The Prevalence of Sickle cell Disease Phenotypes and Sickle Cell Gene Frequency in Some Tribals of Ghatanji and Kelapur Taluka, Distirct Yavatmal, Maharashtra (India)

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Abstract- Sickle cell disease (SCD) is a major genetic disorder among the tribal population. Hence the objective of the present study was to determine the prevalence and frequency of the sickle cell gene in some selected tribal population of the Ghatanji and Kelapur taluka of Yavatmal District (Central India). A total of 1078 tribal individuals were screened for SCD from 17 tribal villages constituting 3 tribal castes (Gond, Kolam, Pardhan). Using electrophoresis on cellulose acetate membrane 25 individuals were found heterozygous and 19 individuals were found to be homozygous for sickle cell gene. The sickle cell allele frequency was found to be 0.01414 in Gond, 0.03604 in Kolam and 0.00436 in Pardhans.

Index Terms- Sickle cell Anemia, Tribals, Gond, Kolam, Pardhan, Ghatanji, Kelapur.

I. Introduction

Sickle cell disease (SCD) is an autosomal recessive genetically transmitted hemoglobinopathy responsible for considerable morbity and mortality. This is hereditary disorder due to defective hemoglobin structure. Sickle cell disorder is caused by a point mutation at sixth position in β globin chain, valine substituting glutamic acid, due to which in deoxygenated state the shape of erythrocytes change to sickle shape and also the fragility of cell membrane increases (Ingram,1956). Prior to 1952, no information was available about the existence of sickle cell disease in India. In 1952 it was recorded for first time simultaneously amongst the tribal population group of Nilgiri hill and laborers in the tea garden of Assam (Lehman and Catbrush, 1952).Now it is firmly established that these genes harbor amongst different caste groups but with very high prevalence amongst scheduled caste, scheduled tribes and other backward communities (Bhatia and Rao, 1987, Sharma, 1983).

The prevalence of sickle cell gene has been reported in many parts of India including central India, where the prevalence in the different communities ranges from 9.4% to 22.2 % (Shukla and Solanki, 1985). According to studies carried out by Kate (2001), 10% of total population of the state of Maharashtra belongs to tribal population groups. Zade et al have studied and reported the high prevalence of Sickle cell disease in tribals of Amaravati District. In the present work an effort has been made to screen few tribal communities of Ghatanji and Kelapur Taluka, Yavatmal district and find out the magnitude of prevalence of SCD in the tribal groups residing in this region.

II. Material and Methods

Screening of SCD was conducted in 17 tribal villages from Ghatanji and Kelapur Taluka, Yavatmal District from June 2012 to February 2013. A total of 1078 blood samples from individuals belonging to 3 different tribal castes were collected by organizing screening camps in co-ordination with the officials from Primary Health Centers. Few drops of blood were collected by bold finger prick for performing the solubility test (Huntsman et al, 1970) for preliminary diagnosis of SCD. Blood samples of solubility test positive subjects were later subjected to electrophoresis on cellulose acetate membrane (Dacie and Lewis, 1991) in the laboratory of Anthropological survey of India, Nagpur regional centre, as a confirmatory test for SCD.
Allele frequency was calculated using Hardy Weinberg Principle. A dendrogram was drawn as per UPGMA clustering method using phylip - v 3.69 (Felsenstein, 1993) and MEGA -5 (Tamura et al, 2011).

III. Results and Discussion

In the present work 3 tribal castes individuals i.e. Gond, Kolam and Pardhan suffering from SCD were found to be predominant in the study area. Zade *et al* recorded the presence of SCD in 5 tribal castes (Korku, Bhil Gaoli Gowari and Nihal) of Melghat region in Amravati district. A total of 438 tribal's were screened for SCD from 6 tribal villages of Melghat region in Amravati district and 43 heterozygotes and 12 homozygotes were documented (Zade et al, 2011). In the present work a total of 1078 tribals from 17 tribal villages of Ghatanji and Kelapur taluka of Yavatmal district were screened for SCD and 25 heterozygotes and 19 homozygotes were recorded. Similarly 1352 non tribal indivisuals belonging to Navbouddha and Kunbi community were screened and 7 heterozygote and 6 homozygotes for SCD were recorded.

The sickle cell allelic frequency in the Melghat region of Amaravati District was reported to be 0.3294 in Korku, 0.4934 in Bhil, 0.4071 in Gaoli, 0.2871in Gowari and 0.2898 in Nihal (Zade et al,2011). In the present work, the sickle cell allelic

frequency was found to be highest in the Kolams followed by Gonds and Pardhans(Table 1).

Table 1: Showing the computed genotypic and allelic frequency of Normal and affected allele of the study Population.

Tribal casts	Genotypic frequency	Allelic frequency
Gond (n=495)	AA =0.9818 AS =0.00808 SS =0.0108	p(A) = 0.98584 q(S) = 0.01414
Kolam (n=291)	AA =0.9553 AS =0.0171 SS =0.02749	p(A) = 0.9553 q(S) = 0.03604
Pardhan (n=292)	AA =0.9691 AS =0.0102 SS =0.0205	p(A) = 0.9742 q(S) = 0.00436
Navbouddha (n=344)	AA=0.9767 AS=0.008720 SS=0.0145	p(A)= 0.98106 q(S)= 0.01886
Kunbi (n=1008)	AA=0.9950 AS=0.003968 SS=0.0009920	p(A)=0.99698 q(S)=0.002976

The dendrogram was constructed using the genetic distance obtained from the sickle cell allele frequencies using UPGMA method. Pardhan, Gond and Kolams represent the indigenous, aboriginal, dark-skinned, Dravidian-speaking population of the Deccan, of which the Gonds are the most primitive tribe (Christopher von Fürer- Haimendor, 1982, Dunlop and Muzumdar, 1952, Kate, 2000). The Kunbi, Pardhans and Gonds form three different embranchments of which the Gonds occupy the basal position in the dendrogram. However the Navbuddha and Kolam forms a single clade (Figure 1).

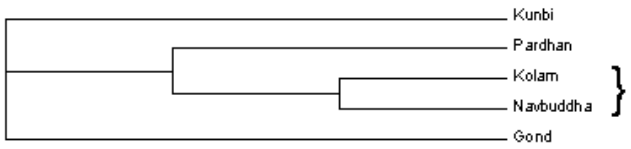

Figure 1 : Dendrogram Showing genetic relationship among five communities of Ghatanji and Kelapur Taluka of District Yavatmal.

According to the Anthropological studies, Navbuddhas (Mahars) occupy a position midway between Marathas and primitives. In the ancient past their may have been the admixture of Veddian tribes and primitives of the eastern region. The primitives entering through the eastern gaps of Chattisgarh into Narbada and Tapti Valley and the Veddian advancing from the South. Thus producing the middle race of above community (Shukla et al, 1958).

In the dendrogram study on the tribal groups of Melghat region of Amaravati District, Maharashtra it was reported that Bhil and Gaoli tribals formed one clade and Gowari and Nihal formed the second clade whereas the korku tribe was forming the outgroup (Zade et al,2011).

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