

Prevalence of Beta-Thalassaemia Trait and Sickle Cell Trait In-Gujarat-India

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Abstract:

BACKGROUND: Hemoglobinopathy is group of diseases characterize by abnormality all quantitative and qualitative through synthesis of hemoglobin. Hemoglobinopathies consist of sickle cell anaemia (SCA), Beta-thalassaemia Trait (BTT). In the world, they are responsible for the largest number of genetic disorders and hence are of great public health hazardous. In Yemen & India major concerned haemoglobinopathy disorders are sickle cell anaemia and β -thalassaemia. Examination of 100 individuals showed high incidences for hemoglobin variants, HbS and Hb β^T in different ethnic groups, the frequency being varies from 0% - 3% and 0% - 3% respectively.

OBJECTIVE: To detection the prevalence of different hemoglobinopathies particularly beta-thalassaemia trait (BTT) and sickle cell trait (SCT) and find out the incidence of anemia in them.

MATERIAL AND METHODS: The present study screened 100 samples of students from Shree P.M. College of Paramedical Science and Technology Anand-Gujarat. Blood samples were initially tested by using an Automated Cell Counter (CBC), Peripheral Smear (Field Stain), Solubility Test. Samples having abnormal of morphology and MCV (≤ 78), MCH (≤ 28) and/or positive solubility test were comforted by Hb electrophoresis on cellulose acetate membrane(pH 8.6). Hb A2 level $\geq 3.5\%$ was considered as diagnostic for BTT and present HbS was considered as diagnostic for SCT.

RESULT: Overall prevalence of BTT and SCT in Anand-Gujarat was 3% and 3% respectively.

CONCLUSION: Study suggests that BTT and SCT is the most prevalent haemoglobinopathy in Gujarat therefore we have to do screening before marriage.

Keywords: Hemoglobinopathy, Prevalence of Sickle Cell Trait, Thalassaemia Trait, Hemoglobin Electrophoresis, Postgraduate of Sardar Patel University-Anand-Gujarat-India.

Introduction:

Haemoglobinopathies are group of diseases characterized by abnormalities both quantitative (thalassaemia syndromes) and qualitative (sickle cell anaemia) in the synthesis of haemoglobin.⁽¹⁾ Which is considered the most common inherited disorders in human and results from genetic mutation in one or more genes.^(2,3)

Hemoglobinopathies are diagnosed by a complete blood count (CBC) and electrophoresis testing to confirm the amounts of different kinds of hemoglobin. Follow up genetic testing on family members may also be performed.^(1,3)

In India, they are responsible for the largest number of genetic disorders and hence are of great public health hazardous, major concerned haemoglobinopathic disorders are sickle cell anaemia and β -thalassaemia.⁽¹⁾

Thalassemia disease and Sickle cell disease are genetic conditions that inherited. They are examples of autosomal recessive conditions.⁽⁴⁾

Hemoglobinopathies are more common in Gujarat compared to other Indian states.⁽⁵⁾

Materials and Methods:

The present study, out of 100 random students at Shree P.M. Patel College of Paramedical Science & Technology, SPU. Anand city, Gujarat - India. Necessary permission was obtained from the university & college principals. An informed consent was taken from all students who participants. The information like name, age, sex, address, religion, caste, sub-caste, previous transfusion history etc. was filled in forms.

Two and half ml of blood sample was collected in EDTA tubes. All the samples were tested for red blood cell indices by an automated cell counter (MEK-6318 or MEK-5216k), Peripheral blood smear and stained by Field Stain to identify of morphology of RBCs, solubility test was carried out on all samples to identify subjects suspected to have SCT or Sickle cell disease (SCD). All samples having Mean cell volume (MCV) ≤ 78 fl and/or Mean cell hemoglobin (MCH) ≤ 28 pg were investigated for HbA2 and positive solubility test were investigated for Hb S by Hb-electrophoresis at pH 8.6 at Surat Raktadan Kendra & Research Centre (Regional Blood Transfusion Center) in Gujarat- India.

Results:

Total 100 students were screened for BTT and SCT during the period of study. Out of them, 94 were normal and 6 had various types of hemoglobinopathies.

Table 1 showed: The prevalence of **BTT** about 3% and SCT about 3% Conformable previous studies and normal case is 94%.

Table 1: Prevalence of (BTT& SCT) and normal case.

Total samples	(BTT& SCT)	%	Beta- Thalassemia trait(BTT)	%	Sickle cell trait (SCT)	%
100	6	6	3	3	3	3

Figure 1: Prevalence of (BTT& SCT)

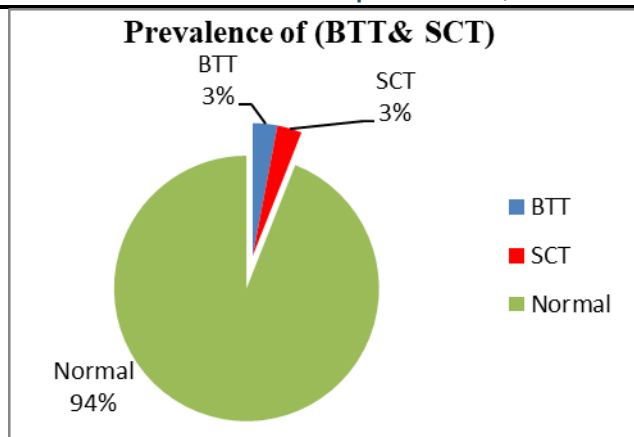


Table 2 showed : The prevalence of BTT in Hindu population is 1 (1.1%) while SCT is 3 (3.3%) and BTT in Muslim population is 2 (25%) while SCT is 0 (0%) but in Christian population Prevalence of (BTT& SCT) is 0 (0%) as shown in the table 4.

Table 2: Prevalence of BTT and SCT in different Religions.

Religion	Total Number	Beta- Thalassemia Trait (%)	Sickle Cell Trait (%)	Total Condition BTT & SCT (%)
Hindu	90	1 (1.1%)	3 (3.3%)	4 (4.4%)
Muslim	8	2 (25%)	0 (0%)	2 (25%)
Christian	2	0 (0%)	0 (0%)	0 (0%)
Total	100	3 (3%)	3 (3%)	6 (6%)

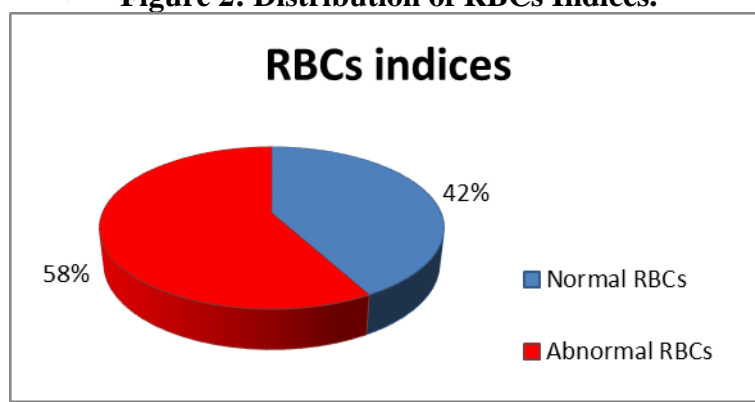
Table 3: Showed: The: Various Hematological Parameter Studies in Normal Subjects (N = 94)

No. sub	Hb Mean \pm sd	RBC Mean \pm sd	HCT Mean \pm sd	MCV Mean \pm sd	MCH Mean \pm sd	MCHC Mean \pm sd	RDW Mean \pm sd
94	11.4 \pm 1.8	4.4 \pm 1.2	33.7 \pm 4.2	79.7 \pm 10.2	27 \pm 4.4	33.6 \pm 1.9	14.1 \pm 1.2

Table 4: Distribution of Cases Depending on the RBCs Indices (CBC test)

Total samples	Normal RBCs Indices	Abnormal RBCs Indices	Female	Mal
100	42	58	53	5

Figure 2: Distribution of RBCs Indices.



Discussion:

The first step in population screening for Beta-thalassemia trait and sickle cell trait is the accurate complete blood count. MCV \leq 76 fL and MCH \leq 26 pg indicate possibility of BTT and should be further screened for HbA2 level, solubility test positive indicate possibility of SCT.

Table 4; In our study, majority (58%) of students' samples showed 58 samples abnormal of RBCs indices (Hb <11 g/dL, RBC count elevated, HCT decrease, MCV < 80, MCH < 28, MCHC < 30, RDW increase), but cellulose acetate membrane electrophoresis and HPLC confirmed BTT only in 3 % subjects and SCT 3 % also (figure 2).

The mean \pm SD Hb concentration in non BTT/non-SCT Anand city individuals was 11.4 ± 1.8 ; hence, iron deficiency may not be present in all those having low indices (table 3).

Fifty three female students have been abnormality in RBCs indices may be indicator to malnutrition, other type of anemia especially they are vegetarian.

Has been shown in a previous study in Gujarat the prevalence of BTT in varies between 3-17% and SCT varies between 0 to 31.4% among different tribes.⁽¹⁾ In the result of this study; the prevalence of BTT about 3% and SCT about 3% also, conformable previous studies as shown in the (Table 1).

BTT and SCT are the most prevalent hemoglobinopathies in South Gujarat; it is 6% in Gujarat which is relatively compatible to WHO report. Table 2 shows BTT in Muslim population more than in Hindu population may be due to consanguineous marriages, to avoid these cases we have to do screening hereditary diseases before marriage but SCT in Hindu population more than in Muslim population. The high prevalence may be India have an uneven distribution of carriers because their populations include different ethnic groups (with different carrier rates, types of haemoglobinopathy and mutations) that have become co-located as a result of migration, different religions and different ancestries and Since (BTT, SCT) have no symptoms and because of the complexity and heterogeneity of the disease it is difficult to diagnose. Although India is one of the richest countries in the world possess all sources of food necessary for the body of the wealth of plant and animal and weather appropriate, but there are a lot of people (58%) are suffering from deficiency of hemoglobin level and disorders in RBC indices. This is due to the different religions that prohibit certain foods.

Conclusions:

Study suggests that (BTT, SCT) are the most prevalent hemoglobinopathies in Anand-Gujarat. The prevalence is high therefore screening of (BTT, SCT) is compulsory before marriage to avoid inherits of hemoglobinopathies disorders and community also needs Beta-thalassemia and iron study.

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