Original Research Article

Prevalence of sickle cell disease in tribal peoples of Valsad district region in Gujarat, India

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Abstract

Background: 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. The present study was conducted with an objective to document the prevalence of sickle cell diseasein Valsad district of Gujarat state. **Methodology:** The study is conducted as a retrospective survey in GMERS Medical College and hospital, Valsad between January 2015 to December 2016 were screened for sickle cell anemia by sickling test (with freshly prepared sodium metabisulphite). Those found positive for sickling test, were further analyzed by HPLC (high-performance liquid chromatography) to confirm their status as either sickle cell trait or sickle cell disease. **Results:** Out of 1186 cases number of male cases were 277 (23.35%) and females were 909 (76.64%) cases. The gender distribution of male to female cases is 1:3. 88.7% cases were sickle cell trait, 9.02% cases were sickle cell disease, 1.68% cases were sickle beta thalassemia, 0.25% cases were B Thalassemia Minor and 0.33% cases were B Thalassemia Major. In the present study, among the 1186 cases, 397(33.47%) were from Patel (Dhodia) community, 97 (8.17%) were from varli community, 57(4.8%) were from Halpati community and 51(4.3%) were from Dhodi community followed by other backward community. **Conclusion:** It was concluded that Dhodias, Varli, Halpati and Dhodi were the most common community of sickle cell disorders in tribal peoples of Valsad district. Among the Sickling test positive cases, Sickle cell trait and sickle cell disease was the most common variant.

Keywords: Sickle cell disease, Tribal community, Valsad.

Introduction

The inherited disorders of blood include hemoglobino-pathies which are one of the major public health problems in India[1]. Sickle cell disease is the second most common hemoglobinopathy next to Thalassemia in India [2]. There is a high prevalence of Sickle cell disease in the socio-economically backward groups in India. It is highly prevalent among Scheduled Caste, Scheduled Tribe, and Other Backward Class (10%)[3].

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, Chaudharietc [4]. 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 [5]. The present study was conducted with an objective to document the prevalence of sickle cell diseasein Valsad district of Gujarat state.

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Materials and Methods

The study is conducted as a retrospective survey in a hospital setting. All tribal patients who attended the GMERS Medical college and hospital, Valsad or the state hospitals, PHCs of Valsad district between January 2015 to December 2016 were screened for sickle cell anemia by sickling test (with freshly prepared sodium metabisulphite).

The blood was collected under all aseptic precautions. 2 ml of blood was drawn from antecubital vein by clean venepuncture from each patient with a sterile plastic syringe and collected in an EDTA (anticoagulant) tube

for determination of investigations like Sickling test, Reticulocyte count. Those found positive for sickling test, were further analyzed by HPLC (high-performance liquid chromatography) to confirm their status as either sickle cell trait or sickle cell disease.

Details were also recorded including age, sex, clinical and laboratory parameters. Categorical variable were expressed in actual number and percentages. Continuous variable were presented as Mean ±SD.

Results

There were 1186 samples which were tested positive with Sickling test (DTT test) during the January 2015 to December 2016. The age and gender distribution of cases is according to Table 1. It was seen from Table 1 that among the males 60 (21.6%) cases were in 0-10 years, 64 (23.1%) cases were in 11-20 years, 68 (24.54%) cases were in 21-30 years, 44 (15.88%) cases were in 31-40 years, 22 (7.94%) cases were in 41-50 years, 8 (3.97%) cases were in 51-60 years and 11 (3.97%) cases were more than 60 years. Among the females 85 (9.35%) cases were in 0-10 years, 239 (26.29%) cases were in 11-20 years, 393 (43.23%) cases were in 21-30 years, 104 (11.44%) cases were in 31-40 years, 52 (5.72%) cases were in 41-50 years, 25 (2.75%) cases were in 51-60 years and 11 (1.21%) cases were more than 60 years. The mean age of the cases participated in the study were 24.9 ± 13.134 years.

Table-1: Age and gender distribution of cases.

Age (in years)	Male	Female	Total
0-10	60(21.66)	85(9.35)	145(12.22)
11-20	64(23.10)	239(26.29)	303(25.54)
21-30	68(24.54)	393(43.23)	461(38.87)
31-40	44(15.88)	104(11.44)	148(12.47)
41-50	22(7.94)	52(5.72)	74(6.23)
51-60	8(2.88)	25(2.75)	33(2.78)
>60	11(3.97)	11(1.21)	22(1.85)
Total	**277(23.25)**	**909(76.64)**	**1186**

Table-2: Types of sickle cell disease

Types of disease	No.	%
Sickle cell trait	1052	88.7
Sickle cell disease	107	9.02
Sickle beta Thalassemia	20	1.68
B Thalassemia Minor	3	0.25
B Thalassemia major	4	0.33
Total	**1186**	**100**

It was seen from the Table 2 that among the 1186 cases, 1052 (88.7%) cases were sickle cell trait, 107 (9.02%) cases were sickle cell disease, 20 (1.68%) cases were sickle beta thalassemia, 3 (0.25%) cases were B Thalassemia Minor and 4 (0.33%) cases were B Thalassemia Major.

Table-3: Caste wise distribution of cases

Caste	No.	%
Patel (Dhodia)	397	33.47
Varli	97	8.17
Halpati	57	4.8
Dhodi	51	4.3
Nayka	48	4.04

As far as caste distribution is concerned, it was seen from Table 3 more are belonged to schedule tribe. i.e. Patel (Dhodia) 397 (33.47%), followed by other backward community, out of which 8.17% were Varli, 4.8% were Halpati, 4.3% were Dhodi and 4.04% belonged to Nayka.

Discussion

The population of Gujarat has crossed 6 crores as per Census 2011[6].14.79% of the population in Gujarat is tribal[7]. Out of total 26 districts of Gujarat; more than half are tribal districts. Gujarat is the 4th most schedule tribe populated state of India after Madhya Pradesh, Maharashtra and Orissa. The tribal community of Gujarat inhabitants in the geographically difficult terrains of the Eastern belt, extending from Ambaji in the North to Dang in the South Southern Gujarat includes districts of Dangs, Valsad, Navsari, Surat and Bharuch[8].

Gujarat state is expected to have 6,47,025 Sickle trait and 48,257 Sickle disease patients, belonging to Dhodia, Dubla, Kukna, Gamit, Chaudhary, Halpati, Varli, Kokni, Kathodi, Kolcha, Kotwadiaetc [9]. Sickle cell disease in this tribal area poses difficulty in diagnosis and management, as the sign and symptoms of this disease overlap with other common diseases. Recurrent attacks of musculoskeletal pain, anemia, frequent respiratory infections, jaundice and splenomegaly are the typical features which should arouse suspicion of sickle cell disease. We acknowledge that a community based study is ideal to know the true prevalence of the disease but because of ethical/social issues involved, it is difficult toconduct a community based study involving invasive procedure (blood collection). However, this hospital based survey is important for sensitization and can serve as a baseline for generating more data.

In the present study, out of 1186 participants, 909 were female, which comprised of 76.64% of the total study population. The gender distribution of male to female cases is 1:3. While in the study done by Awasthy et al in Safdarjung hospital, Delhi, male and female comprised of equal participants [10]. Contrary findings were observed by Kam

ble et al in their study, where male to female ratio was 1.65:1[11]. Among the sickling test positive, 88.7% cases were sickle test trait. The higher prevalence of the sickle cell trait may be a result of a higher frequency of consanguineous marriages within the relatively small community. Association for Health Welfare in the Nilgiris (ASHWINI), Tamil Nadu also reported prevalence of sickle cell trait in non-tribal Chetti community to be as high as 30% [12]. Studies by S. L. Kate indicated that the overall prevalence of sickle cell disorder in different tribal populations is 10% for carrier state and 0.5% for the sufferer[13]. Sahu T et alreported 16.55% prevalence of sickle cell disorder in below fifteen years children in tribal areas of Gajapati district of Orissa[14]. In the present study, majority (33.47%) of cases belongs toPatel (Dhodia) community followed by Varli, Halpati, Dhodi, Nayka, Dubla and Bhoya. These are the main tribal communities of south Gujrat region. Sahu T et alhas reported Ratia, Sabar, Beera, Mandaletctrible community in their study in south Orissa[14]. The prevalence amongst the different communities in the decreasing order of frequency was Rathod (71.4%), Vasava (21.4%), Chavda (3.6%) and Solanki (3.6%)[15]. Saxena in his study reported prevalence of sickle cell anemia among Vasava was 26.4%, chaudhari 21.4%, Gamit 20%, Panchal 13.85% and among rathod was 8.3%[16]. These observations support the hypothesis that the sickle cell disorders are present in scheduled castes, tribals and few communities of other backward classes (OBC), and not found in so called higher castes; though the review of literature says it is present invariably in all castes[17].

Majority cases were found positive for sickle cell traitor disease belongs to Dhodia community (33.47%), while Dalal M has reported 18.4% prevalence of sickle cell trait in Dhodias of south Gujarat region[18]. The variation in proportion of people with different communities dependson their distribution. In Gujarat, the Dhodia, Dubla, Gamit, and Naikatribes have a high prevalence of HbS (13-31%)[19].

More recently very extensive population surveys have been done by the Indian Red Cross Society, Gujarat State Branch where 1,68,498 tribals from 22 districts were screened and the overall prevalence of sickle cell carriers was 11.37% [20]. Some tribal groups in south Gujarat like Chaudry, Gamit, Rohit, Vasava and Kukana have shown both a high prevalence of HbS (6.3 to 22.7%) as well as β-thalassaemia trait (6.3 to 13.6%). [21] These tribal groups would have the likelihood of co-inheriting both these genes.

Conclusion

Study suggested that Sickle cell disease is the most prevalent hemoglobinopathy in South Gujarat. Dhodia, Varli, Halpati, Nayka, Dhodi and other backward community are high risk communities for sickle cell disease among the sickling positive test. Sickle cell trait and sickle cell disease was the most common variant.

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