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Glucose-6-Phosphate Dehydrogenase deficiency and colour vision defect in six endogamous groups of Andhra Pradesh

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Maping of genes on the chromosomes has been a subject of intensive research for th last 4 or 5 decades. Despite advances made after the successful karyotyping of human chromosomes (Tijo and Levan 1956), it has not been possible to assign genes on most of the autosomes to any particular number or groups. However, considerable success has been achieved in maping a few well defined genes responsible for Hemophilia, Glucose-6-Phosphate dehydrogenase deficiency, red-green colour blindness, Xg blood group and Ichthyosis and others on X chromosomes (Sanger 1965).

Many investigations concerning the distribution of G-6-PD deficiency trait have been made in different parts of the world. Though incidence of G-6-PD and colour blindness in various Hindu (endogamous) groups in India has been reported, the present study reports for the first time such data among six endogamous groups of Andhra Pradesh.

Material and Methods

Six endogamous groups viz. Brahmin, Kapu, Mala, Sugali, Yanadi and Yerukula of Andhra Pradesh were screened for colour blindness and G-6-PD deficiency. Exclusively males were considered from each group.

Colour vision studies were carried out with the help of Ishihara Charts (1968). Those who could not read the numbers were made to trace the lines. G-6-PD deficiency tests on the red blood cells were carried out by the decolorisation technique of Motulsky and Campbell-Kraut (1961).

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Results and Discussion

Table-1 shows the incidence of colour blindness. Yanadi showed a very low percentage frequency of colour blindness (0. 79%). The other two tribal groups the Sugali and Yerukula showed an incidence of 2.43 per cent and 1.29 per cent respectively. The Mala (low caste group) showed a percentage of 3.31 while the other two upper caste groups Brahmin and Kapu showed an incidence of 4.72 per cent and 4 00 per cent respectively.

In general the incidence of colour vision defect among the tribal populations of South India studied so far is relatively low. The surveys of Goud (1977). Dronam Raju and Meerakhan (1963). Ramana Rao *et al.* (1972), Veera Raju (1973), Reddy (1975), and Ramachandraiah (1967), are strongly supporting the above statement. It is evident from the previous studies that the high caste groups namely Audich Brahmins and Ladvania have a high frequency for the colour vision defect while the low values for it were recorded in nomadic Nandiwallas (0.06%) and in Konda Reddy tribe (0.26%). The results obtained among the tribes of the p·esent study (except Yanadi) are relatively low when compared with the caste groups The variation that is observed in colour vision defect among the non-tribal and tribal groups may be explained by the hypothesis of Post (1962) and Pickford (1963). According to them the natural selection possibly eliminates the disadvantageous genes from the tribal populations.

The frequency of G 6-PD deficiency in some endogamous groups of south India (Present study) is given in Table-2. The highest incidence of G-6-PD deficiency is identified among the tribe Yerukula (3.33%) Next in the decreasing order is the tribe Sugali (3.00%). Due to the small sample size it will be seen that no person with G-6 PD deficiency was observed in Yanadi. The low caste Mala studied showed an incidence of 1.33 per cent whereas the Upper caste groups, Kapu and Brahmin showed a percentage of 1.14 and 2.47 respectively.

From the above investigation it is clear that the highest frequency of G-6-PD deficiency appeared among the tribal groups (except Yanadi) than the non-tribals. The results of the present study are supporting the results of Sukumaran *et al.* (1956). Vyas *et al* (1962), Das *et al.* (1967), Negi (1970), Meerakhan (1964), Goud (1977) and Kate *et al.* (1978).

The main reason respons ble for the maintenance of G-6-PD deficiency in different ethnic groups in India may be due to the epidemic Malaria situation complicated by inbreeding, endogamy, and admixture and other factors yet unknown. In the present investigation of tribal and non-tribal groups not even a single G-6-PD deficient individual was found to be colour blind.

TABLE 1

Incidence of Colour Blindness in six endogamous groups of Andhra Pradesh

Group	No. tested	Colour vision defect (%)	G-6-PD deficiency (%)
Vadagali Brahmin	182	4.72	2.47
Kapu	175	4.00	1.14
Mala	150	3.31	1.33
Yanadi	50	0.79	0.00
Yerukula	125	1.29	3.33
Sugali	100	2.43	3.00

References

Das S. R , D P. Mukherjee, D B. Sastry

1967 Sickle-cell trait in Koraput district and other parts of India. *Acta. Genet. Stat. Med.*, 17: 62-73.

Dronam Raju, K. R. and P. Meerakhan

1963 Frequency of Colour blindness among the tribal and non-tribal people of Andhra Pradesh. *Ann. Hum. Genet.*, 27: 417.

Goud, J. D.

1977 *Population Genetics of five endogamous tribal groups of Andhra Pradesh.* Unpuvlished Ph. D Thesis, Osmania University, Hyderabad.

Ishihara, S.

1968 *Tests for Colour blindness.* 38 plates edition, Kenehara Shuppan Co. Ltd., Tokyo, Japan.

Kate, S. L., B. N. Mukherjee, K. C. Malhotra, and M A. Phadke

1978 Red Cell glucose - 6- Phosphate dehydrogenase deficiency and hemoglobin variants among ten endogamous groups of Maharashtra and West Bengal. *Hum. Genet* , 44: 339-343.

Meerakhan, P.
1964 Glucose-6-Phosphate dehydrogenase deficiency in rural India. *Indian. J. Genet.*, 59:14-18.
Motulsky, A. G., and J. M. Campbell Kraut
1996 Standardization of procedure for study of Glucose-6-Phosphate dehydrogenase. *WHO. Technical series No. 336*, Geneva : 35-36.
Negi, R. S.
1968 Sickle-cell trait in India. *Bull. Anthropol. Surv. India.*, 17: 439-499.
Pickford, R W.
1963 Natural selection and Colour blindness. *Eugenics Review* : 55-97.
Post, R. H.
1962 Population differences in red and green colour vision deficiency, Review and a query on selection relaxation. *Eugen. Quarterly.*, 9 : 131.
Ramachandraiah, T.
1967 *A genetic study of the Lambadis of Andhra Pradesh.* Ph. D. Thesis, Univ. Delhi
Ramana Rao, V. V., G. V. Srinivasa Rao, and V. Nagendra Kumar
1972 ABo-Rh blood groups and colour blindness among Chenchus, *Paper No. 7 Tribal cultural research and Training Institute*, Hyderabad.
Reddy. G.,
1975 Blood taste, digital hair and colour blindness in the Bagathas of Andhra Pradesh. Paper presented at II *Ann. Conf*, *Indian Soc. Hum. Genet.*, Calcutta.
Sanger, R ,
1965 Genes on the X chromosome, *Canad., J. Genet.*, 7. 179-188
Sukumaran, P. K., L. D. Sanghvi, and G. N. Vyas,
1956 Sickle-cell trait in some tribes of western India, *Curr. Sc.*, 25 : 290-291
Tijo, J. H. and A. Levan
1956 The chromosome numbers of man. *Heredits*, 42 : 1.
Veer Raju, P.
1973 *A genetic study of the Konda Reddis* Ph. D. Thesis Andhra Univ. Waltair,
Vyas, G , H. M. Bhatia, P. K. Sukumaran, V. Balakrishnan, and L. D. Sanghvi,
1962 Study of blood groups abnormal hemoglobin and other genetical markers in some tribes of Gujarat. *Am. J. Phys. Anthro.*, 20 : 255-265.