

# INCIDENCE OF SOD VARIANTS AMONG DIFFERENT CASTE GROUPS OF ANDHRA PRADESH

B. Ramesh Babu\*, S. Anitha Kumari\* and N. Sree Ram Kumar

Key words : Placenta, Electrophoresis, SOD, Isozyme.

A total of 1622 placental samples belonging to Brahmins (280), Vysas (196), Muslims (294) and Scheduled Caste (852) groups living in Andhra Pradesh, South India were studied electrophoretically for the distribution of SOD variants. No variant of mitochondrial SOD Isozyme have been found. However, three different forms of cytoplasm SOD isozymes have been detected.

## INTRODUCTION

The enzyme SOD was first recognized and described by Mc Cord and Fridovich (1968, 1969). SOD catalyses dismutation of oxygen radicals to yield  $H_2O_2$  and  $O_2$  (Mc Cord and Fridovich, 1969). Superoxide dismutase (SOD) displays on electrophoresis two isozymic forms,  $SOD_A$  and  $SOD_B$ , while the former is cytoplasmic, the later is mitochondrial in origin. Very few studies on the distribution of SOD phenotypes in India reported by Das *et al.* (1970) used red cells from a Bengali population, while Sree Ram Kumar (1980) used human placenta from different population groups of twin cities of A.P. for the study. However, the present investigation was carried out to study the distribution of SOD variants among few caste groups from Telangana and Andhra regions of Andhra Pradesh.

## MATERIALS AND METHODS

1622 placenta from individuals belonging to Brahmins (280), Vysya (196), Muslims (294) and scheduled castes (852) groups were screened electrophoretically for SOD isoenzyme variants following essentially the method as described by Sree Ram Kumar and Rao (1982). For the electrophoretic study, homogenates were prepared by grinding 1 to 2 gms of placental tissue with an equal volume of distilled water in a teflon homogenizer held in ice. Later the homogenates were centrifuged at 3000 rpm for 20 minutes. The clear supernatants were separated and used for electrophoresis.

## RESULTS AND DISCUSSION

The results of the present study are shown in Table-1. Only 2 (Shia) among the 294 Muslim samples, 2 among the 280 Brahmin samples and 3 (2 Madiga and 1 Machi) among the 852 scheduled caste samples showed the  $SOD_A$  2-1 phenotypes and all the rest displayed the  $SOD_A$  1-1 pattern only. The  $SOD_A$  2-1 gene frequencies among the different caste groups of the present study are 0.0099 among the Shia muslims. Among Scheduled castes, Madiga showed an  $SOD_A$  2-1 gene frequency of 0.0035 while Mochi showed 0.0023 and Brahmin caste group showed the gene frequency of 0.0035. No variants of the mitochondrial forms were detected in the present study.

There have been no reports on the detection of any electrophoretic variation in any other population in the case of the slowly migrating mitochondrial SOD isozyme at the  $SOD_M$  or  $SOD_B$  locus. However, three different forms of the fast

migrating soluble (cytoplasm) SOD isozyme at the  $SOD_S$  or  $SOD_A$  locus have been recorded. The three different forms of  $SOD_A$  are referred to as  $SOD_A$  1-1,  $SOD_A$  2-1 and  $SOD_A$  2-2 and they are controlled by two autosomal alleles namely  $SOD^1$  and  $SOD^2$  (Beckman *et al.*, 1975). The  $SOD^1$  gene is of a very high common occurrence but the  $SOD^2$  gene has a very low frequency in most of the world populations, with the exception of the populations of Northern Finland, Northern Sweden and the Orkney Islands. In the Northern Sweden (Torne laden), the highest frequency of  $SOD^2$  gene has been recorded (Beckman and Beckman, 1975; Beckman and Pakarinen, 1973; Welch and Mears, 1972). In India, the studies on the distribution of the SOD genes have been very few and the data available is scanty. (Das *et al.* 1970; Sree Ram Kumar, 1980).

A frequency of  $SOD^2$  gene which is far below the polymorphic frequency was noted in various parts of the world including Hyderabad (A.P.) populations (Sree Ram Kumar, 1980). The frequency of  $SOD^2$  is about 2.5% in the Borderline area between Sweden & Finland (Beckman, 1973; Beckman and Pakarinen, 1973). The same polymorphic frequency was found on the Westray Island of the Orkneys also (Welch and Mears, 1972). Since the settlers of this Island were of Scandinavian descent, the source of the  $SOD^2$  gene may be the same as that in Northern Sweden and Finland.

The data so far obtained from different populations throughout the world suggest that the source of  $SOD^2$  gene among these populations is genetic drift (Beckman *et al.*, 1972). Therefore, the high frequency of  $SOD^2$  gene does not necessarily imply that the gene is maintained by selective forces. To make any such observation with reference to the finding of the variants of  $SOD_A$  in the present work is very difficult. Further investigations are needed in order to establish the regional variations of the  $SOD^2$  gene frequency within India.

## References

- Beckman, L., Cedergren, B, Collinder and Ramsmuson, M., 1972 . Population studies in northern Sweden III. Variations of ABO and Rh blood groups gene frequencies in time and space. *Hereditas*, **72** : 183.
- Beckman, G., 1973. Population studies in Northern Sweden. VI. Polymorphism of superoxide dismutase. *Hereditas*, **73** : 305.
- Beckman, G. and Pakarinen, A., 1973. Superoxide dismutase. *Hum. Hered.*, **23** : 346.

Dept. of Zoology, Osmania University College for Women, Koti, Hyderabad (A.P.)

\*Corr. Add.- H. No. 11-15-48/4, Plot No. 10, Doctor's Colony

Jinkala Bavi, Saroor Nagar, Hyderabad-500 035

E-mail : anitha\_shinde2001@yahoo.com

Beckman, G., Beckman, L. and Nilsson, L.O., 1975. Genetics of superoxide dismutase. *Hereditas*, **79** (1) : 43.

Beckman, G. and Beckman, L., 1975b. As cited by Beckman, G. in "The Biochemical Genetics of Man" (D.J.H. Brock and O. Mayo, Eds). Chapter 5. Academic Press, London and New York.

Das, S.R., Mukherjee, B.N. and Das, S.K., 1970. The distribution of some enzyme group systems among Bengalis. *Indian. J. Med. Res.*, **58** : 866.

Mc Cord, J.M. and Fridovich, I., 1968. The reduction of cytochrome C by milk xanthine oxidase. *J. Biol.Chem.* **243** : 5753.

Mc Cord, J.M. and Fridovich, I., 1969. Superoxide dismutase. An enzymatic function for erythrocyte cuprein (haemo cuprein). *J. Biol. Chem.* **244** : 6049.

Sree Ram Kumar, N., 1980. Genetic and Developmental variation of placental isozymes. Ph.D. Thesis. Osmania University.

Sree Ram Kumar, N. and Rao, P.R., 1982. Placental alkaline phosphatase phenotypes by polyacrylamide gel electrophoresis. *Man in India* : 62 (2) : 183-185.

Welch, S.G. and Mears, G.W., 1972. Genetic variants of human indophenol oxidase in the Westray Island of the Orkneys. *Hum. Hered.*, **22** : 38.