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Growth Delay In β-Thalassemia Major Patients in A Sample of Iraqi Children

Dr. Salman Hussin Asst
M.B.Ch.B., D.H.,
F.I.B.M.S., IN PEDIATRIC
F.I.B.M.S., IN PEDIATRIC NEPHROLOGY
Ministry of Health, Baghdad Al-Russafa Health Directorate, Imam Ali Hospital, Baghdad, Iraq.
assisalman2@gmail.com

Dr. Mustafa Ibrahim Munaty
M.B.Ch.B., F.l.C.M.S.
Ministry of Health, Baghdad Al-Russafa Health Directorate, Imam Ali Hospital, Baghdad, Iraq.
mostafamonty76@gmail.com

Dr. Ali Hasan Rashid
M.B.Ch.B., D.M.,
E.M.J.F.S., IN EMERGENCY MEDICINE
Ministry of Health, Baghdad Al-Russafa Health Directorate, Imam Ali Hospital, Baghdad, Iraq

Abstract

Background: Thalassemia syndrome is a heterogeneous group of inherited anemias characterized by abnormalities in tetra hemoglobin synthesis. Objectives: To study the risk factors for delayed growth in patients with thalassemia B who visit the Thalassemia Center at IBN AL Abalady Maternity &Children Hospital in Baghdad.

Patients and treatment methods: One hundred thalassemia major patients attending the Thalassemia Center at IBN AL Abalady Maternity &Children Hospital in Baghdad. Were studied during the period from September 1, 2021, to June 30, 2022. Their ages ranged between (5-20) years, including 46 females, and 54 were male. Results. Growth retardation, as a complication of thalassemia, is found in 69% of patients. Patients who required frequent blood transfusions (mean 16.76 blood transfusions/year) developed more growth delay than those who required less frequent blood transfusions (mean 13.67 blood transfusions/year). Conclusions: Growth retardation was found in 69% of thalassemia patients. Most patients were over- or under-transfused, and patients who started deferoxamine therapy early and who received it several days a week were less likely to develop growth retardation.

Key words: *Thalassemia syndrome, abnormalities, thalassemia major patients, growth retardation, deferoxamine therapy*

Introduction

A diverse range of inherited anemias known as the thalassemia syndrome are typified by abnormalities in the synthesis of hemoglobin tetramers. Children are typically asymptomatic at birth [1,2,3], becoming sick 4–6 months after birth when the normal physiological phenomena of the "switch over" from fetal to adult hemoglobin occur. Clinically speaking, thalassemia is classified as thalassemia major, thalassemia intermedia, thalassemia minor, or thalassemia trait, depending on the severity [4,5, 6]. Serum ferritin level research as a growth retardation predictor in Thalassemia major [7,8,9] The purpose of this study was to ascertain whether there was a correlation between growth delay and transfusion program, as well as to examine the risk factors for growth delay in B-thalassemia patients attending the thalassemia center at the IBN AL Abaldy Maternity &Children Teaching Hospital in Baghdad. In addition to assessing the patient's and his or her family's adherence to the treatment, iron overload and chelating therapy [10].

Patients and method

Between September 1, 2021, to June 30, 2022, where one hundred B-thalassemia major patients who were receiving treatment at the Thalassemia Center at the Ibn Al-Baldy Maternity& Children Teaching Hospital in Baghdad were the subject of the study. There were 46 female patients and 54 male patients, ranging in age from 5 to 20 years. The patients provided the following information: The patients and their mothers were asked to provide a history that included the following: name, age, sex, place of residence, age at diagnosis, number of blood transfusions annually, history of spleneclamy, history of consanguinity, history of familial thalassemia, and additional complications related to thalassemia (hepatitis, D.M., etc.). When to begin deferoxamine therapy, as well as how and how often it is administered. Patients will undergo a physical examination to gauge their growth characteristics as well as an abdominal examination to check for splenomegaly and hepatomegaly. Signs of growth delay were measured for the patient and family and included height, weight, OFC, secondary sexual characteristics, and primary amenorrhea. The following laboratory tests were to be performed on the patients: transferrin saturation, serum iron level, iron-binding capacity, and hemoglobin level before and after blood transfusion. Because serum ferritin levels are unavailable, they were not measured. Radiological assessment of bone age using elbow and wrist x-rays. These specifics are displayed on the attached questionnaire paper. The findings were examined using the t-test to determine the significant P-value (P-value <0.05).

Results

Age distribution of patients: A-Age distribution of thalassemia major patients: The average age of thalassemia patients was 14.86 years. With a range of 5-20 years. The majority of patients were 20 years old. The majority of patients were between 16-20 years old. The majority of patients were male (54%) and female (46%). The majority of patients live in urban areas (53% in patients with developmental delay) and (56.6% in patients with developmental delay). Distribution of blood transfusion frequency for thalassemia patients, whether with or without growth retardation, according to the frequency of blood transfusion annually. It has been shown that patients who require frequent blood transfusions develop delayed growth, while most of

those who do not suffer from delayed growth require blood transfusions less frequently annually. It was found that 25 (78%) patients with growth retardation had a splenectomy, and 7 (22%) patients with growth retardation had a splenectomy.

The age at initiation of deferoxamine therapy for patients with thalassemia major shows that

	Patients with growth delay	Patient with no growth delay	P-value

60.82% of patients with developmental delay initiated deferoxamine therapy <5 years, while 41.17% of patients with developmental delay initiated deferoxamine therapy <5 years.

Table 1- Frequency of deferoxamine

No of days /week, receive deferoxamine	Patients with growth delay		Patient with no growth delay	
	N	F%	N	F%
1day/week	9	11.5	4	13.20
2day/week	40	58.8	5	16.20
3day/week	16	23.7	9	28.30
4day/week	4	5.88	13	45.2

Table 2 - Family history of thalassemia

v	Patients with growth delay	Patient with no growth delay
Percentage	41.17	28.30
Percentage	47	37.28

Table 3- Sign of growth delay of thalassemia patients

	Patients with growth delay		Patient with no growth delay	
v	n	%	n	%
Height	69	100	0	0
Weight	48	70.5	14	47.1
OFC	29	41.7	0	0
Delay bone age	32	47.6	3	9.7
No secondary sexual	64	92.7	21	67.7

	Patients with growth delay	Patient with no growth delay	P-value
v	n	n	
Regular visit	43	29	0.0014
Knowledge about defeoxamine	35	22	<0.08
Accept defeoxamine	20	20	<0.0017

Primary amenorrhea	26	81.2	8	57.1

	Nr:13-32 Mmol/l		
v	Range	Mean	P
Growth delay patients	15-50	35	<0.01
Non-Growth delay patients	10-35	17.9	<0.01

Table 4- Family compliance to regular visit

	Nr:45-70 Mmol/l		
v	Range	Mean	P
Growth delay patients	53-84	59.5	>0.01
Non-Growth delay patients	34-78	40.8	>0.01

Table 5- Patient compliance

Table 6- Value of S. IRON,

	Patients with growth delay	Patient with no growth delay	P-value
v	n	n	
Regular visit	48	29	0.0094
Knowledge about defeoxamine	27	27	<0.0001
Accept defeoxamine	28	27	<0.0001

Table 7- Value of TIBS

Discussion

The average age of the patients was 14.86 years, with a range of 5-20 years. 30 There were more males than females (54% Continuous blood (average 16.76 transfusions/year). (1996) who found that males were also more common patients living in urban areas (53%) than in rural areas (47%), while in other areas, it was more rural and (44.8%) than urban. This difference may be due to the study conducted by Al-Haj Ahmed (1992)30 showing that (55.2%) of patients had better compliance than urban

Patients who required frequent blood transfusions (average 16.76 transfusions/year) had more developmental delay than those who required less frequent blood transfusions (average 13.67 transfusions/year), which is similar to what Sacca et al. (1995) found (34).))

Splenectomy was performed in (22.5%) of growth retardation patients, while the percentage of growth retardation patients was (36.2%), which is higher than the result obtained by Awad M.H. in Mosul (1999) (35), where it was found that 30.71% of patients underwent splenectomy, which may be due to advanced age [11,12,13].

The mean age at thalassemia diagnosis was 8.23 months and was higher than that found by Waad-ISSAC (2004), which was 7.16 months, and this is probably related to the older age group in our sample [14,15.16].

Patients who started deferoxamine treatment earlier, at a mean age of 4.66 years, had less growth impairment than those who started later at a mean age of 6.29 years, which is similar to the study by Olivieri NF (1999) s). The recurrence rate of treatment with deferoxamine was (45.28%) in cases of no growth and delayed treatment (4 days/week) and (58.8%) in patients with delayed growth. The P-value <0.0001 is very significant, almost similar to that found by Saka (66%) in patients with developmental delay [17,18,19,20].

Growth delay, as a complication of thalassemia, was found in 69% of the patients, which is a little higher than that found by Awad M.H. in Mousi (1999).05 The height of the patients (<3rd centil) was found in (69%), weight (<3rd centil) was found in 62% of patients, and OFC (<2centil) in (29%). Delayed bone age was found in 47.55%, less than that found by Saka34), which was (66%). Thalassemia patients >12 years of age had a lack of secondary sexual characteristics found in (73%), which was similar to that found by Bircan (1993, and primary amenorrhea found in (46) of females. Hepatomegaly was found in 57% of the patients, splenomegaly was found in42 (61.7%) out of 68 thalassemia patients, and splenectomy was done to 32 (32%) patients [21,22]

Thirteen percent of thalassemia patients received growth hormone, and47% of patients had chronic disease (DM.CHF.Hypothyrodism, HBV, and HCV.) Family

Compliance in non-growth delayed patients (regular visit in96.22%), (knowledge about deferoxamine in 90.45%) while in growth delayed patients (regular visit in 70.53%), (knowledge about deferoxamine in39.41%) and (acceptance of deferoxamine was 40.76%). This indicates noncompliant families, that is why their children developed the complications. Patient compliance regarding (acceptance of deferoxamine therapy) was found to be 64.15% in non-growth delay patients, while it was 29.41% in ingrowth delay patients. This is probably due to the unavailability of the pump and painful administration, and unfortunately, there is no previous study to compare. Serum iron level was found in the upper normal level, total iron binding capacity was found in the normal lower limit, transferring saturation also was in the normal

lower limit in non-growth delay patients, while growth delay patients all values are higher than the normal.

Conclusions

1. Growth delay was found in 89% of thalassemia patients
2. Most of the patients were over-transfused and under-chelated.
3. Patients who started deferoxamine therapy earlier and who received it for many days per week are less liable to develop growth delay.
4. The most frequent signs found among growth delay patients were short stature and lack of secondary sexual characteristics.
5. Family compliance regarding (regular visits, knowledge about deferoxamine. acceptance of deferoxamine therapy) is more important than the patient's compliance for the prevention of future development of growth delay.

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