Prevalence Of Anemia, Thalassemia And Sickle Cell Disorder In Young Adults Of Gujarat

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Abstract : **Background & objectives**: Anemia is considered as important clinical manifestation of haematological and non-haematological disease while thalassemia and sickle cell disease considered now as genetic disorders. The purpose is to investigate prevalence of anemia, β-thalassemia trait and sickle cell trait. **Materials & Method**: The present study was carried in 250 medical students (194 male & 56 female) for screening of for anemia, β thalassemia trait and sickle cell trait with help of tests like Haemoglobin estimation, Peripheral blood smear examination, NESTROFT and Dithionate turbidity test[5,6] and Hb electrophoresis. **Results**: The prevalence of anemia was higher in female 25 (44.6%) as compared to male medical students 59 (30.4%) & difference was statistically significant ($p<0.05$) but anemia detected in male & female medical students was not correlated with MCV & PCV value ($p>0.05$). Only 2 (1.03%) male shows β thalassemia trait and sickle cell trait while in case of female 2 (3.57%) shows prevalence of β thalassemia trait & 1 (1.7%) shows prevalence of sickle cell trait. **Conclusion**: Knowledge of heterozygote for β-thalassemia trait and sickle cell trait impart great impact on society for genetic counselling and prevention of their offspring became homozygote for thalassemia major and sickle cell disease. Also evaluate sensitivity of simple screening test like NESTROFT and dithionate solubility test for detection of β-thalassemia trait and sickle cell trait. [Shiladaria P et al NJIRM 2013; 4(4) : 61-63]

Key Words: Anemia, Thalassemia, Sickle cell disease, Hb electrophoresis.

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Introduction: Anemia is a clinical sign define as a reduction in the oxygen carrying capacity of blood, usually as a result of reduction below normal limit of the total circulating red cell mass.[1] This reduction is reflected by lower than normal hematocrit and hemoglobin concentration. The limits of normal range depend on the age and gender of the subject as well as their attitude of resistance.[2] In most anemia erythropoietin production and erythropoiesis are increased.

For practical purposes three measurements are used to establish the presence of anemia-hemoglobin level, hematocrit and RBC number. In the past these parameters were measured by using manual, physical and chemical technique but now this assay are determined by electronic hematologic cell counters, which is convenient, cost-effective and reliable measure of anemia.

Anemia are viewed differently by different specialists and classified according to etiological, morphological, pathololological and red cell indices basis. Thalassemia is considered the most common disorder world wide. The primary defect is quantitative one with deficient synthesis of one or more globin sub-units of normal human hemoglobin. According to the chain whose synthesis is impaired, the thalassemia are designated as –α, β, δ, δβ thalassemia. In the last few years application of recombinant DNA technology has permitted the understanding of basic aspect of gene structure, function and molecular basis of thalassemia.[3]

Sickle cell disorder is a hereditary hemoglobinopathy resulting from point mutation of globin gene, is associated with substitution of valine with glutamic acid at 6th position of β globin chain[4]. High prevalence of sickle cell gene has been found in tribal population of community of Gujarat-like Bhils, Dhodias, Kolis, Dhankers, Gamits, Vasava, Bariya, Tadvi, Rathore and Chaudhry.

Material & Methods: Permission of institutional review board taken. A total 250 medical students (194 male and 56 female) from different regions of Gujarat were taken as study sample & following investigations were carried out:

1. Hemoglobin estimation was done by cyanmethemoglobin technique on Corona digital hoto colorimeter and counter checked on Abott cell dyn-1700, an automated cell counter.

2. Peripheral blood smear examination using Leishman's stain.
3. Screening test for thalassemia minor and sickle cell trait, NESTROFT and Dithionate turbidity test[5,6.]
4. Hb electrophoresis on those samples positive on screening test using cellulose acetate membrane and HbA2 estimation by elution.

Result & Discussion: In present study prevalence of anemia in female 25 difference was statistically significant ($p<0.05$) but anemia detected in male & female medical students was not correlated with MCV & PCV value ($p>0.05$) [Table I] which is similar to study done by Cunnigham[7] & Oski FA[8] showing prevalence of anemia 34.2% and 39.5 % respectively. (44.6%) & male medical students 59 (30.4%) & The NESTROFT test is highly sensitive for detection of β thalassemia trait in peripheral laboratories and for mass screening programs to detect β thalassemia trait. In our study only 2 (1.03%) male & 2 (3.57%) female shows β thalassemia trait [Table II] which is comparable to study done by Ambek et al[10] showing frequency of β thalassemia trait in various states of India (In Maharashtra 7.04%, Sindh 10%, Punjab 6.5%, Tamil Nadu 8.4%, Gujarat 10-15% & in India average frequency is 3.3%).

Table I :
Anemia in Male & Female Medical Student with Hemoglobin Concentration & Correlation with MCV & PCV

	Anemia [Hb<13gm/dl for male & <12gm/dl for female]	MCV <76fl microcytic anemia	MCV 76-96fl normocytic anemia	MCV >96fl macrocytic anemia	PCV <42%	PCV 42-52%
Male , N=194	59	47	12	nil	47	12
Female, N=56	25	18	7	nil	18	7
	X^2 : 4.54, p value: 0.033	X^2 : 0.588, p value: 0.44			X^2 : 0.588, p value: 0.44	

Table II : NESTROFT & Solubility Screening Test for β Thalassemia Trait & Sickle Cell Trait among 250 Medical Students

Type of tests	No. of +ve results	Hb electro phoresis	HbA2 within normal limits	HbA2 > 3.5%
NESTROF test* N=250	23	HbA2 band	19	4
Solubility test N=250	3	HbS band	-	-

* X^2 : 1.09, p value: 0.24

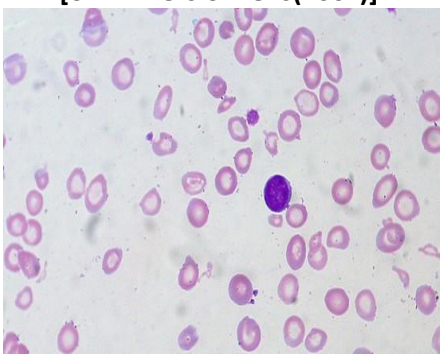
The prevalence of sickle cell trait was seen only in 2 (1.03%) male & 1 (1.7%) female medical students [Table III] which is much less as compared to study done by S V Kerman et al[2](18.05%) & Vyas et al (19.15%). The prevalence of sickle cell triait was low in present study because study was not conducted in targated population were prevalence were high.

Table III : Sex Wise Distribution Of Number & Percentage of Prevalence of Anemia, β Thalassemia Trait And Sickle Cell Trait in Male & Female Medical Student

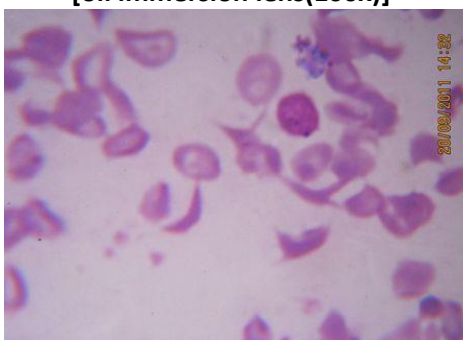
Sex N=250	No. of anemic cases	Confirmed positive cases of β thalassemia trait	Confirmed positive cases of sickle cell trait
Male n=194	59 (30.4%)	02 (1.03%)	02 (1.03%)
Female n=56	25 (44.6%)	02 (3.57%)	01 (1.7%)
		X^2 : 0.12, p value: 0.578	X^2 : 0.25, p value: 0.61

Conclusion: The study shows Anemia is more prevalant in female (44.6%) as compare to male student (30.4%). No significant difference in prevalence of β-thalassemia trait between male (1.03%) and female (1.71%). The prevalance of sickle cell trait slightly higher in female (3.57%) as.

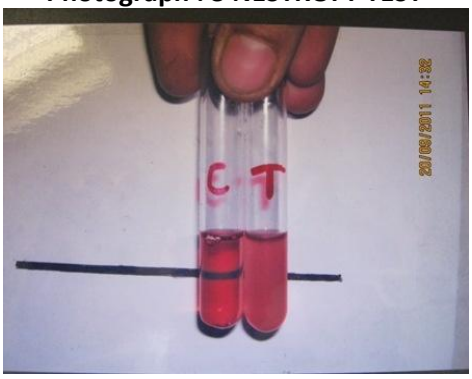
Photograph :1 Microcytic Hypochromic Anemia [oil immersion lens(100x)]



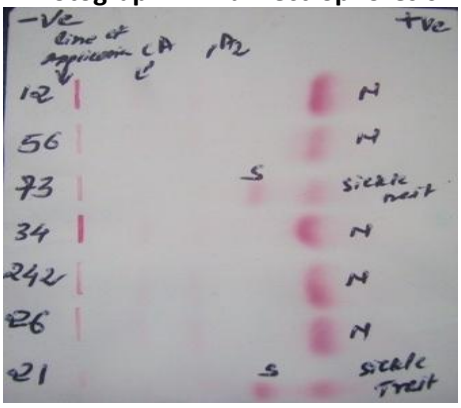
Photograph :2 Sickle Cell Anemia [oil immersion lens(100x)]



Photograph : 3 NESTROFT TEST



Photograph : 4 Hb-Electrophoresis



compare to male (1.03%). The NESTROFT and Dithionate solubility tests are sensitive test for mass screening of general population for β-thalassemia trait and sickle cell trait

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