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Clinical Profile of Pregnant Women with Thalassemia A Retrospective Study

Yassir Abubakar Fikak

Assistant professor Department of Pharmacy,

Glocal University, Mirzapour pole, Saharanpour, UP, India

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Research Paper

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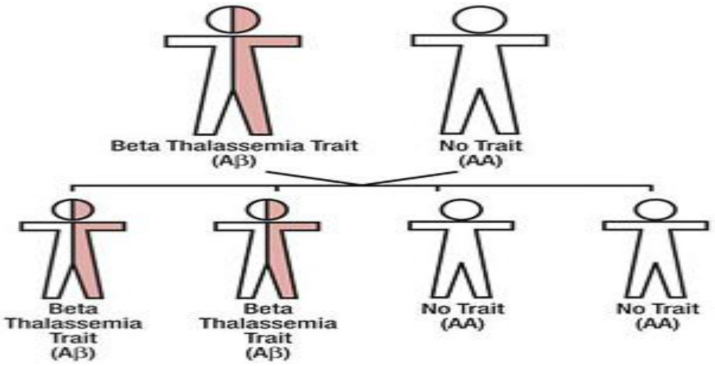
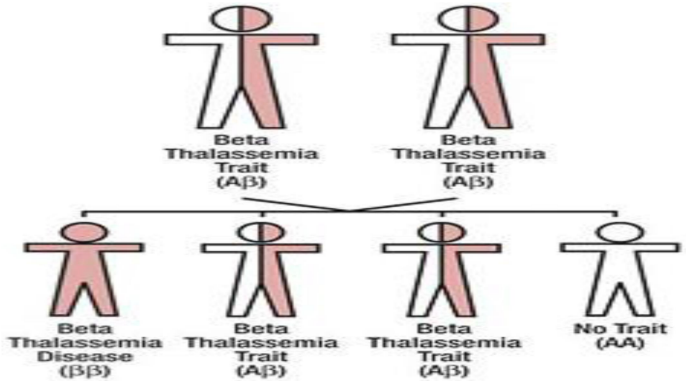
ABSTRACT

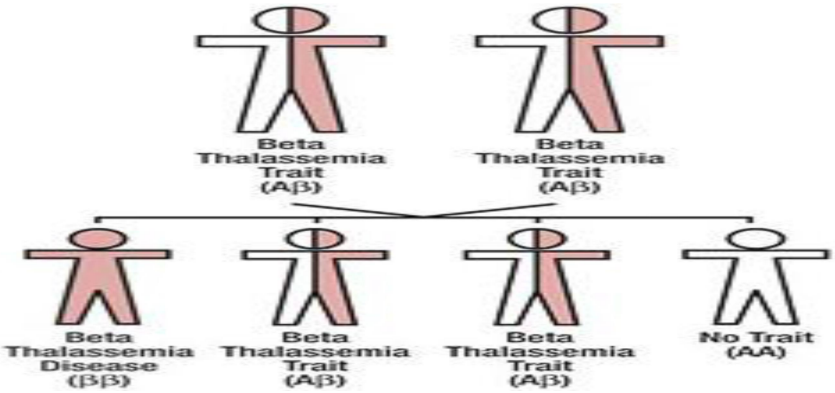
Thalassemia syndromes are the commonest genetic disorders of blood and constitute a vast threat to public health (pregnant women and new-borns), pregnant women carrying affected foetuses are themselves at risk for serious pregnancy and delivery complication. The current retrospective study is designed to assess the prevalence of thalassemia and other hemoglobinopathies in pregnant females, from a secondary care referral hospital. Pregnant women who reported to OBG department for consultation, and admitted for delivery suffering hemoglobinopathies after explaining the merits and demerits of the study and a proper inform consent was obtained and all data's pertaining to research were documented.

Introduction

Thalassemia is a category of disorders defined by a reduction or absence of haemoglobin's globin chains. Whipple and Bradford named the disease in 1932 using the Greek terms "Thalassa" meaning sea and "Haema" meaning blood, based on its early observation in the Mediterranean population. Thalassemia problems affect an estimated 15 million people worldwide. Approximately 240 million people worldwide carry β-thalassemia, representing 1.5% of the global population. In India alone, there are around 30 million carriers, with 505 in South East Asia. The prevalence of hemoglobinopathies in India is high, with almost 12,000 newborns born each year with a severe condition. This implies that every hour, one child is born.







Thalassemia places a significant psychological and financial burden on patients and their families. This deadly disease can be avoided with rigorous screening and counseling programs. A simple blood

test can identify silent carriers and encourage them to avoid marriage.

Who should be screened for thalassemia?

- Pre-marital young adults (aged 18–25)

  Pregnant women in their first trimester, as well as parents and relatives of children with thalassemia major.
- Individuals in high-risk communities
- Those with increased RBC counts

  The key sign for the classical beta thalassemia trait is a blood film including hypochromic microcytic red blood cells, with red cell indices indicating a decrease in mean corpuscular hemoglobin (MCH) and mean corpuscular hemoglobin (MCV). An essential feature.

The analysis process only requires 6 minutes to complete. Quality control is meticulously observed to guarantee the precision of the findings. In addition to prenatal screening, CE-HPLC can be utilized for diagnosing hemoglobinopathies in prenatal cases. This comprehensive approach includes obstetricians, paediatricians, and a well-equipped laboratory for HPLC-based hemoglobinopathy screening. Community awareness initiatives aim to educate the public about the disease and eliminate the social stigma linked to thalassemia.

Literature Review

Roshan Colah, Khushnooma Italia, and Ajit Gorakshakar (2017), National Institute of Immunohematology, Mumbai, India, performed a study that reported evidently that India has a huge burden with an estimated 100,000 patients with beta thalassemia syndrome and around 150,000 patients with sickle cell disease, but few among them are optimally managed, and cell transplants are unaffordable for the majority of families, published in Pediatric Hematology Oncology Journal 2 (2017) 131(6):602-606.

K. Ananth Rao (2018) performed a study on inpatients admitted to the pediatric ward during the period from October 2017 to January 2018 (n = 2055). Out of that, 52 patients were confirmed to have thalassemia. Out of 52 cases, 34 were male children with a minimum Hb gm% of 3.4 and a maximum Hb gm% of 9.4 with a 95% confidence interval of 5.3–6.5. Cases of thalassemia in

females were 18 with a minimum Hb gm% of 3.7, a maximum Hb gm% of 9.8, and a 95% confidence interval of 5.13 - 6.47.The prevalence rates of thalassemia in pediatric inpatient wards were 2.53%, as published in Cont Med A Dent 2018, 12(2):61–76.

Raffaella Origa, Federica Comitini, Galanello, and Origa Orphanet (2010) performed a study on patients and found hemoglobin should be maintained over 10 g/dL to allow normal fetal growth. Chelators are not recommended; nevertheless, it may be reasonable to consider restarting chelation therapy with desferrioxamine towards the end of the second trimester when the potential benefits outweigh the potential fetal risk, as published in Journal of Rare Diseases 2010, 29(2):71–74.

Kirti Grow, Minakshi Vashist, Pankaj Abrol, Shiksha Sharma, and Ritu Yadav (2014) performed a study to assess the burden of hemoglobinopathies (beta thalassemia's) in the Indian population, which showed that hemoglobinopathies and beta-thalassemia are major health problems in India but have received little attention because of other health priorities, such as malnutrition and communicable diseases. Further recommendations to make possible prenatal diagnosis of beta thalassemia in India by direct detection of mutant beta globin genes were published in the International Journal of Pharmacy and Pharmaceutical Sciences 2014, 6(4):389–393.

Asha Baxi, Kaushal Manila, Pooja Kadhi, and Baxi Heena (2013) conducted a study to assess the prevalence of the beta thalassemia trait in pregnant women at a single center in Indore (MP) for a period of 2 years. Blood samples were tested for complete blood count and hemoglobin electrophoresis, which showed that out of the total of 1,006 women screened, 28 women who carried abnormal patterns were detected, as published in Indian J Hematol Blood Transfus 2013, 29(2):71–74.

Marianna Politou *et al.* (2018) performed a study on the deletion of three α-globin genes in hemoglobin H (Hb H) disease. In addition to deletional forms, there are at least 70 forms of non-deletional hemoglobin H disease, which may require occasional or frequent transfusions. A clear phenotype-genotype correlation is found in terms of hemoglobin and reticulocyte values, MCV, bilirubin in children, LDH, and splenomegaly, published in Hindawi Case Reports in Obstetrics and Gynecology 2018, Article ID 8532081. 10.1155/2018/8532081

Ari Indra Susanti *et al.* (2017) performed and showed that low hemoglobin (Hb) or anemia is common among pregnant women in developing countries, which may cause adverse pregnancy outcomes and maternal deaths. Our study aimed to assess the Hb level measured by midwives in a primary health care facility in a rural area of Jatinangor, Indonesia, and to explore whether the

anemia was due to iron deficiency (IDA) or β-thalassemiaa, published in Hindawi Anemia 2017, Article ID 69356488

Poonam Yadav, Seema Kumari, and Vikas Kumar (2017) performed a study on Thalassemia major, also called Cooley's anemia. It has a co-dominant inheritance, and its pathology lies in decreased synthesis of beta chains, resulting in increased production of alpha chains, which subsequently leads to red cell destruction, ineffective erythropoiesis, and anemia.

George Petrakos Panagiotis Andriopoulos Maria Tsironi (2016) performed a study showing that thalassemia intermediate (TI) is a clinical definition that represents a wide spectrum of thalassemia genotypes but mainly includes patients who do not require or only occasionally require transfusion. An uncommon case of a 32-year-old Greek woman, Para 1, at the 22nd week + day 3 of gestation with thalassemia intermedia (she was splenectomized), where her pregnancy was complicated with portal vein thrombosis, splenic thrombosis, and partial HELLP, is described, published in International Journal of Women's Health 2016, 8: 15:4331–4336.

Rationale of the Research

A study undertaken in rural south India sought to determine the prevalence of thalassemia and other hem oglobinopathies among pregnant women.

Every year, around 15,000 infants in India are born with hemoglobinopathy, with more than 9000 childr en suffering from beta-thalassemia major and sickle cell disease.The prevalence of the beta thalassemia trait varies by state, ranging from 1.48% to 3.64%, but the prevalence of the HbE trait was reported to be 3.63%. Furthermore, a hospital-based study found that 5.9% of females examined during the prenatal period had the thalassemia trait.

Objective (s) of the Research

The current retrospective study was designed to assess the prevalence of thalassemia and other hemoglobinopathies in pregnant females from a secondary care referral hospital in south India.

Methodology:

Study procedure

i. Data collection form is designed to collect the datas' for analysis and interpretations.

ii. Diagnosis of thalassemia is done by the identification of an abnormal hemoglobin or elevated levels of HbA2 (≥3.5%) for beta thalassemia carriers and identification of H bodies for alpha thalassemia carriers.

Thalassemia carriers have a reduced mean corpuscular volume (MCV) and mean

1. Corpuscular hemoglobin (MCH). With MCH, 27 pg seems to be the most acceptable cutoff, and 77 fL with MCV.
2. As thalassemia usually presents with a microcytic hypochromic anemia, it needs to be differentiated from iron deficiency anemia.

Various formulae have been used to differentiate between iron deficiency anemia and thalassemia.

Results

Table 1. Demography of study participants

S no	Age Distribution (in years)	Number (N)	Percentage (%)
1	19 - 24	57	40.42
2	25 – 29	45	31.91
3	30 - 34	32	22.69
4	35 - 39	7	4.96
Total		141	100

Index	Formula and significant value
Mentzer index	MCV/RBC, if <13
England Fraser	MCV - (5 × Hb) - RBC - 3.4, if negative value
Shine and Lal	MCV × MCV × MCH/100, if <1530
Bessman	RDW, if <15.5%
RBC count	If >5 million/μL
Green and King	MCV × MCV × RDW/Hb × 100, if <65
Srivastava	MCH/RBC, if <3.8
RDW index	MCV × RDW/RBC, if <220

MCV: Mean corpuscular volume, MCH: Mean corpuscular hemoglobin, RDW: Red cell distribution width, RBC: Red blood cell, Hb: Hemoglobin

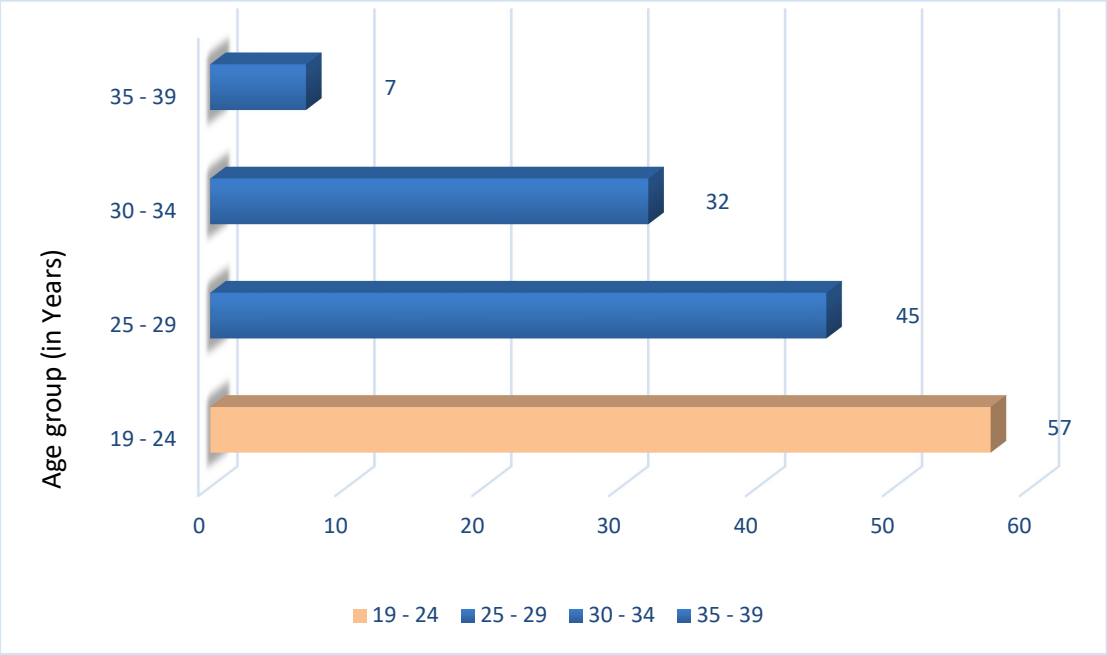


Figure 1. Demography of study participants

Table 2. Category of Thalassemia's in study participants		
Category of Thalassemia	Number (N)	Percentage (%)
Major thalassemia only	92	65.25
Minor thalassemia only	13	9.22
Major thalassemia with hemoglobinopathies (Aplastic anaemia)	4	2.84
Major thalassemia with hemoglobinopathies (Iron deficiency anaemia)	9	6.38
Major thalassemia with hemoglobinopathies (Sickle anaemia)	18	12.77
Minor thalassemia with hemoglobinopathies (Aplastic anaemia)	1	0.71

Minor thalassemia with hemoglobinopathies (Iron deficiency anaemia)	1	0.71
Minor thalassemia with hemoglobinopathies (Sickle anaemia)	3	2.13
Total	141	100

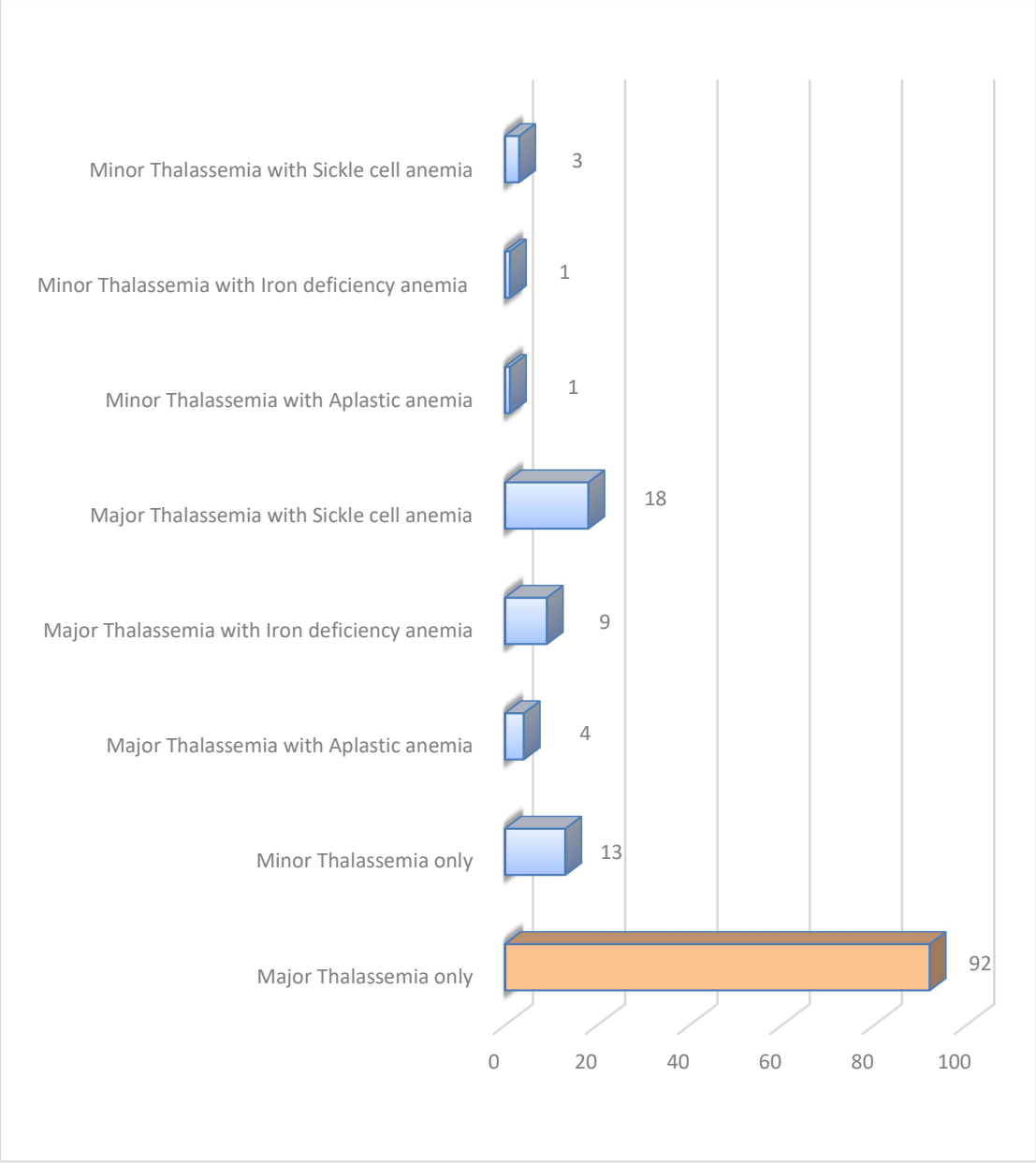


Figure 2. Category of Thalassemia's in study participants

Table 3. Distribution of Hemoglobinopathies in study participants		
Types of Hemoglobinopathies	Number (N)	Percentage (%)
Aplastic anaemia	5	13.89
Sickle anaemia	21	58.33
Iron deficiency anaemia	10	27.78
Total	36	100

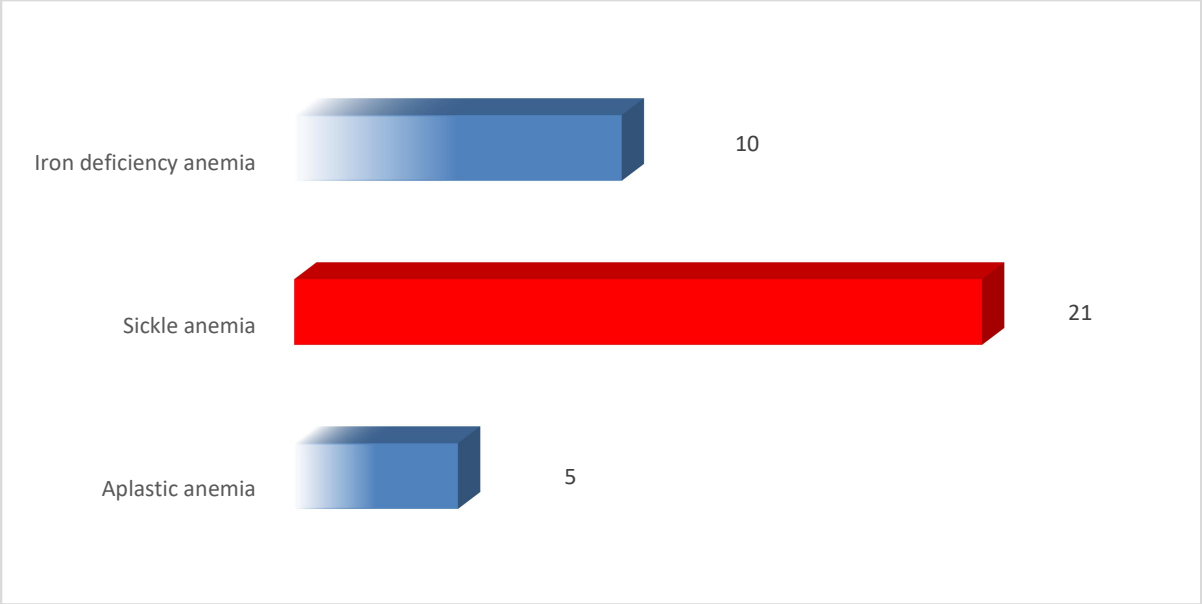


Figure 3. Types of Hemoglobinopathies in study participants

In our retrospective analysis, a total of 141 pregnant women attending the obstetrics and gynaecology department of the secondary referral healthcare facility were identified as having thalassemia and hemoglobinopathies. Among the 141 pregnant women with thalassemia and hemoglobinopathies, 57 (40.42%) were between the ages of 19 and 24. The pregnant women were divided into 8 categories based on the specific types of thalassemia they presented with. Out of these categories, 92 (65.25%) women had major thalassemia alone, while 13 (9.22%) women had minor thalassemia alone. Additionally, 4 (2.84%) women were diagnosed with major thalassemia and hemoglobinopathies causing aplastic anemia, 9 (6.38%) had major thalassemia and hemoglobinopathies causing iron deficiency anemia, and 18 (12.77%) had major thalassemia and hemoglobinopathies causing sickle

anemia. Furthermore, 1 (0.71%) pregnant woman was diagnosed with minor thalassemia and hemoglobinopathies causing aplastic anemia, 1 (0.71%) with minor thalassemia and hemoglobinopathies causing iron deficiency anemia, and 3 (2.13%) with minor thalassemia and hemoglobinopathies causing sickle anemia. In our study, the distribution of hemoglobinopathies among the 141 participants was as follows: sickle anemia accounted for 21 (58.33%), iron deficiency anemia accounted for 10 (27.78%), and aplastic anemia accounted for 5 (13.89%).

Discussion

In Southeast Asia, 4.13% of conceptions are affected by hemoglobinopathies annually; as reported, 90% are beta-thalassemia and 4.3% are alpha-thalassemia. A significant number of pregnant carriers, 8 lakh out of 91 lakh (10%), are from Southeast Asia. Each year, 1.9 lakh pregnancies involve carrier couples, with approximately 30% at risk of having a child with thalassemia. Our research indicates that the majority of individuals affected by thalassemia fall within the 19–24 age group, consistent with the findings of Dewan K. in 2018. Furthermore, our study revealed a higher prevalence of thalassemia major cases in individuals with sickle cell anemia as hemoglobinopathies, aligning with the results of N. Madan in 2010 and the documented information in the Reports.

Conclusion:

Our latest research study has shown results consistent with the Reports, Control of Thalassemia in India, indicating a higher prevalence of thalassemia with sickle cell hemoglobinopathy compared to other thalassemia and hemoglobinopathies. It is evident that thalassemia syndromes are the most common genetic disorders affecting blood and pose a significant threat to public health, particularly for pregnant women and new-borns. Therefore, it is recommended that a continuous awareness campaign be implemented for an effective control program. This program should be closely monitored and evaluated to ensure reliable and cost-effective diagnostic measures, as well as provide unbiased genetic counseling through further extensive research for a positive impact and outcome.

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