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Original Article

Prevalance of Hemoglobinopathies Amongst Pregnant Women in Tertiary Care Hospital, Vadodara

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ABSTRACT

INTRODUCTION: Hemoglobinopathies may be either qualitative or quantitative defects of hemoglobin. The major hemoglobinopathies consist of Thalassemias (mainly alpha and beta) and variant haemoglobins (HbS, HbE, HbD, Punjab etc.). India has the largest number of children with Thalassemia major in the world – about 1to 1.5 lakhs and almost 42 million carriers of Beta thalassemia trait. About 10,000 – 15,000 babies with Thalassemia major are born every year. Pregnancy with hemoglobinopathies are at very high risk.

METHOD: This prospective cross-sectional study was conducted on pregnant females attending ANC (Anti Natal Care) OPD in Dhiraj Hospital, Vadodara for a period of one year (1 year) from July 2022 to July 2023. Consenting participants were interviewed using a pre-constructed questionnaire. All the data were charted and tabulated according to mentioned parameters like Name, Age, Address, Socioeconomic status sibling history, consanguinity, any family history of blood disorder etc.

RESULTS: The total number of pregnant women screened for hemoglobinopathies was 500 from the ANC OPD of Dhiraj Hospital, Piparia from July 2022 to June 2023. 475 out of total 500 women were positive for hemoglobinopathies. Out of these, 86% were positive for sickle cell trait while 7% showed sickle cell disease and 2% were positive for Beta thalassemia trait on the basis of their HPLC test result. In our study majority of Women demonstrated mild anaemia (60%) while Moderate (36%) and severe (4%) anaemia were seen in a total of 40 pregnant women, which is additional finding observed.

CONCLUSION: In the present study, gravid population has higher prevalence of hemoglobinopathy (95%) mainly Sickle cell trait (86%). More efforts are required to increased awareness in high risk populations concerning hemoglobinopathies before in order to control it in India

Key Words: *Hemoglobinopathy, Beta thalassemia trait, Sickle cell trait, Sickle cell disease.*

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INTRODUCTION

Hemoglobinopathies are inherited disorders of red blood cells. Being an important cause of morbidity and mortality, they impose a heavy burden on families and the health sector in our country.

Hemoglobinopathies may be either qualitative or quantitative defects of haemoglobin. The major hemoglobinopathies consist of Thalassemias (mainly alpha and beta) and variant haemoglobins (HbS, HbE, HbD, Punjab etc). In India, major symptomatic hemoglobinopathy disorders are Beta Thalassemia and Sickle Cell Anaemia. They result in clinical syndromes known as Thalassemia Major, Thalassemia Intermedia and Sickle Cell Disease.

India has the largest number of children with Thalassemia major in the world – about 1 to 1.5 lakhs and almost 42 million carriers of Beta thalassemia trait. About 10,000 – 15,000 babies with Thalassemia major are born every year. Sickle cell disease affects many communities in certain regions, such as central India and states of Gujarat, Maharashtra and Kerala. The carrier of frequency of sickle cell gene varies from 1 to 35% and hence there are a huge number of people with Sickle cell disease. [1]

Thalassemias are clinically divided into Thalassemia Major (TM), Thalassemia Intermedia (TI) and Thalassemia Minor or Trait according to severity. Thalassemia Major (TM) and the severe form of Thalassemia Intermedia (TI) constitute the major burden of disease as management of both requires lifelong blood transfusions and iron chelation. While Thalassemia minor is the carrier state in which the person is clinically normal and is commonly referred to as β (beta)Thalassemia Trait (BTT).[1]

The thalassemia syndromes (TM, TI) are caused by inheritance of abnormal β thalassemia genes from both carrier parents, or abnormal β Thalassemia gene from one parent and an abnormal variant hemoglobin gene (HbE, HbS) from the other parent.

Sickle-cell Anaemia (also known as sickle cell disorder or sickle cell disease) is a genetic blood disorder, where the blood cells contain abnormal haemoglobin (HbS) called sickle haemoglobin.

As a result red blood cells which are normally discoid in shape, become sickle shaped when they are exposed to low oxygen levels. The present study was an effort which has been made to assess and identify the pregnant women with hemoglobinopathies in tribal community around Vadodara, Gujarat [2]

AIM: To screen samples of ANC women and find prevalence of hemoglobinopathies among pregnant women.

OBJECTIVES

- To create awareness about hemoglobinopathies in tribal community around Vadodara, Gujarat.
- To survey the common perinatal problems of mother having hemoglobinopathies.
- For prevention of spread of hemoglobinopathies through screening of ANC women and referring them for genetic counselling.

MATERIAL & METHODS

This prospective cross-sectional study was conducted on pregnant females attending ANC (Anti Natal Care) OPD in Dhiraj Hospital, Vadodara, for a period of one year (1 year) from July 2022 to June 2023. Most of patients were from tribal background and lower socioeconomic status.

Before conducting the study, permission from the Human Research Review Penal (HRRP) and Sumandeep Vidyapeeth Institutional Ethics Committee (SVIEC) of SBKSMI & RC was obtained.

Women included in this study were in their steady state for a long period of time without any chronic systemic illness or other diseases which could affect the haematological parameters. Subjects who were not willing to participate were excluded.

Consenting participants were interviewed using a pre-constructed questionnaire. The information like - Name, Age, Address, Socioeconomic status, sibling history, consanguinity any family history of blood disorder etc. were filled according to the proforma. Data was collected and compiled Microsoft Excel.

RESULTS

The total number of pregnant women screened for hemoglobinopathies was 500 from the ANC OPD of Dhiraj Hospital, Vadodara from July 2022 to June 2023.

475 out of total 500 women were positive for hemoglobinopathies. Out of these, 86% were positive for sickle cell trait while 7% showed sickle cell disease and 2% were positive for Beta thalassemia trait based on their HPLC test result.

Table 1. Distribution of hemoglobinopathy based on HPLC finding

Hemoglobinopathy	No. of women	Percentage (%)
Sickle Cell Trait (SCT)	430	86%
Sickle Cell Disease (SCD)	35	7%
Thalassemia Trait	10	2%
Normal	25	5%

Additional findings apart from hemoglobinopathies, nutritional anaemia was very much prevalent in and largely neglected due to lack of education amongst pregnant women, although these results were not followed up further.
All the data collected was charted and tabulated according to mentioned parameters: Age, Severity of Anaemia, Age wise distribution of anaemia, distribution of hemoglobinopathy based on HPLC findings and Anaemia with age wise distribution.

Table 2. Age of pregnant women in study population

Age (in years)	No. of females (Total 500)	Percentage (%)
<= 20	125	25%
21-25	270	54%
26-30	80	16%
31-35	20	4%
> 35	5	1%

Our study showed that highest percentage of pregnant women consenting to be a part of our study belonged to a younger age group (21-25 years) while percentage of women who were of more than 35 years of age were very less

Table 3. Severity of Anaemia in study group

Degree of Anaemia (Hb level)	No. of females (Total 500)	Percentage (%)
Mild (10.0 – 11.9 g/dl)	300	60%
Moderate (7.0 – 9.9 g/dl)	180	36%
Severe (< 7.0 g/dl)	20	4%

Majority of Women in our study demonstrated mild anaemia (60 %) while Moderate (36 %) and severe (4%) anaemia were seen in a total of 40 pregnant women. Thus, the percentage of pregnant women having mild anaemia is much more higher than the pregnant women having moderate and severe anaemia.

The prevalence of sickle cell trait in the study conducted by us is 86%, that of sickle cell disease is 7% and that of Thalassemia trait is 2%. The percentage of pregnant women having sickle cell trait is higher than those having sickle cell disease or thalassemia trait.

Table 4. Anaemia with age wise distribution

Sr. no.	Age (years)	Degree of Anaemia			
		Mild No.	Moderate No.	Severe No.	Total numbers of women (500)
1	<20	90	30	5	125
2	21-25	150	110	10	270
3	26-30	50	25	5	80
4	31-35	5	15	0	20
5	>35	5	0	0	5
Total		300	180	20	500

There was a significant association observed between mother's age group and severity of anaemia in our study. It was found that most of the pregnant women with mild anaemia belong to a younger age group (21-25 years) and the same age group had the highest number of pregnant women with moderate and severe anaemia.

DISCUSSION

Hemoglobinopathies though are common worldwide, but some geographic areas and some populations have a higher prevalence comparatively.In India, according to hospital based study, average frequency of sickle cell gene is around 5%, while in Gujarat alone it is 6.4%.

The article by Colah et al reported that antenatal screening is acceptable in India; however, awareness generation is still a primary requisite. Several programs, with the aim of preventing homozygous β-thalassemia, based on carrier screening and counselling of couples at marriage, preconception or early pregnancy, are operating in several at-risk populations in Mediterranean areas.[1]

The prevalence of sickle cell carriers among different tribal groups varies from 1 to 40 percent. [4]

Further, 27 of the 45 districts in Madhya Pradesh fall under the sickle cell belt and the prevalence of HbS varies from 10 to 33 percent. [4] It has also been estimated that 13,432 pregnancies would be at risk of having a child with sickle cell disease in this state and the expected annual births of sickle homozygotes would be 3358. [5]

High prevalence of sickle gene has been established in various tribal communities of Gujarat including Bhils and Dhodias of Panchmahal, Dhanka, Gamit, Vasava, Bariya, Varli, Vaghari, Kukna, Halpati, Dublas, Naikas, Koli, Chaudhari etc. [6]

Tribal population accounts 15 % of the total population of Gujarat and distributed in various districts of the state such as Sabarkantha, Banaskantha, Panchmahal, Vadodara, Narmada, Bharuch, Surat, Valsad, Dang and Div-Daman [6 - 8]

CONCLUSION

Studied gravid population has a higher prevalence of hemoglobinopathy (95%) mainly Sickle cell trait (86%). When it comes to prevalence of hemoglobinopathies, there are a certain limitation yet to be fulfilled like there is a need for more screening of the whole population with help of such studies and creating a better future for the high risk communities.

One of the most effective approach to this problem in India is by increasing the awareness amongst women and high risk communities, screening and literacy as well as motivating parents to seek genetic counselling and promote proper and efficient health education of prenatal diagnosis and inheritance in high risk communities. More efforts towards awareness and education are needed in order to control hemoglobinopathies in India.

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