

## Incidence of Sickle Cell Haemoglobin Among the Thotis of District Adilabad, Andhra Pradesh

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**ABSTRACT** The study deals with the incidence of sickle cell anaemia among the Thotis, a primitive tribe of Andhra Pradesh. The sample comprises of 397 individuals (188 males and 209 females). Among the 12.84% individuals who had sickle cell disease, 9.32% were heterozygous (AS) for sickle cell trait while 2.52% were homozygous (SS). Genes A and S have the frequencies of 0.92 and 0.08, respectively. Generation wise comparison of the distribution of sickle cell trait among the Thoti tribal population shows similar frequency (16.07%) of sickle cell disease in the offspring as well as the parental generation. But the offspring had less number of (12.50%) heterozygotes (AS) and more number of (3.57%) homozygotes (SS) for sickle cell disease than the parental generation (AS= 14.20%, SS= 2.38%).

### INTRODUCTION

The tribe Thoti is known by different names. The name Thoti is based on the traditional occupation of their women, which is tattooing (Thochi in Marathi means tattoo). The Thoti women have been traditionally tattooing the Gond women on the chest, arm and legs and in turn they receive cash or kind for their services. In short, the Thoti women proudly proclaim that they are traditional tattooers to Gonds. On the basis of this occupation they are also known as "Pachaobotlurvandlu" or "Chukkabotlurvandu". The other name "Birdu Gond" resulted from bard-patron relationship between Thotis and Gonds. Gonds call them as Birdal (receiver) and Thoti in turn call Gonds as Dhani (Donor). In the taluks of Asifabad, Luketipet and Chinnur, Thotis are known as "Pandavulu" as they narrate the stories of Pandavas the heroes of the epic Mahabharata.

Government of India recognized the Thotis as a primitive tribe in 1983. According to Guha (1935), the Thotis belong to the proto- Australoid

stock having dark skin colour, sunken nose and low forehead. Russell (1916) had described the Thoti as a sub tribe of the Pardhans (cited from Haimendorf & Haimendorf, 1979). But it is difficult to confirm this though these two tribes are identical in their traditional relationship to Raj Gonds as ritual beggars (Haimendorf & Haimendorf, 1979).

According to 1991 census, Thotis numbered 3654 persons in Andhra Pradesh and majority of them i.e. 1792 (49.04%) lived in Adilabad district only. They are found in erstwhile taluk of Adilabad, Boath, Utnoor, Luxettipet and Khanapur. They are also present, however, in small numbers in Asifabad, Wankidi, Chinnur and Nirmal taluks. Thoti generally live along with other tribal and non-tribal communities and their villages are easily accessible. All the villages or hamlets where Thoti inhabit are multi ethnic villages and a majority of them are having either *Kacha* or *Pucca* road facilities.

Haemoglobinopathies are common genetic disorders and their gene frequencies have been extensively documented in different world populations (Livingstone, 1985; Bhasin et al., 1994). The incidence of genetic disorders can be reduced remarkably by genetic counseling and prenatal diagnosis (Cao, 1993). For effective genetic counseling the population at risk needs to be identified.

### MATERIALS AND METHODS

Blood samples were collected in micro tubes containing one drop of EDTA from 397 individuals of all ages consisting of 188 males and 209 females. For the study of generational differences 112 parents (56 males and 56 females) and 56 off

springs, one from each family, (32 males and 24 males) were taken as the representative sample. Three to four drops of blood were taken from the fingertip of each individual by pricking with a sterilized disposable lancet. The blood samples collected on each day were kept in the icebox and transported on the same day to the field laboratory set up at Uttnoor. For the confirmation of results the blood samples were also collected on filter paper strips for electrophoretic analysis later done at the Department Laboratory. Field test was performed as per the method given by Daland and Castle (1948).

### Confirmation of Zygosity of Sickle Cell Disease

Haemoglobin typing was done by electrophoresis using citrate agar gel medium (Garrick et al., 1973). As the blood samples were in dried form it was essential to elute the bloodstain for electrophoresis. Haemolysing reagent was used to elute the haemoglobin that was prepared according to the method given by Verma (1994). Cleland's reagent was prepared according to the method advocated by Barnard and Grunbaum (1979). For the electrophoresis the method advanced by Division of Host Factors, Center for Infectious Diseases, Atlanta (1984) was adopted with minor modifications (Sachdeva et al., 1999).

## RESULTS AND DISCUSSION

The results of the study are set out in Tables 1 through 3. Analysis of the table 1 reveals that in the total sample of 397 individuals (188 males and 209 females), 12.84% who had sickle cell disease, 9.32% were heterozygous (AS) for sickle cell trait while 2.52% were homozygous (SS). 87.16% of the samples tested were normal

homozygotes (AA). Sex wise distribution reveals that males had higher percentage (14.36%) of sickle cell cases compared to females (11.48%). In the males 11.70% were found to be heterozygous (AS) and 2.66% were homozygous (SS) for sickle cell anemia. Among the females 9.09% were heterozygous and 2.39% homozygous for sickle cell anaemia.

The A/S gene frequencies were estimated for this population. Gene A is found to be 0.92 and gene S is found to be 0.08.

### Generation Wise Distribution of Sickle Cell Trait Among Thoti Tribal Population

Table 2 shows the generation wise distribution of sickle cell trait among the Thoti tribal population. Analysis of the table shows similar frequency (16.07%) of sickle cell disease in the offspring as well as the parental generation. But the offspring had less number of (12.50%) heterozygotes (AS) and more number of (3.57%) homozygotes (SS) for sickle cell disease than the parental generation (AS= 14.20%, SS= 2.38%).

Generation-cum sex wise distribution reveals that highest percentage (21.88%) of sickle cell cases is found in males of offspring generation, successively followed by females of parental generation (17.86%), males of parental generation (14.29%) and females of offspring generation (8.33%).

No significant differences in the distribution of sickle cell disease between males as well as female respectively belonging to the two generations (males  $\chi^2=1.484$ ,  $df=1$ ; females  $\chi^2=1.642$ ,  $df=1$ ) were observed. The S gene frequency (q) in the offspring generation is 0.10 and 0.09 for the parental generation. The study thus shows no difference in the distribution of sickle cell gene frequency in both the gene-

Table- 1: Distribution of sickle cell disease among randomized sample of Thoti Tribal population

| Sex         | Number of<br>samples | Zygosity |       |     |       |     |      | Total sickle<br>cell |       | Allele<br>frequencies |      |
|-------------|----------------------|----------|-------|-----|-------|-----|------|----------------------|-------|-----------------------|------|
|             |                      | AA       |       | AS  |       | SS  |      | No.                  | %     | p                     | q    |
|             |                      | No.      | %     | No. | %     | No. | %    |                      |       |                       |      |
| Male (M)    | 188                  | 161      | 85.64 | 22  | 11.70 | 5   | 2.66 | 27                   | 14.36 |                       |      |
| Female (F)  | 209                  | 185      | 88.52 | 19  | 9.09  | 5   | 2.39 | 24                   | 11.48 |                       |      |
| Total (M+F) | 397                  | 346      | 87.16 | 41  | 10.32 | 10  | 2.52 | 51                   | 12.85 | 0.92                  | 0.08 |

Table- 2: Generation-wise distributions of sickle cell disease among the Thoti tribal population

| Generation  | Sex                     | No. of Samples | Zygosity |       |     |       |     |      | Total sickle cell |       | Allele frequencies |      |
|-------------|-------------------------|----------------|----------|-------|-----|-------|-----|------|-------------------|-------|--------------------|------|
|             |                         |                | AA       |       | AS  |       | SS  |      |                   |       | p                  | q    |
|             |                         |                | No.      | %     | No. | %     | No. | %    | No.               | %     |                    |      |
| Offspring   | Male (M)                | 32             | 25       | 78.13 | 5   | 15.63 | 2   | 6.25 | 7                 | 21.88 | 0.90               | 0.10 |
|             | Female (F)              | 24             | 22       | 91.67 | 2   | 8.33  | 0   | 0.00 | 2                 | 8.33  |                    |      |
|             | Total (M+F)             | 56             | 47       | 83.93 | 7   | 12.5  | 2   | 3.57 | 9                 | 16.07 |                    |      |
| Parent      | Male (M)                | 56             | 48       | 85.71 | 7   | 12.5  | 1   | 1.79 | 8                 | 14.29 | 0.91               | 0.09 |
|             | Female (F) <sup>1</sup> | 56             | 46       | 82.14 | 9   | 16.07 | 1   | 1.79 | 10                | 17.86 |                    |      |
|             | Total (M+F)             | 112            | 94       | 83.93 | 16  | 14.29 | 2   | 1.79 | 18                | 16.07 |                    |      |
| Grand Total | Total (M+F)             | 168            | 141      | 83.93 | 23  | 13.69 | 4   | 2.38 | 27                | 16.07 |                    |      |

rations. Thus the Thoti population appears to be in a stable equilibrium with respect to sickle cell gene.

#### The Incidence of Sickle Cell Anaemia Among Thoti vis-a vis Other Tribal Populations of Andhra Pradesh

Table 3 shows the distribution of sickle cell anaemia among tribal populations of Andhra Pradesh. Analysis of the table shows that the Pradhans (34.7% and 31.7%), Konda Kammara (30.9%), Koya Dora (24.2%), Valmiki (20.2%), Kolam (16.4%), Sugali and Raj Gond (14.3%), respectively had higher percentage of sickle cell anaemia than the Thoti (12.86%), while most others tribal populations of Andhra Pradesh, like Raj gond (11.7%) of Hyderabad, Raj Gond (11.3%) of Kurnool, Kolam of Asifabad and Koya Dora East Godavri (8.0% each), Koya Dora of Kurnool (7.9%), Koya Dora of Hyderabad (7.7%), Koya (Bhadrachalam) (7.3%), Kolam (7.0%) and Koya of Tirupathi (6.6%), Jatapu of Vizianagaram (6.0%) and Naikpod of Chinoor (5.4%), Naikpod of Kurnool (4.6%), Naikpod of Luxettipet (4.5%), Suvvi Yerukala (3.2%), Savaras (3.1%), Sugali (Lambadis) and Lambadi of Anantpur (2.7% each), Lambadis of Kurnool (2.6%), Konda Reddi (2.3%), Kunchpari Yerukala (1.9%), Badda Yerukala (1.6%), Savaras (1.5%), Koya (Borgumpadd) (1.4%), Jatapu of Srikakulam (1.3%), Yerukala (0.8%), Chenchus of Mehboobnagar (0.7%) and Yanadi, Yerukala of Nellore, Anantpur, Warangal, Chenchus of Kurnool, Naikpod of Nizamabad and Uppu Yerukala (0.0%) have lower incidence of sickle cell anaemia as compared to Thoti.

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Table 3: Distribution of sickle cell disease among other Tribal populations of Andhra Pradesh

| S.No. | Tribe               | Place                     | Sickler Percent | Author(s)              |
|-------|---------------------|---------------------------|-----------------|------------------------|
| 1.    | Koya Dora           | East Godavari District    | 8.0             | Negi, 1976             |
| 2.    | Valmiki             | East Godavari District    | 20.2            | Negi, 1976             |
| 3.    | Konda Reddi         | East Godavari District    | 2.3             | Negi, 1976             |
| 4.    | Koya (Bhadrachalam) | Khammam Distt.            | 7.3             | Negi, 1976             |
| 5.    | Koya (Borgumpadd)   | Khammam Distt.            | 1.4             | Negi, 1976             |
| 6.    | Yenadi              | Nellore Distt.            | 0.0             | Negi, 1976             |
| 7.    | Yerukala            | Nellore Distt.            | 0.0             | Negi, 1976             |
| 8.    | Yerukala            | Anantpur Distt.           | 0.0             | Negi, 1976             |
| 9.    | Sugali (Lambadi)    | Anantpur Distt.           | 2.7             | Negi, 1976             |
| 10.   | Pradhan             | Anantpur Distt.           | 34.7            | Goud, 1977             |
| 11.   | Lambadi             | Anantpur Distt.           | 2.7             | Goud, 1977             |
| 12.   | Chenchu             | Kurnool Distt.            | 0.0             | Negi, 1976             |
| 13.   | Sugali              | Kurnool Distt.            | 14.3            | Negi, 1976             |
| 14.   | Savara              | Srikakulam Distt.         | 1.5             | Rao et al., 1978       |
| 15.   | Jatapu              | Srikakulam Distt.         | 1.3             | Rao et al., 1978       |
| 16.   | Kolams              | Utnur Adilabad Distt.     | 16.4            | Ramesh et al., 1979    |
| 17.   | Kolams              | Asifabad, Adilabad Distt. | 8.0             | Ramesh et al., 1979    |
| 18.   | Chenchu             | Asifabad, Adilabad Distt. | 0.0             | Chaudhuri et al., 1964 |
| 19.   | Yerukala            | Warangal                  | 0.8             | Goud & Rao, 1977       |
| 20.   | Koya Dora           | Hyderabad                 | 7.7             | Goud, 1977             |
| 21.   | Raj Gond            | Hyderabad                 | 11.7            | Goud, 1977             |
| 22.   | Naikpod             | Hyderabad                 | 4.7             | Goud, 1977             |
| 23.   | Koya Dora           | Godavari Distt.           | 24.2            | Babu et al., 1980      |
| 24.   | Chenchus            | Mehboob Nagar Distt.      | 0.7             | Ramesh et al., 1980    |
| 25.   | Chenchus            | Kurnool Distt.            | 0.0             | Ramesh et al., 1980    |
| 26.   | Koya Dora           | Kurnool Distt.            | 7.9             | Goud & Rao, 1979       |
| 27.   | Raj Gond            | Kurnool Distt.            | 11.3            | Goud & Rao, 1979       |
| 28.   | Lambadi             | Kurnool Distt.            | 2.6             | Goud & Rao, 1979       |
| 29.   | Naikpods            | Kurnool Distt.            | 4.6             | Goud & Rao, 1979       |
| 30.   | Pradhans            | Kurnool Distt.            | 31.7            | Goud & Rao, 1979       |
| 31.   | Jatapu              | Vizianagaram Distt.       | 6.0             | Rao et al., 1986       |
| 32.   | Konda Kammara       | East Godavari             | 30.9            | Jaikishan et al., 1982 |
| 33.   | Naikpod             | Nizamabad Distt.          | 0.0             | Murlidhar et al., 1989 |
| 34.   | Naikpod             | Chinnoor                  | 5.4             | Murlidhar et al., 1989 |
| 35.   | Naikpod             | Luxettipet                | 4.5             | Murlidhar et al., 1989 |
| 36.   | Suvvi Yerukala      | Luxettipet                | 3.2             | Narahari, 1991         |
| 37.   | Badda Yerukala      | Luxettipet                | 1.6             | Narahari, 1991         |
| 38.   | Uppu Yerukala       | Luxettipet                | 0.0             | Narahari, 1991         |
| 39.   | Kunchapari Yerukala | Luxettipet                | 1.9             | Narahari, 1991         |
| 40.   | Savaras             | Vizianagram Distt.        | 3.1             | Rao et al., 1987       |
| 41.   | Koya                | Tirupati                  | 6.6             | Pingle, 1984           |
| 42.   | Kolams              | Tirupati                  | 7.0             | Pingle, 1984           |
| 43.   | Raj Gond            | Tirupati                  | 14.3            | Pingle, 1984           |
| 44.   | Thoti               | Adilabad                  | 12.85           | Present study          |

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