Sickle cell disease status among school adolescents and their tribal community in South Gujarat

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Citation

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Abstract

Objectives: to create awareness, to screen samples of school adolescents and then to reach their community through them by doing surveillance for sickle cell diseaseDesign: Field based cross-sectional studySettings: St Xavier`s high school and Vanraj high school of Umarpada taluka of Surat district. Subjects: School adolescents, their parents and friendsMethod: After taking permission from school authority, blood samples of 948 school adolescents were taken for DTT test and then for electrophoresis. Blood samples of motivated parents and friends of those adolescents found positive for DTT was taken in subsequent visit and results were communicated to them.Results: Blood samples of 948 school adolescents, out of 1081 were tested for DTT test. It was positive in 242 samples, giving a prevalence of 25.5% for sickle cell disease. On subjecting the positive blood samples to electrophoresis, the proportion of sickle cell trait and sickle cell disease was found to be 92% and 8% respectively. Then electrophoresis was done in 64 parents and friends, 24 (37.5%) of them were found positive of which, 14 (58%) were having sickle cell trait and 10 (42%) having sickle cell disease. Conclusion: approaching community can be possible through school adolescents for conduction of surveillance of sickle cell anemia

Source of funding: Study was done as part of sickle cell disease programme in the south Gujarat region

INTRODUCTION

Sickle cell disease is an autosomal recessive genetically transmitted hemoglobinopathy responsible for considerable morbidity and mortality (1). It is one of the most common hereditary diseases occurring worldwide, which may affect any organ or system of human body. It is irreversible, untreatable health problem predominantly seen amongst various tribes. With its present rate of spread, in another 25-40 years, over 150 lakh children will suffer and die of sickle cell disease, and over 300 lakh person will inherit the abnormal hemoglobin trait (2). In India the Hemoglobin S (Hb S) was first detected in Veddoid tribe in Nilgiri hills of Tamilnadu and later discovered in other states (3). The incidence varies from 5 % to 34 % and it is mainly restricted to the tribal population (4). High prevalence of sickle gene has been demonstrated in various tribal communities of Gujarat including Bhils and Dhodias of Panchmahal, Dublas, Naikas, Koli, Dhanka, Gamit, Vasava, Bariya, Varli, Vaghari, Kukna, Halpati, Chaudhari etc (5). Tribal 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 (2).

Sickle cell disease carriers are absolutely normal and healthy, unless they have a special blood test investigation electrophoresis for Hemoglobin S. Confirmation of patient suffering from sickle cell disease is carried out only by laboratory investigation. Therefore, blood examination of community at large is needed to estimate the load of cases and carriers of sickle cell disease. In present study an effort has been made to assess the prevalence of sickle cell disease by using Dithionate Tube Turbidity (DTT) test in school adolescents and then subsequently electrophoresis test among those found positive for DTT test to confirm their status as Sickle Cell Trait or Sickle Cell Disease and then reaching to community through them for identification of people suffering from sickle cell disease or the carriers of sickle cell disease.

MATERIAL & METHOD

This study was done with objective to create awareness, to screen samples of school adolescents and then to reach their community through them by doing surveillance for sickle cell disease. Present study was done in Umarpada taluka of

Surat district in South Gujarat region, which has a predominant tribal population (85-95%). Sickle cell disease (SCD) is a most common genetic disease and major health problem found in tribal population of South Gujarat region. Approval was taken from ethical committee of Government Medical College, Surat before conducting study on school adolescents. Study was conducted with purposive sampling selecting two main schools of this taluka namely St. Xavier`s High School and Vanraj High School having more than 90% students from tribal community. Permission was taken from school authorities to conduct the study. Schools were selected in such a manner that they represent adolescents of tribal population in their area. Data was collected during September & October 2006. Study subjects were school adolescents of 8^{th} to 12^{th} standard as they can understand and disseminate the information about sickle cell disease to their community at large after getting tested for sickle cell disease and getting adequate education about the same. School authorities were informed in advance and date was fixed for both the schools to collect the data and blood samples.

During first visit of schools, total 948 school adolescents out of 1081studying in 8^{th} to 12^{th} standard in St Xavier`s and Vanraj High School were present. So study was conducted in these 948 school adolescents. A lecture was delivered on various aspects of sickle cell disease and also a printed booklet in local language (Gujarati) was given to school adolescents during first visit of these schools. They were motivated to come forward for giving their blood samples. The blood samples were collected by trained personnel after taking their informed consent. All students present on the day of visits to each school have participated in the study. Total 948 samples were collected and sent to Department of Pathology, Government Medical College, Surat for Dithionate Tube Turbidity (DTT) test. Those found positive for DTT test, were further analyzed by electrophoresis to confirm their status as either sickle cell trait or sickle cell disease.

Though present study was cross sectional, second visit was made in same schools later on after getting results of DTT test and electrophoresis test. In second visit, all those adolescents, found positive (242) were contacted in school. Their status on sickle cell disease was communicated to them and also motivated to come with their parents and friends in next visit. The date for third visit was decided and communicated to these school adolescents. In third visit, blood samples of motivated parents and friends of those found positive came to school was collected. They were also tested for their status and informed in next visit. Health education regarding symptomatology, clinical management and treatment, laboratory investigation, care of patient and carrier, and marriage counseling was also given to them. After data collection, data was entered and analyzed by using Epi Info software version 6.04.

RESULTS

Out of 1081 total registered adolescent students of 8^{th} to 12^{th} standard studying in St Xavier`s and Vanraj High School, the proportion of tribal students, in these schools was 239 (94%) and 764 (92.4%) respectively.

Figure 1

Table I Tribal caste wise distribution of school adolescents participated

Caste	Boys		Girls		Total	
	No.	%	No.	%	No.	%
Vasava	400	86.8	359	85.5	759	86.2
Chaudhari	17	3.7	32	7.6	49	5.5
Gamit	5	1.0	7	1.7	12	1.4
Dhodias	2	0.4	1	0.2	3	0.3
Others	37	8.0	21	5.0	58	6.6
Total	461	52.3	420	47.7	948	100

During first visit of schools, total 948 students were present out of 1081 students. So study was conducted in these 948 school adolescents. The overall mean age was 14.94 + 1.68 for these school adolescents. As shown in table 1, majority of school adolescents (86.2%) belong to Vasava caste and 5.5% belong to Chaudhary caste. Only 6.6% adolescents belong to non tribal community, while remaining 93.4% study adolescents belong to tribal community.

Figure 2

Table II Result of Dithionate Tube Turbidity (DTT) Test for sickle cell status among school adolescents

Standard	No. of students registered	No. of students whose blood sample was tested	Coverage %	Point Prevalence of sickle cell carrier	
				No.	%
8	341	310	90.9	69	22.2
9	212	184	86.8	52	28.2
10	137	119	86.7	30	25.2
11	238	212	89.0	54	25.5

Blood samples of 948 (87.7%) school adolescents were collected out of 1081 registered students. These adolescents

were tested for sickle cell disease by using Dithionate Tube Turbidity (DTT) test. Table 2 shows that 948 adolescents were tested and among them 25.5% (n=242) adolescents were found positive for sickle cell disease. Those who were found positive for DTT test were further tested for their sickle cell status whether trait or disease by using electrophoresis technique.

Figure 3

Table III Caste wise distribution of school adolescents showing their status of sickle cell trait or disease as per electrophoresis result

Caste	DTT positive	Sickle Cell Trait		Sickle Cell Disease		Total Positive	
		No.	%	No.	%	No.	%
Vasava	218	201	83.1	17	7.0	218	90.1
Chaudhari	17	15	6.2	2	0.8	17	7.0
Gamit	5	5	2.1	0	0	5	2.1
Dhodias	2	2	0.8	0	0	2	0.8
Others	0	0	0.0	0	0	0	0
Total	242	223	92.2	19	7.8	242	100

As shown in table 3, 92% adolescents have sickle cell trait and 8% have sickle cell disease. Among all the tribal castes, majority (90%) of the adolescents belong to Vasava community, followed by Chaudhary (7%), Gamit (2.1%) and Dhodias (0.8%). Out of 64 motivated parents and friends, blood samples of 47 parents and 17 friends tested further by electrophoresis. Among these, majority (95%) belongs to Vasava community (table 4). All positive results for either sickle cell trait (58.3%) or disease (41.7%) were found in Vasava community.

Figure 4

Table IV Caste wise distribution of parents and friends of positive school adolescents showing their status of sickle cell trait or disease as per electrophoresis result

Caste	Screened		Sickle Cell Trait		Sickle Cell Disease		Total Positive	
	No.	%	No.	%	No.	%	No.	%
Vasava	61	95.2	14	58.3	10	41.7	24	100
Chaudhari	1	1.6	0	0	0	0	0	0
Gamit	1	1.6	0	0	0	0	0	0
Dhodias	1	1.6	0	0	0	0	0	0
Total	64	100	14	58.3	10	41.7	24	100

DISCUSSION

If any person has sickle cell disease, he/she should learn as much about the disease as possible. This will help him/her to recognize early signs of problems, such as fever or chest pain, and seek early treatment. Centers and clinics for sickle cell disease diagnosis can provide information and counseling to help the parents to handle the stresses in coping with this serious chronic disease. School-aged children and adolescents should participate in physical education. School teachers can support such children with sickle cell disease to rest if they are tired and to drink fluids after exercise. Many non governmental and voluntary organizations working for sickle cell anemia and identification work are doing camps, where large number of people gathers, and their blood samples are collected to carry out laboratory investigation but that`s all on temporary basis. Unfortunately neither the diagnostic nor the treatment facilities are available in tribal area and all this are beyond their reach. Without diagnosis and comprehensive care, children suffer crippling medical problem leading to lack of education, employment opportunities and integration into the society.

In present study, majority (86.2%) of the adolescents belong to Vasava community, followed by Chaudhary, Gamit and Dhodias. These are the main tribal communities of south Gujarat region. Sahu T et al (6) has reported Raita, Sabar, Beera, Mandal, etc tribal community in their study in south Orissa. Balgir R S et al (7) has reported sickle cell disease in Bhuyan and Kharia tribes of north-western Orissa.

Present study has reported 25.5% prevalence of sickle cell disease in school adolescents. These adolescents were DTT test positive. Patel J (8) in his study reported similar prevalence of sickle cell disease among tribal community in another part of Gujarat. Saxena D (9) has reported 1.8% prevalence of sickle cell disease among school children in same study area. Kamble M et al (1) has reported 5.7% prevalence of sickle cell disease in their study of central India. The difference could be explained by statement made by Italia Y (4), who has reported prevalence of sickle cell anemia varying from 5% to 34% from different parts of Gujarat.

Majority (90%) of the adolescents found positive for sickle cell trait (83%) or disease (7%) belong to Vasava community, while Dalal M (10) has reported 18.4% prevalence of sickle cell trait in Dhodias in South Gujarat region. The variation in proportion of people with different communities depends on their distribution. Meta-analysis may be done to detect overall frequency and distribution of sickle cell disease in different tribal population of Gujarat.

When 242 adolescents positive for DTT test were motivated, 47 parents and 17 friends came forward for their blood investigation. Out of 64, sickle cell trait was found positive in 14 (58.3%) and sickle cell disease in 10 (41.7%). Ambekar S S et al (11) used electrophoresis for diagnosis of SCD in their study in Western Maharashtra. The highest frequency of sickle cell gene in India is reported in Orissa followed by Assam, Madhya Pradesh, Utter Pradesh, Tamilnadu and Gujarat (12). Patel A B et al (13) reported older age of presentation, absence of sever anemia, male preponderance in their study. It indicates limited availability of health services, education and counseling available to susceptible populations (14), which was also observed in present study. People who received information through lectures, booklets, pamphlets, teachers or friends, are more likely to show their interest to know their sickle cell status then those who did not receive information (15). So, more population can be covered if efforts are made to reach community through school adolescents by giving information and education to them.

CONCLUSION

It can be concluded that approaching community can be possible through school adolescents for conducting surveillance of sickle cell anemia. As it was a small study, similar study of large size can be repeated by regular and planned visit to school adolescents. A new method may be developed for approaching community through school adolescents.

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