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PREVALENCE OF THALASSEMIA TRAIT IN COUPLES TENDING FOR MARRIAGE IN NINAWA CITY

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ABSTRACT

Thalassemia is a common inherited preventable hematologic disorder by investigating hemoglobin electrophoresis. It is a worldwide disorder with a predominant incidence in Mediterranean countries, North Africa, the Middle East, India, Central Asia, and Southeast Asia. The treatment of affected individuals presents a substantial global disease burden. β-thalassemia is characterized by the reduced synthesis (β^+) or absence (β^o) of the β-goblin chains in the HbA molecule, resulting in accumulation of excess unbound α-globin chains that precipitate in erythroid precursors in the bone marrow and in the mature erythrocytes, leading to ineffective erythropoiesis and peripheral hemolysis. Our study done on 86027 couple tending for marriage attending to official institutions health facilities In Ninawa governorate in 2019. The result was 0.44 % having thalassemia trait of couples tending for marriage. 7.7% are consanguinity relationship.

INTRODUCTION

Thalassemia's are inherited blood disorders characterized by abnormal hemoglobin production.[7] Symptoms depend on the type and can vary from none to severe.[1] Often there is mild to severe anemia (low red blood cells).[1] Anemia can result in feeling tired and pale skin.[1] There may also be bone problems, an enlarged spleen, yellowish skin, and dark urine.[1] Slow growth may occur in children.[1]

Thalassemias are genetic disorders inherited from a person's parents.[2] There are two main types, alpha thalassemia and beta thalassemia.[7] The severity of alpha and beta thalassemia depends on how many of the four genes for alpha globin or two genes for beta globin are missing.[2] Diagnosis is typically by blood tests including a complete blood count, special hemoglobin tests, and genetic tests.[3] Diagnosis may occur before birth through prenatal testing.[8]

Treatment depends on the type and severity.[4] Treatment for those with more severe disease often includes regular blood transfusions, iron chelation, and folic acid.[4] Iron chelation may be done ith deferoxamine or deferasirox.[4] Occasionally, a bone marrow transplant may be an option.[4] Complications may include iron overload from the transfusions with resulting heart or liver disease, infections, and osteoporosis.[1] If the spleen becomes overly enlarged, surgical removal may be required.[1]

As of 2015, thalassemia occurs in about 280 million people[5], with about 439,000 having severe disease.[9] It is most common among people of Italian, Greek, Middle Eastern, South Asian, and African descent.[7] Males and females have similar rates of disease.[10] It resulted in 16,800 deaths in 2015, down from 36,000 deaths in 1990.[6][11] Those who have minor degrees of thalassemia, similar to those with sickle-cell trait, have some protection against malaria, explaining why they are more common in regions of the world where malaria exists.[12]

Signs and symptoms

- Iron overload: People with thalassemia can get an overload of iron in their bodies, either from the disease itself or from frequent blood transfusions. Too much iron can result in damage to the heart, liver, and endocrine system, which includes glands that produce hormones that regulate processes throughout the body. The damage is characterized by excessive deposits of iron. Without adequate iron chelation therapy, almost all patients with beta-thalassemia accumulate potentially fatal iron levels.[13]

- Infection: People with thalassemia have an increased risk of infection. This is especially true if the spleen has been removed.[14]
- Bone deformities: Thalassemia can make the bone marrow expand, which causes bones to widen. This can result in abnormal bone structure, especially in the face and skull. Bone marrow expansion also makes bones thin and brittle, increasing the risk of broken bones.[15]
- Enlarged spleen: The spleen aids in fighting infection and filters unwanted material, such as old or damaged blood cells. Thalassemia is often accompanied by the destruction of a large number of red blood cells and the task of removing these cells causes the spleen to enlarge. Splenomegaly can make anemia worse, and it can reduce the life of transfused red blood cells. Severe enlargement of the spleen may necessitate its removal.[16]
- Slowed growth rates: anemia can cause a child's growth to slow. Puberty also may be delayed in children with thalassemia.[17]
- Heart problems: Diseases, such as congestive heart failure and abnormal heart rhythms, may be associated with severe thalassemia.[18]

Diagnosis

Thalassemia can be diagnosed via a complete blood count, hemoglobin electrophoresis, and DNA testing.[19]

Management

Mild thalassemia: people with thalassemia traits do not require medical or follow-up care after the initial diagnosis is made.[20] People with β-thalassemia trait should be warned that their condition can be misdiagnosed as the more common iron deficiency anemia. They should avoid routine use of iron supplements; iron deficiency can develop, though, during pregnancy or from chronic bleeding.[21] Counseling is indicated in all persons with genetic disorders, especially when the family is at risk of a severe form of disease that may be prevented.[22]

Anemia

People with severe thalassemia require medical treatment. A blood transfusion regimen was the first measure effective in prolonging life.[20]

Iron overload

Multiple blood transfusions can result in iron overload. The iron overload related to thalassemia may be treated by chelation therapy with the medications deferoxamine, deferiprone, or deferasirox.[23] These treatments have resulted in improving life expectancy in those with thalassemia major.[23]

Deferoxamine is only effective via daily injections which makes its long-term use more difficult. It has the benefit of being inexpensive and decent long-term safety. Adverse effects are primary skin reactions around the injection site and hearing loss.[23]

Deferasirox has the benefit of being an oral medication. Common side effects include: nausea, vomiting and diarrhea. It however is not effective in everyone and is probably not suitable in those with significant cardiac issues related to iron overload. The cost is also significant.[23]

Deferiprone is a medication that is given by mouth. Nausea, vomiting, and diarrhea are relatively common with its use.[23] It is available in both Europe and the United States.[23,24] It appears to be the most effective agent when the heart is significantly involved.[23]

There is no evidence from randomized controlled trial to support zinc supplementation in thalassemia.[25]

Bone marrow transplantation

Bone marrow transplantation may offer the possibility of a cure in young people who have an HLA-matched donor.[26] Success rates have been in the 80–90% range.[26] Mortality from the procedure is about 3%.[27] There are no randomized controlled trials which have tested the safety and efficacy of non-identical donor bone marrow transplantation in persons with β-thalassemia who are dependent on blood transfusion.[28]

If the person does not have an HLA-matched compatible donor, another method called bone marrow transplantation (BMT) from haploidentical mother to child (mismatched donor) may be used. In a study of 31 people, the thalassemia-free survival rate 70%, rejection 23%, and mortality 7%. The best results are with very young people.[29]

Gene therapy

Gene therapy is being studied for thalassemia.[30] The procedure involves collecting hematopoietic stem cells (HSCs) from the affected person's blood. The HSCs then have a beta-globin gene added using a lentiviral vector. After destroying the affected person's bone marrow with a dose of chemotherapy (a myeloablative conditioning regimen), the altered HSCs are infused back into the affected person where they become engrafted in the bone marrow where they proliferate. This potentially results in a progressive increase in hemoglobin A2 synthesis in all subsequent developing red blood cells, with resultant resolution of the anemia.[31]

While one person with beta thalassemia has no longer required blood transfusions following treatment within a research trial, it is not an approved treatment as of 2018.[30,32]

HbF induction

HbF induction is an attempt to reactivate fetal globin gene transcription.[33] Efforts involve trying to disrupt the fetal globin gene promoter.[33]

Aim of the study
To calculate thalassemia trait percentage among asymptomatic persons decided for marriage and to council them about the impact of marriage if both of them are carriers of the trait.

Patient and method
An observational, descriptive cross sectional study entertained for this study. Data were collected from preexisting official data for 2019.

Study setting
Maternal and child health division in public health department in Ninawa governorate by collecting final results of each month for the year in study.

Study period
1st of January to the 31th of December 2019.

Study sample
86028 male and female tending for marriage in Ninawa governorate.

RESULTS

Table 1. No. of investigated couples for thalassemia according to gender.

Gender	No.	positive	%
Male	43014	217	0.50
Female	43014	167	0.38
Total	86028	384	0.44

Table 2. Relationship between thalassemia and level of hemoglobin according to gender.

Hb less than 12	No.	positive	%
Male	9370	96	1.02
Female	9241	105	1.13
Total	18611	201	1.08

Table 3. The relationship between consanguinity couples and thalassemia.

No. of investigated couples	No. of positive relationship	%	No. of negative relationship	%
26436	2046	7.7	24390	92.3

Table 4. No. of investigated couples for rhesus factor according to gender.

Rhesus factor	No.	Rh -	%
Male	24654	3780	15.33
Female	24654	4677	18.97
Total	49308	8457	17.15

After calculation of couples tending for marriage and analyzing their results (384) out of (86027) person involving male and female in a percent of (0.44) are carriers of thalassemia trait those are not patients but the local authorities council them not to go ahead for marriage to protect their children getting thalassemia in future by far this is the chief goal of premarital councilling for those tending for marriage, this percent doesn't reflect the hall picture in Iraq as it made for the north sub strict Ninawa only, to be noted this project started in 2012 as a band of investigations including thalassemia trait hemoglobin electrophoresis. The test started by measuring hemoglobin level for those male or female having a level lesser than 12 mg/dl as approved by MOH Iraq, those with hemoglobin level lesser than 12 mg/dl are (201) in a percent of (1.08). Table number 3 shows the effect of consanguinity in relation to probability of thalassemia occurrence revealing (7.7 %) are related to other in a third degree relation and more in the other word cousins and their off springs. Table number 4 showing the percent of Rh- for both genders taking in mind to inform the couple about the risk if being Rh- altogether.

DISCUSSION

prevalence of β thal trait in Turkey varies between 0.7% in Erzurum[34] and 7.9% in Hatay2(35). Those results are very close to what appeared in our study (0.44) this could be resulted from adjacent cities geographically and both are middle east countries.

In Cyprus, Greece, and Italy, molecular basis and prenatal studies seem to have replaced the β thal trait prevalence studies. There are also other reasons for this. Namely: Cyprus started a program in 1973, and successfully decreased the number of affected births from 51 to 0 annually between 1974 and 2002. Similar programs were implemented in Italy and Greece.[36]

Beta thal is also common in Saudi Arabia along the coastal strip of the Red Sea and in the Eastern province

around Jubail, Qateef, Dammam, and Hofuf. Although β thal has been known for many years in these areas and many of its manifestations are recognized, the details of actual incidence, the natural history or clinical course of the disease from early childhood to death are unknown. This is mostly because of inadequate facilities for mass population screening, variable severity, and manifestations and complexity of the interaction of the disease process with other health-related events e.g. sickle cell disease.[37]

As a general conclusion, low prevalence values have been reached in Iran as a result of the premarital screening program. Five studies from Saudi Arabia were included[38] In addition to this information, β thal trait prevalence is estimated to be 4%-5% in screening studies. The prevalence of thalassemia varies throughout Iran with the highest incidence in regions near the Caspian Sea and the Gulf. The provinces of Mazandaran, Gilan, Hormozgan, Khuzestan, Kohkiluyeh-Boyerahmad, Fars, Bushehr, Sistan- Baluchestan, Kerman, and Isfahan are the 10 provinces most afflicted. This shows that geographical features have an effect on the β thal prevalence in Iran too.[39]

CONCLUSION

Thalassemia is common in midetrnian and middle eastern countries showing higher prevalence in Iraq and Saudi Arabia could be due to consanguinity marriage related to religious issues and lower prevalence in Iran and Turkey which have a good funding to premarital screening programs.

RECOMMENDATIONS

1. Distribution of knowledge about importance of screening thalassemia.
2. Good communication between civilian courts and health regime to regulate marriage bonds after health care clearance of STDs and thalassemia.
3. Making more researches about other types of thalassemia and making an update of data.
4. Seeking thalassemia in other regions in Iraq and calculation its prevalence and incidence.
5. Improving awareness among population as some couples override screening heading for marriage against law.

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