AN EPIDEMIOLOGICAL STUDY OF THALASSAEMIA PATIENTS ATTENDING THALASSAEMIC CENTER IN WASSIT GOVERNORATE

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ABSTRACT

Background: Thalassemia is an autosomal recessive inherited blood disorder due to hemoglobin-production abnormalities. It is one of the most common monogenic disorders in the world and is mainly endemic in some areas of the tropics and subtropics. Approximately 7% of the world’s population is affected by haemoglobin disorders, distributed globally; in addition to the Mediterranean countries in which they were first recognized. Objective: To identify the Socio Demographic, clinical characteristics and family history of thalassemic patients that attending hematologic clinic in Wasit Governorate. Subject and methods: A descriptive, cross-sectional study was conducted and performed in Thalassaemic Center in Wasit governorate, during the period from the 1st of December 2016 to the 28th of February 2017. Results: The age of patients was between (1- 54) years. The study showed that the higher percentage were at age < 10 y. (47.2%) and the percentage was decreasing with increasing age and (78.7%) of the sample were of major type of β-thalassemia, male percentage were (50.3%). It was found that 2/3 of study sample were from urban area (64.1%), only (5.9%) were married. (63.0%) were of low socio-economic-status, the highest representation of β- thalassemia patients (59.1) was observed (< 1) year of age group, more families have one child patient and (86.7%) were of +ve consanguinity. It was found that there was non- significant association between type of β-thalassemia in hepatomegaly, splenomegaly, splenectomy and showed hepatosplenomecaly with higher frequency (92.3%
& 86.7% respectively. **Conclusions:** An conclusion it was found that thalassemia major is the most frequency type with high significant association with age group and education level. while showed only significant association with socio-economic-status.

**KEYWORDS:** Epidemiological, Thalassaemia, Iraq.

**INTRODUCTION**

Thalassemia is an autosomal recessive inherited blood disorder due to hemoglobin-production abnormalities. It is one of the most common monogenic disorders in the world and is mainly endemic in some areas of the tropics and subtropics, including southern China.\(^1\) There are two types of thalassemia, \(\alpha\) and \(\beta\) thalassemia. Most patients with severe \(\alpha\)-thalassemia may die in utero or shortly after birth as a result of serious intrauterine anemia, and most patients with severe \(\beta\)-thalassemia may develop serious anemia in early childhood if untreated. Thalassemia is an important public health problem in many countries and its prevention is mainly dependent on genetic counseling and prenatal diagnosis.\(^1\)

Thalassemia is found in some 60 countries, People of Mediterranean, Middle Eastern, African and Southeast Asian descent are at higher risk of carrying the genes for thalassemia.\(^2\) In the United States relatively rare but as a consequence of immigration patterns, occurrence of thalassemia disorders in USA is increasing.\(^3\)

In Iraq, beta-thalassemia is an evident health problem, specifically in the Dohuk region located in the northern part of the country. The Dohuk region lies midway between Iran, Turkey and Syria, countries also characterized by a relatively high frequency of beta-thalassemia, The disease prevalence in Dohuk is reinforced by the high rate of consanguineous marriages in the region.\(^4\)

Thalassemia in Iraq is a real problem mainly due to the deficiency in the equipments and drugs during different periods of lack of security and wars. Out of 1064 couples recruited from the public health laboratory in Basra, southern Iraq, about 5% had beta-thalassemia trait and the carriers of major beta-globin disorders comprised 11.48%.\(^5\)

Thalassemia (Thalassa is Greek for a meaning the sea, Haema is Greek a meaning for blood). Because of recognized links to the mediterranean regions documented in all ethnic groups originating from geographic regions. Thalassemia is an increasing public health problem worldwide.\(^6\) It is the name for a group of genetic blood disorders characterized by anemia
due to enhanced RBC destruction. Hemoglobin, the oxygen-carrying component of the RBCs consists of two different proteins, an alpha and a beta. If the body doesn't produce enough of either of these two proteins, the RBCs become defective and cannot carry sufficient oxygen.\[7\]

People with moderate to severe forms of thalassemia have inherited abnormal genes from both parents. People who are carriers thalassemia trait (alpha or beta) generally do not have any thalassemia symptoms. However, a mild form of anemia may be present, usually diagnosed through a blood test. Most persons with thalassemia trait are found incidentally when their complete blood count shows a mild microcytic anemia. Microcytic anemia can be caused by iron deficiency, thalassemia, lead poisoning, sideroblastic anemia, or anemia of chronic disease.\[8\]

**Classification of thalassemia**
The most common types of thalassemia are alpha-thalassemia and beta thalassemia, in which either of the 2 chains are synthesized in reduced quantities(Vanichsetakul, P. 2014). In α thalassemia, production of α globin chain is affected, while in β thalassemia production of the β globin chain is affected.\[9\]

**Beta thalassemia**
β-Thalassemia is characterized by the reduced or absent production of β-globin chains in the hemoglobin molecule leading to an excess of α-globin chains.\[2\]

There are 3 main types of beta thalassemia, each with subclasses. The heterozygous state is known as thalassemia minor or trait and thalassemia intermediate, whereas the homozygous condition has been called thalassemia major. The severity of these types of thalassemia is influenced by a variety of factors, including race and interaction with other inherited erythrocytic disorders.\[9\]

**Objective of the study**
To identify the Socio Demographic, clinical characteristics and family history of thalassemic patients that attending hematologic clinic in Wasit Governorate.

**Patients and Methods: The Study design**
A descriptive, cross-sectional study was conducted.
Study Setting
This study was performed in Kut Hospital for Gynecology and Pediatrics (Thalassaemic Center). This is the only center found in Wassit Governorate.

Period of the study
The data collection was carried out for a period from the 1st of December 2016 to the 28th of February 2017.

Data Collection
Data were collected through direct interview of patients using questionnaire form, which was designed for the study purpose. A structured questionnaire was developed and constructed by the researcher and the supervisor and modified by expert panel.

Statistical Data Analysis
Data are analyzed through the use of SPSS (Statistical Process for Social Sciences) version 23.0 application Statistical analysis system and excel application.

The following statistical data analysis approaches were used in order to analyze and assess the results of the study:

Descriptive Data Analysis
1. Tables (Frequencies and Percent’s)
   This approach included the measurement of frequencies and percentage.
   \[
   \% = \frac{Frequency}{Sample \ size} \times 100
   \]

   Inferential Data Analysis
   These were used to accept or reject the statistical hypotheses, which included the following Pearson Chi-Square test for testing of the observed frequencies.

RESULTS
Socio-demographic characteristics: (Table 1) Show the distribution of the sample according to their age groups and type of β-thalassemia, The study showed that higher percentage of the study sample was at age < 10 y. (47.2%) and the percentage was decreasing with increasing age and (78.7%) of the sample were of major type of β-thalassemia and (21.3%) was of intermedia type of β-thalassemia decrease with increasing age, which is
found to statistically high significant at $P = < 0.01$.

The distribution of the sample according to gender with type of $\beta$-thalassemia, It was found that percentage of male (50.3%) affected whole female (49.7) affected, with non-significant association with type of $\beta$-thalassemia at $P = > 0.05$.

It was found that 2/3 of study sample were from urban area (64.1) and 1/3 from rural area (35.9) with no significant effect with type of $\beta$-thalassemia at $p = >0.05$.

Regarding the marital status of the study sample it was found that the higher percentage were Single (94.1%), only (5.9%) were married, with non-significant association at $p = < 0.05$.

Shows the relationship between type of $\beta$-thalassemia and socio-economic status in which it was found that (63.0%) of the sample were of low socio-economic-status and of that it was found that (66.3%) were of major type $\beta$-thalassemia, followed by (36.5%) were of middle status with (49.4%) were of Intermedia type thalassemia and the least was of high socio-economic-status (0.6%), all of them were of major type with statistically, significant association at $p = < 0.05$.

Which show the association between educational level and type of $\beta$-thalassemia. It was found that the sample the high percentage of study sample were of primary level of education (40.6%), followed by preschool level (28.2%), then illiterate level (13.5%) and the least were of higher educational level (3.3%), and the association was found to be statistically, highly significant at $P = < 0.01$.

(Table 1) Distribution of patients according to socio-demographic characteristics (SDCs).

<table>
<thead>
<tr>
<th>SDCs</th>
<th>Type of $\beta$-thalassemia</th>
<th></th>
<th></th>
<th></th>
<th>$P= $</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Major</td>
<td>Intermedia</td>
<td>Total</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>N0</td>
<td>%</td>
<td>N0</td>
<td>%</td>
<td>N0</td>
</tr>
<tr>
<td>Age groups</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(&lt; 10)</td>
<td>149</td>
<td>52.3</td>
<td>22</td>
<td>28.6</td>
<td>171</td>
</tr>
<tr>
<td>(10-19)</td>
<td>102</td>
<td>35.8</td>
<td>39</td>
<td>50.6</td>
<td>141</td>
</tr>
<tr>
<td>(20-29)</td>
<td>24</td>
<td>8.4</td>
<td>6</td>
<td>7.8</td>
<td>30</td>
</tr>
<tr>
<td>(30-39)</td>
<td>6</td>
<td>2.1</td>
<td>8</td>
<td>10.4</td>
<td>14</td>
</tr>
<tr>
<td>(40-49)</td>
<td>2</td>
<td>0.7</td>
<td>2</td>
<td>2.6</td>
<td>4</td>
</tr>
<tr>
<td>(≥ 50)</td>
<td>2</td>
<td>0.7</td>
<td>0</td>
<td>0.0</td>
<td>2</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>148</td>
<td>51.9</td>
<td>34</td>
<td>44.2</td>
<td>182</td>
</tr>
</tbody>
</table>

$\chi^2 = 22.669 \ P = 0.000 \text{ HS}$

$\chi^2 = 1.466 \ P =$
### Table 2: Distribution of patients according to family history of thalassemic patients.

<table>
<thead>
<tr>
<th>Patient history</th>
<th>Group</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Onset of disease / years</strong></td>
<td>&lt; 1</td>
<td>214</td>
<td>59.1</td>
</tr>
<tr>
<td></td>
<td>1 - 2</td>
<td>82</td>
<td>22.7</td>
</tr>
<tr>
<td></td>
<td>&gt; 3</td>
<td>66</td>
<td>18.2</td>
</tr>
<tr>
<td></td>
<td>Mean ±SD</td>
<td>2.522 ± 5.2108</td>
<td></td>
</tr>
<tr>
<td><strong>Consanguinity</strong></td>
<td>+VE</td>
<td>314</td>
<td>86.7</td>
</tr>
<tr>
<td></td>
<td>-VE</td>
<td>48</td>
<td>13.3</td>
</tr>
<tr>
<td><strong>Family history of the disease in</strong></td>
<td>One per family</td>
<td>130</td>
<td>35.9</td>
</tr>
</tbody>
</table>

S*: Sig. at p<0.05; HS**: High Sig. at p<0.01; NS***: Non Sig. at p>0.05; Chi-Square test.

(Table 2) Reveals the frequency of the disease regarding the onset of disease, frequency of consanguinity, family history of the disease, presence dead cases in the family, blood transfusion therapy and chelation agent therapy, it was found that the onset of disease < 1 year (59.1%), (22.7%) were observing the disease 1-2 year and (18.2%) were > 3 years getting the disease. (86.7%) were of +ve consanguinity, Family history of the disease in family children’s, one child patient per family was the highest (35.9%) and four children patients per family was the lowest (4.4%) and only (12.2%) were getting dead cases in the family because of disease. Regarding therapy it was found that (85.6%) receiving blood transfusion therapy regularly and (66.3%) receiving chelation agent therapy regularly.
family children’s | Two per family | 110 | 30.4 |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>three per family</td>
<td>64</td>
<td>17.7</td>
<td></td>
</tr>
<tr>
<td>four per family</td>
<td>38</td>
<td>10.5</td>
<td></td>
</tr>
<tr>
<td>five per family</td>
<td>16</td>
<td>4.4</td>
<td></td>
</tr>
<tr>
<td>Presence dead cases in the family due to the disease</td>
<td>Yes</td>
<td>44</td>
<td>12.2</td>
</tr>
<tr>
<td>No</td>
<td>318</td>
<td>87.8</td>
<td></td>
</tr>
<tr>
<td>Regularly blood transfusion therapy</td>
<td>Regular</td>
<td>310</td>
<td>85.6</td>
</tr>
<tr>
<td>Irregular</td>
<td>52</td>
<td>14.4</td>
<td></td>
</tr>
<tr>
<td>Regularly chelation agent therapy</td>
<td>Regular</td>
<td>240</td>
<td>66.3</td>
</tr>
<tr>
<td>Irregular</td>
<td>122</td>
<td>33.7</td>
<td></td>
</tr>
</tbody>
</table>

(Table 3) Regarding hepatosplenomegaly & splenomegaly, it was found that (92.3%) of sample had shown non-significant effect of hepatomegaly and after exclusion of cases with splenectomy those who showed splenomegaly were (86.6%) out of total 320 with non-significant effect. For splenectomy variable it was found that only (11.6%) of them sample had operated on splenectomy with non significant effect at P= > 0.05.

(Table 3) Distribution of patients according to clinical characteristics.

<table>
<thead>
<tr>
<th>Clinical characteristics</th>
<th>β-thalassemia type</th>
<th>Total</th>
<th>P .Value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Major %</td>
<td>Intermedia %</td>
<td>Major %</td>
</tr>
<tr>
<td>Hepatomegaly</td>
<td>+VE</td>
<td>261</td>
<td>91.6 %</td>
</tr>
<tr>
<td></td>
<td>-VE</td>
<td>24</td>
<td>8.4 %</td>
</tr>
<tr>
<td>Splenomegaly</td>
<td>+VE</td>
<td>215</td>
<td>85.7 %</td>
</tr>
<tr>
<td></td>
<td>-VE</td>
<td>36</td>
<td>14.3 %</td>
</tr>
<tr>
<td>Splenectomy</td>
<td>+VE</td>
<td>34</td>
<td>11.9 %</td>
</tr>
<tr>
<td></td>
<td>-VE</td>
<td>251</td>
<td>88.1 %</td>
</tr>
<tr>
<td>Total</td>
<td>285</td>
<td>100.0 %</td>
<td>77</td>
</tr>
</tbody>
</table>

NS***: Non Sig. at p>0.05; Chi-Square test.

DISCUSSION

Beta thalassemia is the most prevalent hemolytic anemia in children and adolescents especially in areas where consanguinity is common. The use of regular transfusions with chelation has improved the quality of life in such patients but endocrine complications due to iron overload still do occur in these patients.[10]

Socio-Demographic Characteristics: (Table 2) from the results obtained during studying thalassemic patients attending thalassemia center in Wasit governorate, it was found that the higher percentages of the sample obtained were at age group up to 19 years (86%) and most
of them were of major type (88.1%) out of the total percentage of thalassemia major (78.7%). This result is expected as such age group are children and adolescents of growing period not married and the patient may show certain signs and symptoms of the disease with the presence of positive family history which make the parents more paying attention to their children regarding this hereditary disease. This result is consistent with Zainab A. J. R. Al-Ali & Salah H. F. 2016[11] in Missan province, in which it was found that the major type of thalassemia was (78.97%) and the higher percentage affected were at age lower than 10 years (54%), (77.1%) according to Abdul-Karim, E. T., et al. 2000 (12) in Iraq (64%) in Lebanon by Inati, A. et al.; 2006[13] and (93%) in Pakistan by Q. Ain et al; 2011[14].

The study showed non significant affect regarding the gender distribution which is in contrast to[11,12 &14] in which all of them show significant affect at (p< 0.01) but in consistent with Asadi- Pooya, A.A. and Doroudchi, M. 2004[15] in which they showed non significant affect regarding gender. This difference in thalassemic patients is noteworthy and deserves. Further investigation considering thalassemia as a single-gene disease transmitted by a recessive mode of inheritance.

Most of the sample (64.1%) were from urban area, this may be because of difficulty in reaching the center of thalassemia which is the only center present in the center of province, this result is in consistent to Alnakshabandi, A. A., & Muhammad, H. A. 2017[16] in their study in Iraqi Kurdistan region in which they found that 56% of their sample were living in urban area. Also Baig, S. M. et al; 2011[17] who studied the prevalence of thalassemia by cross sectional study in which they found that most of the participants were from urban area (80.66%).

The study found that low percentage of marriage (5.9%) this because they refuse to marry or the family refuse to be engaged to avoid get diseased children, this agree with Miri-Aliabad, G. et al. 2016[18] the marriage produced 13 children in total sample (228), two with β-thalassemia major and 11 with β-thalassemia intermedia.

The socioeconomic status play a role in which it was found in this study that most of the sample were of low SE status (63%) and most of them were of major type of the thalassemia this result may be due to positive consanguinity in such status in opposite to high socioeconomic persons where we see consanguinity is of low level. This result is consistent with Vasudev, R., & Sawhney, V. 2014[19] in which they found that most of thalassemic
patients in India were of low and middle socioeconomic status. Also the socioeconomic status reflects the educational level of the person mostly the low socioeconomic status the low the level of education, this is consistent with our results which showed 54.1% of the sample were either illiterate or of primary school level with exclusion of preschool level children under six years of age which comprise 28.2%. this reflect the poverty and bad health status of the patient which prevent them to continue graduation to high level of education, also because the complications of disease are increase with increasing age and they need follow up to thalassemic center for treatment and lead to frequent absence from school. This is similar to Wahyuni, M. S. et al 2011 result in which they found that most of the participants in their study were of primary level of education.

Medical history

What was found regarding the history of the disease, it was found that more than half of the sample were discovering the disease before less than one year (59.1%) which is the same result seen in Ikram, N., et al 2004 and Hassan et al 2003 in which they found that the time of diagnosis of the disease was ranged between 6 months – 2 year. This may be because the parents were more aware about their children when first discover the disease, This result may indicate the awareness of the patient’s parents about the initial signs of the child or delay in establishing the Center for the treatment of Thalassemia patients in the government of Wasit in 2005.

Consanguinity is important factor in transmission this disease to siblings as was seen the frequency of consanguinity was very high (86.7%), this result coincide with Lahiry, P. et al 2008 & Arif, F. et al 2008 in which they found that the majority of their study sample showed positive consanguinity (82.5%, 67%) respectively. Also another study done by Inati, A. et al 2006 showed the same result (63%).

Current results also reveal that the incidence of β-thalassemia was the highest in 1st order and the lowest in 5th order. However, it is suggested that increased number of thalassemic patients in 1st birth order. Analysis of the data collected in the present study indicated that almost 35.9% families have one β-thalassemia child, 30.4% families have two β-thalassemia children and 17.7% have three β-thalassemia children, this agree with in which they found more than one child in the family could be affected with thalassemia (70%, 58.9%) respectively. All these results occur due to un awareness of the family about the disease, its hereditary transmission and the effect of consanguinity.
Regarding the line of treatment of thalassemia which is blood transfusion and chelating therapy to prevent deposition of excessive iron in all body organs, it was found that most of them receiving therapy regularly (85%, 66.3%) respectively, as well as similar adolescent age group (85.8%, 70.2%) respectively. This result agree with Wahyuni, M. S. et al 2011[20] who studied the health related quality of life in thalassemia treated with iron chelation, they found that the majority of the study subjects were with regular chelation therapy (75.29%).

**Clinical characteristics**

Hepatomegaly is prominent early in thalassaemia patients, due to increased red cell destruction as well as extramedullary erythropoiesis in the liver Noetzli, L. J. et al., 2012.[23] The study show higher frequency had hepatomegaly (334) most of them affected with major type of β-thalassemia(261) while patient affected with intermedia type of β-thalassemia(73), the association between hepatomegaly with type of β-thalassemia there was non-statistical significance at P= > 0.05. The study show higher frequency had splenomegaly was (274) most of them affected with major type of β-thalassemia(215) while patient affected with intermedia type of β-thalassemia(59) from were total (320) by excluding patients had splenectomy(42), this result agrees with Al-Rubiay, K and Al.Edani, M. 2010[24] they studied the Cutaneous Disorders of patients affected with Homozygous Beta-Thalassemia attending the Thalassemia Centre in Basrah Iraq and their findings indicated that many patients (87.7.%) of the subject sample had Hepatosplenomegaly. The association between splenomegaly with type of β-thalassemia there was statistical non-significant at P= > 0.05.

Many patients with thalassaemia major require splenectomy. However, optimal clinical management from the time of diagnosis may delay or even prevent hypersplenism, thereby increasing the efficiency of transfusion therapy and reducing the need for splenectomy Noetzli, L. J. et al.,2012.[23] The study show who had splenectomy was (42) most of them affected with major type of β-thalassemia(34), this result agree with Taher, A. T. et al. 2011.[25]

**REFERENCES**


