Tikrit Journal of Pure Science
ISSN: 1813 – 1662 (Print) --- E-ISSN: 2415 – 1726 (Online)
Journal Homepage: http://tjps.tu.edu.iq/index.php/j

Study of Prevalence of Thalassemia trait among couples undergoing premarital examination in Al-Hamdaniya

Dunia Zaid
Nineveh Health Department, Ibn Al-Atheer Teaching Hospital for Children, Mosul, Iraq
https://doi.org/10.25130/tjps.v26i2.203

ARTICLE INFO.
Article history:
-Received: 3 / 11 / 2020
-Accepted: 10 / 1 / 2021
-Available online: / / 2021
Keywords: Hb A2, Hb F, β thalassemia, prevalence, Iraq.
Corresponding Author:
Name: Dunia Zaid
E-mail: dunia_zd@yahoo.com
Tel:

ABSTRACT

Background and objectives:
Thalassemia is the most common single genetic disorder. Being a preventable disease, the "premarital screening program" was established. The objective of the study was to determine the prevalence of β-thalassemia trait among couples attending a center for premarital screening in Al-Hamdaniya district.
Material and methods:
A cross-sectional study was carried out in Al-Hamdaniya district (located in the north of Iraq) during December 2019 through July 2020 that included 600 healthy couples screened for hemoglobinopathies. Complete blood count (CBC) and HB electrophoresis were done.
Results:
The prevalence of abnormal Hb F and Hb A2 was 4.8% and 5.8% respectively but the differences were not significant between males and females. No significant association was detected between the degree of consanguinity with the prevalence of Hb F and the prevalence of Hb A2. And there was no significant association between family history of haemolytic disease and the prevalence of Hb F and prevalence of Hb A2
Conclusion:
The prevalence of thalassemia trait in Al-Hamdaniya, like other cities in the north of Iraq is high, so premarital screening program is beneficial for identification and prevention of risky marriages.

Introduction

Thalassemia is the most common single genetic disorder. It is estimated that 80-90 million people (about 1.5% of the global population) are carriers of beta-thalassemia, and 60,000 symptomatic individuals are born annually[1]. Thalassemias are heterogeneous group of genetic defect in hemoglobin (Hb) synthesis; "inherited disorders of Hb synthesis arising from mutations and/or deletions of one or more of the globin genes resulting in production of structurally abnormal Hb variants in the former and reduced rate of synthesis of structurally normal globin chains in the latter"[2]. That result from a reduced rate of production of one or more of the globin chains of haemoglobin[3]..

The high rate of consanguinity among our populations plays significant function in maintaining the recessive pattern of inheritance, and increases the risk of homozygous or doubly heterozygous clinically affected offspring creating great psychological and fiscal stresses on the families and great burdens on the fiscal resources of many countries in the region. Being a preventable disease, the "premarital screening program." was established. The premarital screening center of Al-Hamdaniya was principally designed to control β-thalassemia due to its high prevalence [4].

"The prevalence of thalassemia had increased from 33.5/100,000 in 2010 to 37.1/100,000 in 2015, while the incidence rate had decreased from 72.4/100,000 live births to 34.6/100,000 live births between 2010 and 2015. β-Thalassemia major (β-TM) represented 73.9% of all types of thalassemia. About 66.0% of patients were under 15 years old; 78.8% were offspring of parents who were relatives and 55.9% had at least one complication" [5].

Al-Hamdaniya is one of districts of Nineveh governorate, Iraq where hemoglobinopathies are prevalent. The Iraqi ministry of Health implemented a

program for premarital screening in 2012 for reducing the incidence of the thalassemia major.

The objective of the study was to determine the prevalence of β-thalassemia trait among couples attending a center for premarital screening in Al-Hamdaniya.

Subjects and methods

A cross-sectional study was carried out during December 2019 through July 2020 that included healthy couples attending Al- Hamdaniya health care center to undergo routine premarital mandatory tests which included complete blood count (CBC), blood group, screening for viruses, and thalassemia test. Data was collected using the premarital form that included name, age, gender, address and telephone number, relationship between the couples, and family history for blood diseases.

Individuals were considered to have "β-thalassemia trait if they had MCV< 80 fL and MCH<27 pg and haemoglobin A2 level > 3.5". Venous blood was taken into an EDTA tube and red blood cell indices were measured by a coulter automated cell counter on the same day of collection, haemoglobin % was done by high performance liquid chromatography (HPLC). Verbal consent was taken from all the participants, and none of them refused to participate in the study.

Data were analyzed using the Statistical Package for Social Sciences (SPSS, version 25). Chi square test of association was used to compare proportions. Fisher's exact test was used when the expected count of more than 20% of the cells of the table was less than 5. A p value of ≤ 0.05 was considered statistically significant.

Results

Six hundred couples participated in the study (600 males and 600 females). So the sample size was 1200. Their mean age ± SD was 23.19 ± 7.11 years. The median was 22 years. The age range was 14-69 years. It is evident in Table 1 that one third of the sample were aged less than 20 years and 54.8% were aged 20-29 years. No significant difference in the age distribution was detected between the males and females. The highest proportion of the sample (63.6%) were graduates of the primary schools; 21.3% of the males were college graduates compared with 14% of the females (p = 0.002). Only two patients (0.2%) had family history of hemolytic disease, and those two were males, but the difference was not significant between males and females (p = 0.500). Table 1 shows that 25% of the couples were of the same tribe and 13% were second degree relatives, and of course the difference was not significant (p >0.999).

The prevalence of abnormal Hb F and Hb A2 was 4.8% and 5.8% respectively but the differences were not significant between males and females (p = 0.684 and p = 0.139 respectively). The prevalence of abnormal MCV was 53.2% among females compared with 28.2% among males (p<0.001). Abnormal MCH was significantly (p < 0.001) higher among females than males (56% vs. 39.5%) as presented in Table 2.

No significant association was detected between the degree of consanguinity with the prevalence of Hb F (p = 0.055) and the prevalence of Hb A2 (p = 0.541) as presented in Table 3.

It is evident in Table 4 that there was no significant association between family history of haemolytic disease and the prevalence of Hb F (p = 0.113) and prevalence of Hb A2 (p >0.999).

Table 1: Basic characteristics of the studied sample by gender

	Gender						
	Male		Female		Total		
	No.	(%)	No.	(%)	No.	(%)	p
Age							
< 20	92	(15.4)	309	(51.5)	401	(33.4)	
20-29	413	(68.8)	245	(40.8)	658	(54.8)	
≥ 30	95	(15.8)	46	(7.7)	141	(11.8)	< 0.001
Educational level							
Illiterate	10	(1.7)	25	(4.2)	35	(2.9)	
Read and write	5	(0.8)	6	(1.0)	11	(0.9)	
Primary	369	(61.5)	394	(65.7)	763	(63.6)	
Secondary	88	(14.7)	91	(15.2)	179	(14.9)	
College	128	(21.3)	84	(14.0)	212	(17.7)	0.002
Family history of hemolytic disease							
Yes	2	(0.3)	0	(0.0)	2	(0.2)	
No	598	(99.7)	600	(100.0)	1198	(99.8)	0.500*
Degree of consanguinity							
None	364	(60.7)	364	(60.7)	728	(60.7)	
Same tribe	150	(25.0)	150	(25.0)	300	(25.0)	
Second degree	78	(13.0)	78	(13.0)	156	(13.0)	
Third degree	8	(1.3)	8	(1.3)	16	(1.3)	>0.999
Total	600	(100.0)	600	(100.0)	1200	(100.0)	

*By Fisher's exact test.

Table 2: Prevalence of hemoglobinopathies by gender

	Gender						
	Male		Female		Total		
	No.	(%)	No.	(%)	No.	(%)	p
Hb F							
Normal	573	(95.5)	570	(95.0)	1143	(95.2)	
Abnormal	27	(4.5)	30	(5.0)	57	(4.8)	0.684
Hb A2							
Normal	559	(93.2)	571	(95.2)	1130	(94.2)	
Abnormal	41	(6.8)	29	(4.8)	70	(5.8)	0.139
MCV							
Normal	431	(71.8)	281	(46.8)	712	(59.3)	
Abnormal	169	(28.2)	319	(53.2)	488	(40.7)	< 0.001
MCH							
Normal	363	(60.5)	264	(44.0)	627	(52.3)	
Abnormal	237	(39.5)	336	(56.0)	573	(47.8)	< 0.001
Total	600	(100.0)	600	(100.0)	1200	(100.0)	

Table 3: Prevalence of hemoglobinopathies by degree of consanguinity

	Degree of consanguinity				
	None	Same tribe	Second	Third	p
	No. (%)	No. (%)	No. (%)	No. (%)	
Hb F					
Normal	699 (96.0)	287 (95.7)	143 (91.7)	14 (87.5)	
Abnormal	29 (4.0)	13 (4.3)	13 (8.3)	2 (12.5)	0.055
Hb A2					
Normal	681 (93.5)	284 (94.7)	149 (95.5)	16 (100.0)	
Abnormal	47 (6.5)	16 (5.3)	7 (4.5)	0 (0.0)	0.541
Total	728 (100.0)	300 (100.0)	156 (100.0)	16(100.0)	

Table 4: Prevalence of hemoglobinopathies by family history of hemolytic disease

	Family history of hemolytic disease				
	Yes		No		
	No.	(%)	No.	(%)	
Hb F					
Normal	1	(50.0)	1129	(94.2)	
Abnormal	1	(50.0)	69	(5.8)	0.113*
Hb A2					
Normal	2	(100.0)	1141	(95.2)	
Abnormal	0	(0.0)	57	(4.8)	>0.999*
Total	2	(100.0)	1198	(100.0)	

*By Fisher's exact test.

Discussion

there are many factors affect prevalence of thalassemia and acceptance of preventive programs as social,religious believes,cultural norms,tradition, literacy and education level, governmental policies and the attitudes of individual couples. The prevalence of β-thalassemia trait in Alhamdaniya (5.8 %) was found to be higher than the other centers of Iraq as follows: Sulaimania (4.14%), Duhok (3.7%), Baghdad (4.4%), and Basra (4.6%), but less than the prevalence in Erbil (7.04%) [3,6,7.8.9] and it was less than the prevalence (6.6%) obtained from a previous study done in Mosul center[3]. Our prevalence rate was also more than the prevalence of thalassemia trait in Iran, Turkey and Saudi Arabia (3.5%, 2.1% and 3.22% respectively) [10-12].

The prevalence of abnormal MCV was 53.2% among females compared with 28.2% among males ($p<0.001$). These findings differ from the findings of a study done in Thailand ("the means ± SD of MCV were 86.7 ± 5.1 fL for females and 89.4 ± 7.5 fL for males")[13]. Abnormal MCH was significantly ($p < 0.001$) higher among females than males (56% vs. 39.5%).

No significant difference was detected in β-thalassemia distribution among males and females in our study like in Kirkuk [14]. while Abnormal MCH was significantly ($p < 0.001$) higher among females than males (56% vs. 39.5%) .

Conclusion

The prevalence of thalassemia trait in Al-Hamdaniya, like other cities in the north of Iraq is high, so premarital screening program is beneficial for identification and prevention of risky marriages.

References

[1] Sayani F, Kwiatkowski J. Increasing prevalence of thalassemia in America: Implications for primary care. Ann Med 2015; 47(7):592-604.

[2] Weathrall DJ,clegg JB. The Thalassemia syndrome. 4th ed.oxford:Blackwell;scince;2001.

[3] Khaleel KJ, Hameed AH, Fadhel AM, Yaseen NY. Prevalence of Thalassemia genes in Mosul. Iraqi Journal of Science 2009; 50: 8-10

[4] Polus RK. Prevalence of hemoglobinopathies among marrying couples in Erbil province of Iraq. Iraqi Journal of haematology 2017; 6 (2): 90-3.

[5] Kadhim K, Baldawi K, Lami F. Prevalence, Incidence, Trend, and Complications of Thalassemia in Iraq. Epub 2017; 41 (3): 164-8.
DOI: 10.1080/03630269.2017.1354877.

[6] Al-Allawi NA, Al-Dousky AA. Frequency of haemoglobinopathies at premarital health screening in Dohuk, Iraq: Implications for a regional prevention programme. East Mediterr Health J 2008; 16:381-5.

[7] Jalal SD, Al-Allawi NA, Faraj AH, Ahmad NH. Prevalence of haemoglobinopathies in Sulaimani-Iraq. Duhok Med J 2008; 2:1-9.

[8] Yahya HI. Thalassaemia genes in Baghdad, Iraq. East Mediterr Health J 1996; 2: 315-9.

[9] Hassan MK, Taha JY, Al-Naama LM, Widad NM, Jasim SN. Frequency of haemoglobinopathies and glucose-6-phosphate dehydrogenase deficiency in Basra. East Mediterr Health J 2003; 9:45-54

[10] Hashemizadeh H, Noori R. Premarital Screening of Beta Thalassemia Minor in north-east of Iran. Iran J Ped Hematol Oncol. 2013; 3(1): 210–5

[11] Guler E, Garipardic M, Dalkiran T, Davutoglu M. Premarital screening test results for β-thalassemia and sickle cell anemia trait in east Mediterranean region of Turkey. Pediatr Hematol Oncol 2010; 27(8): 608

[12] Alhamdan NA, Almazrou YY, Alswaidi FM, Choudhry AJ. Premarital screening for thalassemia and sickle cell disease in Saudi Arabia. Genet Med. 2007; 9 (6): 372-7

[13] Insiripong S, Yingsitsiri W, Boondumrongsagul J, Noiwatanakul J. Prevalence of Thalassemia Traits in People without Anemia or Microcytosis. J Hematol Transfus Med 2014; 24:25-9.

[14] Tawfeeq AA. A Prospective Study for the Outcomes of Thalassemia in Kirkuk 2016.Kirkuk University Journal 2017; 12 (4)

دراسة انتشار سمة الثلاسيميا في الأزواج الذين يخضعون للفحص قبل الزواج في الحمدانية

دنيا زيد حازم

دائرة صحة نينوى ، مستشفى ابن الاثير التعليمي للأطفال ، الموصل ، العراق

الملخص

المقدمة:

المعلومات الأساسية والأهداف: إمرض ثلاسيميا هو أكثر الاضطرابات الجينية شيوعا. ونظراً لكونه مرض يمكن الوقاية منه، فقد أنشئ "برنامج الفحص قبل الزواج". الهدف من الدراسة هو تحديد مدى انتشار الإصابة بفقر الدم بيتا بين الأزواج الذين يحضرون لمركز الفحص قبل الزواج في قضاء الحمدانية لتفادي الاقدام على الزواج في حالة الإصابة.

المواد والأساليب: أجريت دراسة شاملة لعدة قطاعات في قضاء الحمدانية (في شمال العراق) خلال الفترة من كانون الأول 2019 إلى تموز 2020 شملت 600 من الأزواج الذين تم فحصهم للكشف عن حالات اعتلال الهيموغلوبين تم إجراء حصر كامل للدم تعداد خلايا الدم الكامل والتحليل الكهربائي للهيموغلوبين

النتائج: معدل انتشار Hb F و Hb 2 غير العادي 4.8 في المائة و 5.8 في المائة على التوالي، ولكن الفروق لم تكن كبيرة بين الذكور والإناث. ولم تكتشف أي ارتباط كبير بين درجة القرابة مع انتشار Hb F وانتشار Hb A2. ولم تكن هناك علاقة كبيرة بين تاريخ الأسرة من مرض الدم وانتشار Hb F وانتشار Hb A2

الخلاصة: انتشار الإصابة بفقر الدم في الحمدانية مثل المدن الأخرى في شمال العراق، مرتفع، ولذلك فإن برنامج الفحص السابق للزواج مفيد في تحديد ومنع الزيجات الخطرة لتقليل الإصابة بمرض فقر الدم بيتا ثلاسيميا بين افراد المجتمع.