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Prevalence of Thalassemia Carrier Among Premarital Screening Attendants

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Abstract:

Background: Premarital screening is an important tool in the prevention process for groups of hemoglobinopathy disorders, combining with raising awareness and carrier screening premarital screening plays a pivotal rule in prevention of thalassemia.

Aim of study: to throw alight on prevalence of thalassemia among couples intend to marriage.

Patients and methods: Descriptive cross sectional study conducted in diwanyia teaching hospital in premarital screening center, in period from 1st march to 1st june 2023. The study recruited data from above center to getting information about premarital counseling persons.

Results: The study was enrolled 21574 couple attendant premarital screening centers. Mean age for women 24±3.6 years and for men 27±6.2. The prevalence carrier for thalassemia in our study was 1.94% during one year of screening test in four centers of governorate; in which 419 person appear positive for screening for thalassemia. Male Thalassemia carrier was 213 and female 206.

Conclusion : Premarital screening is important step in the prevention of thalassemia, but it is not enough alone to get rid of these important disorders, a lot of hard work needed to reach to lower rate of new cases incidence.

Introduction

Thalassemias are group of disorders that results from impaired Haemoglobin production and defective erythropoesis . For those with severe form of thalassemia. Lifelong blood transfusion is the mainstay of treatment. Children with severe thalassemia usually don't survive more than five years . While chronic blood transfusions and medical comprehensive care Life expectancy was expected to the fourth decade of life and more [(1)].

The complications of chronic blood transfusions are the prominence challenges in the management of thalassemia major. In patients with thalassemia major blood transfusions is usually started before the age of one year [(2)]. Complications that are directly related to transfusions are included blood born infections and development of anti RBCs antibodies, febrile, allergic or delayed hemolytic reactions. The goal of blood transfusions is to maintain the Hemoglobin level at 9 to 10 gm /dL. Typically blood is usually given every three to four weeks to reach this target level of Hemoglobin [(3)].

The carriers of beta thalassemia minor are usually asymptomatic . Their hematological parameters are mostly mild hypochromic microcytic, Anemia High Hemoglobin A2 level with normal or mildly elevated HBF level on Hb electrophoresis [(4)].

In a retrospective study of records of patients from 2010 to 2015 through visiting of (16) out of (19) thalassemia centers in Iraq[5].
Thalassemia represents about (75%) of all haemogloniopathies . The prevalence has been reported 32 / 100.000 population in 2010 had been increased to 36/100.000 of population in 2015. However, the incidence had been reduced from (36/100.000) live birth in 2010 to (34/100.000) live births in 2015[5].
Beta thalassemia major represented (67%) of all types of thalassemia.
The highest prevalence rate of thalassemia was reported in Basra (74/100.000) of population. Most of patients with age from 6 to 15 years that represents 42% and only (9.5%) their age 30 years and more[4].
The most important thing is about (75%) patients were consanguineous parents.

Premarital screening is an important tool in the prevention process for these groups of hereditary disorders, combining with raising awareness and carrier screening premarital screening plays a pivotal rule in prevention of these disorders. As a step aiming at prevention of these diseases[6].
Premarital screening are important steps for the prevention of genetic blood disorders such as hemoglobinopathy , and considered a primary preventive approach for couples planning for conception and an important step towards protecting society and allowing people to enjoy life , particularly be important in the prevention of the spread of disease [7] . All couples with marriage plans are required to be tested for human immunodeficiency virus (HIV), hepatitis B virus (HBV) and hepatitis C virus (HCV) and to have the appropriate
counseling (if required) before completing their marriage plans[8] .
Pre-marital Screening is define as a group of tests in which couples that are going to get married are tested for common genetic blood disorders (mainly hemoglobinopathies, e.g. thalassemia and sickle cell anemia) and infectious diseases (e.g. hepatitis B, hepatitis C, and HIV/AIDS)[9]. Premarital screening also include testing for other sexual-transmitted diseases like(syphilis, gonorrhea), blood grouping and resus factor to prevent as much as possible transmitting disease to the other partner or children and to provide partners with options that help them plan for healthy family[10].The premarital screening reduces the spread of those diseases and reduces the financial burdens of their treatments, and also reduces the burden on health facilities and blood banks. PMS would avoid any future social and psychological problems of families[11].

Premarital screening Program and Genetic Counseling in all over the governorates of the country together with Prenatal Diagnosis if possible, is the optimum choice to reduce the burden of β-thalassemia. For example, In Iran, the total costs of preventing 1 case of β-thalassemia were estimated at 100 USD, less than the cost of a single year of optimum support for a case of β-thalassemia[6] .
Similar findings in Greece and Cyprus indicated that the cost of prevention was equal to that of treating one affected patient for one year, while the-annual cost of the screening program was equivalent to treating the thalassemia-affected population for 1 week [12] .
Prevention thus appears to be significantly more cost effective while reducing the psychosocial implications of this chronic disease[13].

Aim of study: to throw alight on prevalence of thalassemia among couples intend to marriage
Patients and methods
Descriptive cross sectional study conducted in diwanyia teaching hospital in premarital screening center, in period from 1st march to 1st june 2023. The study recruited data from above center to getting information about premarital counseling persons.

Every couple applies for marriage certification is mandatorily required to visit their district hospital for premarital screening for hemoglobinopathy.

- Premarital examination for partners include the following data. Socio-demographic data: name, age, and occupation, in addition to the degree of consanguinity between them. And history of medical diseases for both.
- Family history such as inherited blood diseases (thalassemia, sickle cell anemia, and hemophilia), mental disability, and congenital physical handicap.
- Second part physical examination for partners.
- Thirdly laboratory investigations, blood grouping and Rh factor, RBC indices (MCV and MCH), VDRL, HBsAg, and tests for HIV and tuberculosis.

Pre-marriage health centers

In our governorate there is four health centers introduce services for pre marital couples which present in every districts.

Firstly in Diwanyia teaching hospital in center of governorate. In districts of Afag, Hamza, Shamia the center lie in general hospital of these cities.

Couple underwent routine mandatory tests and blood samples collected

from venous blood was taken into an ethylenediaminetetraacetic acid (EDTA) tube and the complete blood count and red blood cell indices were measured by Abbot automated cell counter on the same day of

blood collection. Subjects were considered to have β-thalassemia trait if they had MCV <80 fl, MCH <27 pg and a hemoglobin A2 level >3.5%.

- Those who were "HbS positive" were considered to be carriers of sickle cell anemia.
- A second gel tube blood sample were allowed to clot and centrifuged at 1000 rpm for five minutes. The serum was separated and used for the screening of HIV, HBV and HCV viruses by enzyme-linked immunosorbant assay (ELISA) to detect antibodies in plasma against HCV (indirect ELISA), HIV type 1,2, or subtype 0 (sandwich ELISA), and to detect hepatitis B surface antigen (HBsAg) by (sandwich ELISA).

Then for syphilis rapid test cassette one step rapid test.

Couples with safe marriage test results were issued instant compatibility certificates while at-risk couples were asked to attend meetings the counselors explained to the couple members the potential hazards of their

proposed marriages and the voluntary nature of their compliance.

Statistical Analysis: Statistical analysis was achieved by using SPSS 20.0 software (SPSS, Inc., Chicago, IL, USA). Continuous variables were expressedas the mean ± standarderror. Dichotomous variables

were expressed as percentages. P <0.05 was considered to indicate a statistically significant difference.

- Result
- The study was enrolled 21574 couple attendant premarital screening centers. Mean age for women 24±3.6 years and for men 27±6.2. Forty five point four percent of attendants examination were occurred in AL Diwanyia general hospital, 20.2% in Hamza general hospital, 20.3% of them in Shamia general hospital and 14.1% in Afaq general hospital as shown in table one.
- Table 1: show distribution of sample according to centers.

Name of centers	Number	Percent
Hamza	4352	20.2%
Shamia	4380	20.3%
Afaq	3054	14.1%
Diwanyia	9788	45.4%
Total	21574	

- The prevalence carrier for thalassemia in our study was 1.94% during one year of screening test in four centers of governorate; in which 419 person appear positive for screening for thalassemia. Male Thalassemia carrier was 213 and female 206. There were 314 of thalassemia carrier live in urban region and 104 were resident in rural area.

- Table 2:- prevalence of thalassemia.

Test result		Number	Percentage
Suspected thalassemi carrier	Yes	419	1.94%
	No	21155	98.06%

Table 3: show sex distribution of positive results for thalassemia

Test result		Male	Female	Total
Suspected thalassemi carrier	Yes	213	206	419
	No	10574	10581	21155

Table 4: residence of thalassemia carrier.

Test result		Urban	Rural	Total
Suspected thalassemi carrier	Yes	315	104	419
	No	13752	7403	21155

- The number of attendants differ during the year reached to 2338 in April month in February they were 2304, in June were 2318 and in august 2274, lowest number 1162 in September month these data shown in figure 1.

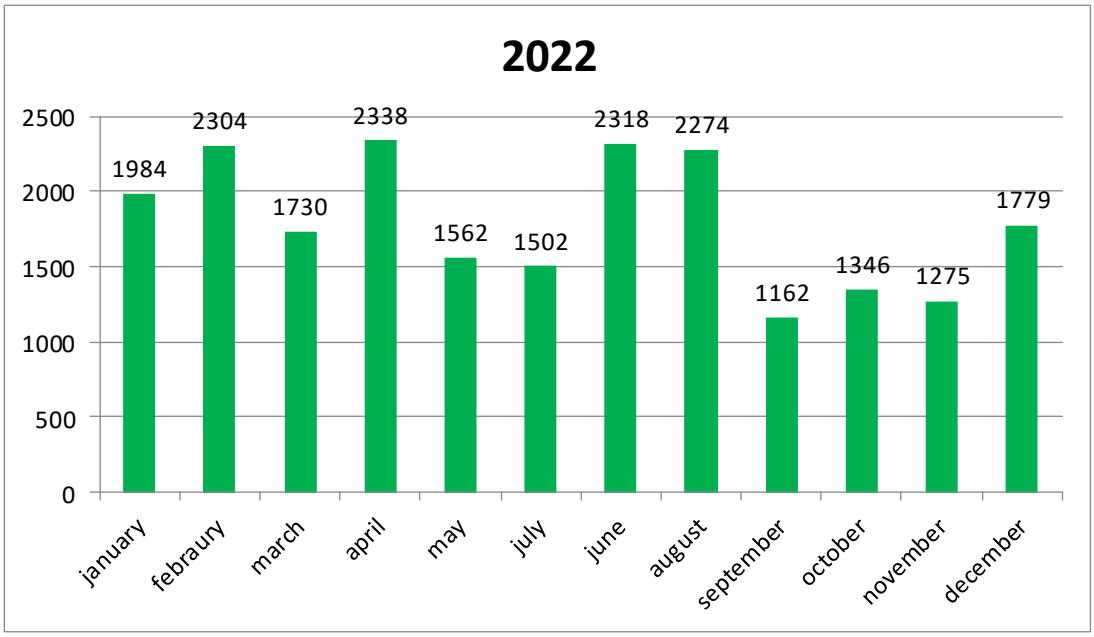

Figure 1 : show the number of monthly attendants.

Discussion

Among the genetic diseases, the most common disorders are hemoglobinopathies [14]. B-thalassemia is prevalent in Mediterranean countries (21). Considering that nowadays, the neighbor Mediterranean countries have eradicated the disease almost completely, Turkish Republic of Northern Cyprus (TRNC), Italy and Greece have succeeded in preventing thalassemia infants being born in the last decade, as a result to society screening, pre-marriage carrier detection [15] .

Thalassemia is encountered at different frequencies in almost all Arab countries with carrier rates of 1-11%, and the frequency is higher in Jordan, Lebanon, Iraq, Egypt, Palestine, and other Arab countries . In Iraq, the carrier rate of β -thalassemia in different governorates is rather uniformly distributed throughout the country, ranges between 3.7% and 6.5% , and with 15,000 registered patients with thalassemia major/ intermedia[6].

Iraq is one of the countries which are endemic with different types of heamoglobinopathies. There are several epidemiological studies on their frequency. The prevalence of gene carriers is high giving a figure of millions among the entire population. The total number of patients diagnosed with these diseases in the MOH laboratories during the last years is 15000 [6]. Thus, detection and advice about these disease becomes the corner stone element in Premarital screening in order reduce the burden of this problem, And to inform couples about their chances of producing affected children and ensure they receive appropriate advice[14].

Our result reveal prevalence of thalassemia gene carrier among couples about1.94% it close to study by **Hanoon et al**, [14] which are lower than reported by others study in Iraq, in Duhok (3.7%) in Baghdad 4.4% and in Basra were reported 4.6% prevalence of thalassemia carrier in couple were attending premarital center. Sulaymaniyah 4.14%was seen by Jalal in 2008 [4]. while the prevalence of β-Thalassemia carrier in Karbala governorate is (3.8%) [6].

Studies in Turkey country north to Iraq reveal different prevalence rate range from 2%-6% depend on site of study, newly study reported 1.8%. Differences in the prevalence of thalassemia carriage in same country can be attributed to differences in diagnostic criteria and laboratory methods used in researches[16] .

Other countries like in Iran rate range from 4%–10% in various regions of the Republic of Iran[14] . A figure of 3.0%–3.4% wasreported from Saudi Arabia [16] while prevalence in Jordan was reported to be 3.0%–3.5% . In the Syrian Arab Republic, the estimated prevalence was 5% [17] .

The prevalence rates of recessive disease like thalassemia may be influenced by cultural and demographic characteristics of a population studied. In Iraq most marriage happened at young age. They have large family size with advanced maternal and paternal ages. The consanguineous marriage represents about 60 70% of marriage in Iraq [(4)].

One of causes low rate in comparison to other studies due to screening program requires both couples to have low MCV and low MCH in order to perform electrophore-sis which may lead to escape of serious hemoglobinopathies[(18)].

The Al Diwanyia thalassemia center registered about 35,29,32 patients during a year of 2016, 2017, 2018 respectively .This figure emphasizes the potential recurring burden of disease and the need for an effective prevention program to reduce that burden[(17)].

The main outcome for this program is prevention of birth of children affected with major Hemoglobinopathy disorder [(19)], and in correlation with the newly registered cases in hereditary blood disease center which not necessarily reflect the marriages in the study period, many parents of registered cases married before the institution of the [(6)].

Conclusion

Premarital screening is important step in the prevention of thalassemia, but it is not enough alone to get rid of these important disorders, a lot of hard work needed to reach to lower rate of new cases incidence.

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