ISSN: 2414 - 7419

Thalassemia incidence, clinical complications on liver and spleen and relationship to blood groupsin Iraq

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مرض الثلاسيميا حدوثه ومضاعفاته السريرية وعلاقته بفصائل الدم في العراق

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الخلاصة

الخلفية: يعتبر مرض الثالاسيميا من الامراض الوراثية الشائعة في الوقت الحاضر ونسبة حدوثه العالية أدت الى زيادة المشاكل الصحية في مجتمعات الدول الاستوائية. التداخلات والمضاعفات السريرية علاوة على علاقته الوراثية بمجاميع الدم لم تدرس بصورة واضحة.

الأهداف وطريقة العمل: هذه الدراسة نفذت من خلال استعمال استبيان ل 56 مصاب بهذا المرض بعد فحصهم في مركز ابن البلدي التخصصي في بغداد لتقييم المضاعفات والعلاقة المذكورتان في أعلاه. **النتائج:** تبين ان أكثر المرضى الوافدين الى المركز هم من سكنة المناطق الجنوبية للعراق والاشخاص الذين يحملون فصيلة دم O هو الأكثر نسبة من بين بقية فصائل الدم وأقلهم من هم يحملون فصيلة الدم A. نسبة حدوث تضخم الطحال وحده او مشتركا مع تضخم الكبد كانت اعلى نسبة البالغين، بينما كانت نسبة حدوث تضخم الكبد لوحده في الأطفال أكثر. الثالاسيميا الكبرى كانت هي الأكثر وجودا في هذه الدراسة مقارنة بالوسطى. نسبة الأشخاص الوارثين للمرض من الإباء كانت من نسبة الوارثين من الام او من كلا الابوين.

الاستنتاجات: على الرغم من ان فصيلة الدم O كانت هي الأكثر وجودا من باقي فصائل الدم الا ان فصيلة الدم BA كانت نسبتها اعلى مما هي عليه في التوزيع الطبيعي للسكان. الكثير المصابين بالثلاسيميا يعانون من تضخم الكبد او الطحال. الأشخاص الذين ورثوا المرض من الإباء فقط هم أكثر من أولئك الذين ورثوه من الام فقط او من كلا الابوين.

الكلمات المفتاح: الثلاسيميا، مجاميع الدم، الكبد، الطحال.

Abstract

Background: Thalassemia is a very common genetic disease currently existsa high frequency increasing public health problem in the tropical countries. The clinical complications and genetic relationships with blood group have not clearly been studied.

Objectives and methods: This study was performed using a questionnaire for 56 thalassemic patients inspected at the Ibn Al-Balady Thalassemia Centre in Baghdad in order investigate such complications and correlations.

Results: The most tested patients were found be living in south parts of Iraq, and the highest number of thalassemia patients in this study were people who have blood group O (24) and the lowest was A group. The occurance of spleenomegaly alone or combination with hepatomegaly in adults was greater than that for children,while hepatomegaly alone was observed in children more than adults. Thalassemia major was the commonest in this study and thalassemic patients who have acquired their defective gene from fathers were more than those who have obtained the disease from mothers or both parents.

Conclusion: Eventhoug blood group O was the greatest among thalassemic patients, blood group AB ratio was higher thanwhat to be normally distributed. There was high proportion of thalassemic patients having enlarged spleen and liver. Patients who has history of thalassemic fathers were higher than those who has history of mother or both parents.

Keywords: Thalassemia, blood groups, liver, spleen

Introduction

Thalassemia is a common inherited disease resulted from reduced or absent synthesis of globin chains of haemoglobin (HB) firstly described by Cooley and Lee in 1925[1-3]. There are two common types of thalassemia α and β, based on the defective globin gene involved[4].The diseaseis described in three broad clinical phenotypes major, intermedia, and minor[5]. Thalassemia major, also known as Cooley's anaemia or Mediterranean anaemia, is the most severe form of β-thalassemia, since mutations of both β-globin alleles results in severely impaired β-globin chain production [6].While thalassemia intermedia occurred in patients who have mild to moderate anaemia and in most cases do not require blood transfusions[7]. Thalassemia minor, also known as the 'thalassemia trait' is most common form of β- thalassemia, in which affected individuals are asymptomatic[8].

The incidence of thalassemia is highest in geographic areas that historically were most affected by malaria, including the Mediterranean, sub-Saharan Africa, the Middle East, the Asian-Indian subcontinent, and Southeast Asia[4]. Thalassemia nowadays considers the commonest genetic disorders[1]; estimating 5% of the world's populations carry at

least one variant globin gene[4].In Iraq, the carrier rate for the β-thalassemia gene ranges from 3.7-4.6%,while no data available for α-thalassemiacarrier rate [9].

Enlargement of liver and spleen were observed in 10% and 19% respectively of thalassemic patients and were not related to sex or age[10]. However, gross enlargement of the placenta, heart, liver, spleen and adrenal glands with hypoplasia of the lungs were observed in the affected fetuses[11].There is unclear or limited data provided for genotype relationship between blood groups and thalassemia.

The purpose of this study is to determine clinical manifestations of thalassemia in affected areas in Iraq, this can be performed by examining the clinical complications of thalassemia on liver and spleen. The study will also comprise the investigation of porpability of the genetic linkage between blood groups and thalassemia.

Materials and methods

A- Study design

The study was performed using a questionnaire (see appendix); information was randomly collected from 56 patients recordedat the Ibn Al-Balady Thalassemia Centre in Baghdad, Iraq in 2014. Data was then assessed andanalysed to be presented using the Microsoft excel.

B- Clinical complications

Clinical complications were defined by enlargement of liver (hepatomegaly) and/or enlargement of spleen (splenomegaly). Enlargement of liver or spleen were indicated by previous diagnosis that made by physicians as answered through the questionnaire. Thalassemia minor was not included due to no admission of patients to the Centre or no clinical complication to be monitored.

Results

Most patient were attended from south region of Iraq (**39**) for both adults and children, and greatly were children (**34**) from both south and north regions, see **Figure (1)**.

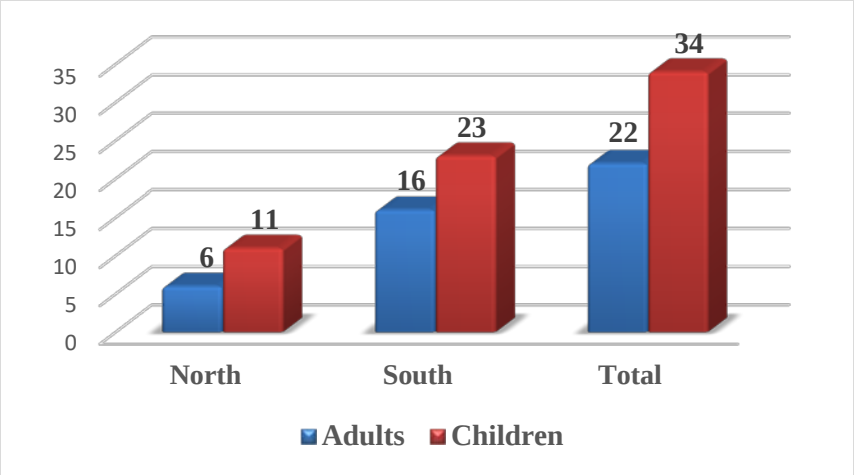
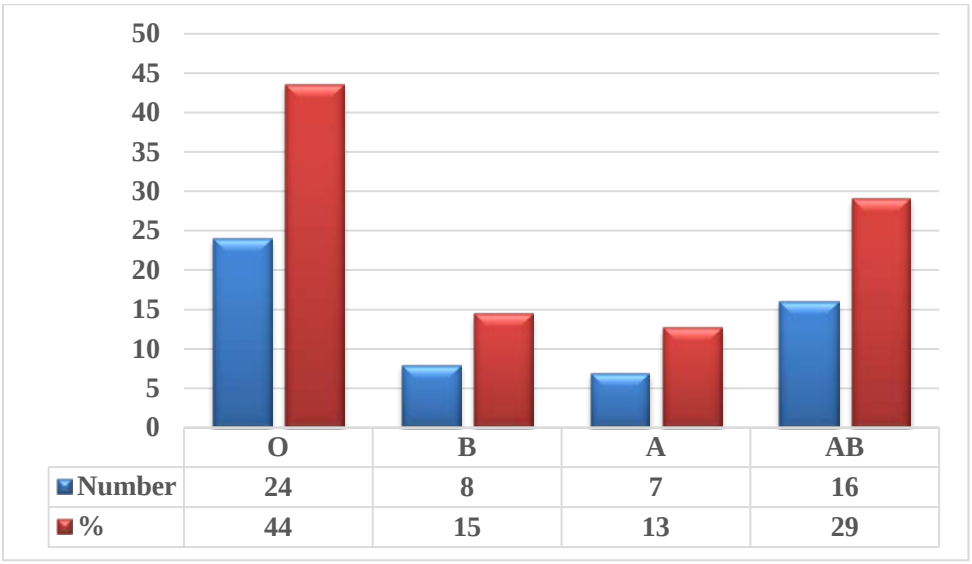


Figure (1): distribution of tested subjects in north or south parts of Iraq.

The highest number of thalassemia patients in this study were people who have blood group O (24) followed by AB (16), B and A, respectively (see **Figure (2)**). Although blood group O was dominant, patients with B group were more affected to have clinical complications (hepatomegaly and/or spleenomegaly) than other blood groups (see **Table (1)**.



	O	B	A	AB
Number	24	8	7	16
%	44	15	13	29

Figure (2): Numbers and percentages of thalassemic patients based on blood group.

Table (1): Affected versus non affected (%) of each blood group

Blood group	Affected (%)	Non-affected (%)
O	**58**	**42**
B	**88**	**12**
A	**86**	**14**
AB	**75**	**25**

Adults had more chance than children to have splenomegaly alone (58%) or both splenomegaly and hepatomegaly (42%), but with less hepatomegaly alone (42%) compared to children ((51%, 35%, and 49%), respectively(see **Table 2**).Subjects who have blood group O have less complication (42%) compared to other blood groups (see **Table 3**).

Table (2): Numbers and percentages of adults and children thalassemic patients observed to have hepatomegaly, splenomegaly or both.

Subject	Hepatomegaly (%)	Splenomegaly (%)	Mixed (%)	Total
Children	18 (49)	19 (51)	13 (35)	**37**
Adults	11(42)	15 (58)	11 (42)	**26**
Total	**29**	**34**	**24**	**63**

Table (3): Numbers of thalassemic subjects who have complications of liver and spleen disorders classified according to their blood group.

Blood group	Hepatomegaly	Splenomegaly	Mixed	Non
O	**4**	**5**	**5**	**10**
B	**0**	**1**	**6**	**1**
A	**1**	**1**	**4**	**1**
AB	**1**	**3**	**8**	**4**

Thalassemia major was the most observed dominant form comparing to others intermedia. However, numbers of thalassemic patients who have acquired their defective gene from fathers are greater than those who have obtained the disease from mothers or both parents regardless to what phenotype they have (see **Figure 3**). No significant differences between percentages of adults and children who have either thalassemia major or intermedia as shown in **Figure 4**.

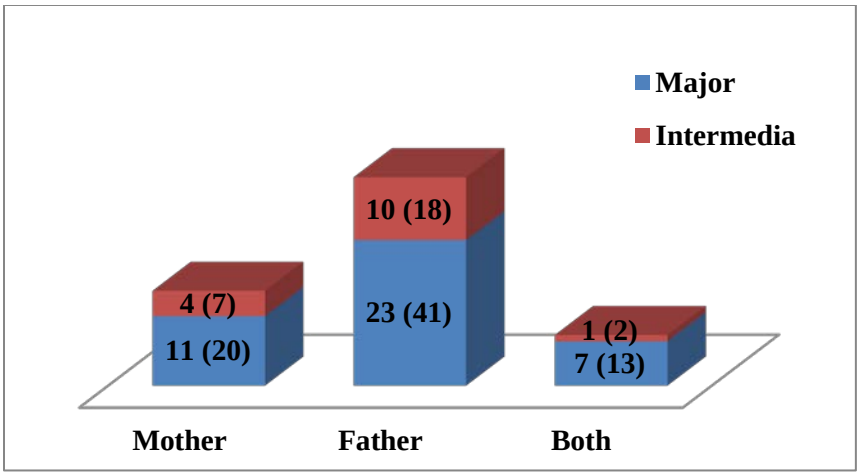


Figure (3): Observed numbers and percentages of subjects with major and intermedia thalassemia that acquired genetically from fathers, mothers or both parents.

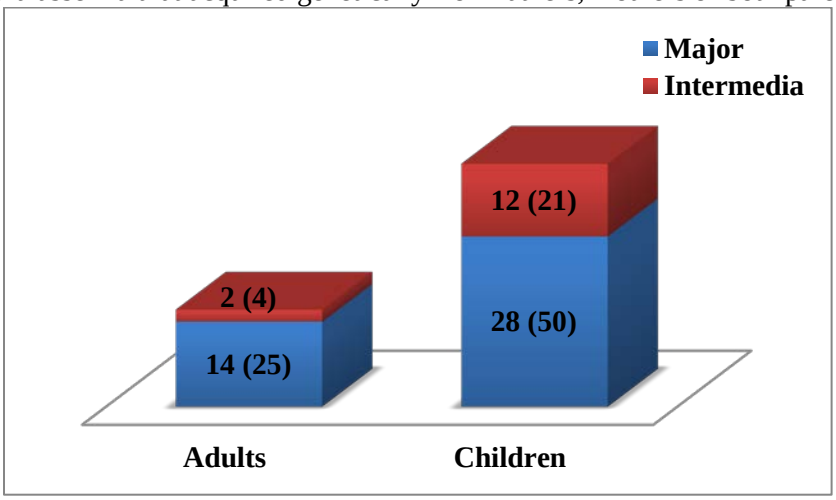


Figure (4): Observed numbers and percentages of subjects with major and intermedia thalassemia in adults and children.

Discussion

This study is investigating the occurrence of thalassemia in Iraq, complication might be combined, and the effect of blood groups on thalassemia.Patients who attended to the Ibn Al-Balady Thalassemia Centre in Baghdadwere mostly from south region of Iraq. This is probably due to existence of another thalassemic centre for people who live in North region of Iraq, whereas no alternatives centres are available in the South region.

The commonest thalassemia patients in this study were people who have blood group O followed by AB, B and A, respectively. Previous studies have similarly reported that phenotype O was the most prevalent (37.16%) in Kurdistan of Iraq[12], (39.7%) in Najaf province [13] and(35.4%) in Missan province[14]. However, the percentages of blood group O among Sabians (Mandaeans) population in Iraq was (49.9%)[15]. Our study has shown 44% of thalassemic population who have blood group O. The ratio of this

phenotype seems to be within the range of normal distribution of phenotype O. The other blood groups followed O, were A, B and AB respectively in all areas mentioned previously[12-15]. Whereas our study has shown a high frequency of phenotype AB (29%) which approached next to blood group O. This might indicate that people who have phenotype AB may genetically have more opportunity to have thalassemia. To validate this correlation, more studies will be needed.

Previous reports have shown an association between the ABO blood group system and various human diseases[16-18]. Phenotype O appeared to be more resistant to have hepatomegaly and splenomegaly compared to other phenotypes. To our knowledge, there is no literature available to relate the resistance of blood group O to diseases. Children appeared to be more susceptible to have hepatomegaly than adults, while adults had more frequencies of splenomegaly and both hepatomegaly and splenomegaly. The authors have no interpretation for this findings.

Thalassemia major was the greatest clinical phenotype comparing to thalassemia intermedia that observed in our data. Most thalassemic patients obtained their gene from fathers alone followed by mothers alone then both parents. Limited data is available to confirm the most effective parental gene to transfer thalassemia. However, analysis of fetal DNA in maternal plasma for the presence of the father's mutation are currently under investigation[5].

Conclusion

This study was curried out to exhibit clinical manifestations of thalassemia in affected areas in Iraq and examining the clinical complications of thalassemia on liver and spleen. Thalassemic patients were commonly presented from south region of Iraq, and mostly have blood group O which considers as usual based on normal distribution of blood groups in population. However, substantial ratio of thalassemic subjects appeared to have phenotype AB greater to normal distribution of this blood group, to validate genetic linkage between them, future studies needs to be performed.

Hepatomegaly and splenomegaly were less occurring in blood phenotypes O compared to other phenotypes. Thalassemia major was the common clinical manifestation in this study suggesting that most patients were children. The great number of thalassemic subjects gained their relative gene from fathers alone followed by mothers alone then from both parents.

Further studies will be needed to achieve more explanations of our data and confirm the findings.

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