mannan A et al, reported that Hb E was the commonest type of thalassemia in their country of Pakistan [24] Other studies supported this view that throughout the world and in Asia-pacific areas, Hb E was the commonest type of thalassemia. [25] In β Thalassemia inter (TI), patients are dependent on repeated blood transfusions and the disease itself showing wide spectrum of clinical manifestations especially in the 3rd to 4th decades of life. [26,27] HO P J, et al in 1998 described that the patients of TI have their phenotype between Thalassemia trait (TT), (asymptomatic) and Thalassemia Major (TM). He also showed that TI occurs between the ages of 2 and 6 years in children. [28] In the present study group B children were considered as TI children, because the blood transfusion was given after 8 years. Group A children were TM patients. This study also proved that children with Thalassemia were with Low Hb levels. The possible contributors for this state were due to iron overload, iron chelator drugs and poor intake of nutrition. Red cell indices are important in thalassemia diagnosis. The age of first blood transfusion was different in both the groups in the study, but the mean values of Hb, MCV and MCH result were similar (p-0.732, 0.551, and 0.684 respectively). In a similar study by Mussallam KM et al [29] in 2018 showed Hb level for the intermediate thalassemia as 7.5g/dL which was similar to this study; which was Hb: 8.24 ± 7.24 in group A and 7.51 ± 6.85 in group B. [30-42].

Conclusions:

The commonest type observed was thalassemia with Hb E, followed by thalassaemia with Hb A; both reflected the overall prevalence in the country. Majority of the children (>75%) were diagnosed before they reached 11 years. Though the age of commencement of blood transfusions was different, there was no significant difference in the BMI and hematology profiles of children. But the low BMI might be the cause of associated with morbidity and mortality. Severe clinical forms were present both in the type E and A hemoglobin children. More studies to understand the diversity of clinical presentation which help to institute better treatment are necessary.

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