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INBREEDING EFFECTS ON REPRODUCTIVE WASTAGES (GENETIC LOAD) OF YERUKULA TRIBE AN ENDOGAMOUS HUMAN POPULATION, ANDHRA PRADESH, INDIA

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ABSTRACT The present paper reports the inbreeding effects on the reproductive wastage in terms of genetic load among endogamous tribal population, namely Yerukala living in Coastal Andhra Pradesh. Estimates of genetic load were calculated from the data on the reproductive histories of randomly selected 100
couples belonged to above populations. The regression coefficient 'B' is positive in this tribe and indicated a positive association between inbreeding and mortality. The genetic load is predominantly segregational. However, the genetic load is due to based on total mortality data revealed that the association between mortality and inbreeding is negitive. Relatively lower levels of coefficient 'A' revealed the changing public health status of these populations.

KEYWORDS : Inbreeding. Genetic Load. Prenatal Mortality. Postnatal Mortality. Scheduled Tribe. Andhra Pradesh

INTRODUCTION

The effect of inbreeding on reproductive wastage is well recognized as a principal driving force of evolution. Natural selection operates through differential mortality and fertility among human populations. The differential mortality acts on individuals prior to their reproductive age, and determines that group of individuals who survive and may potentially produce the offspring who will constitute the next generation of a population. According to Darwin, natural selection for the descent of the organisms, which refers to the evolution, operates through "survival of the fittest" referring differential mortality (prenatal and postnatal) of individuals within a species and the selection agent of differential fertility. It is probable that natural selection operating through differential mortality is less important among modern human populations where differential fertility appears to be more effective. The concept of genetic load was first introduced by Muller (1950) as one of the approaches to explain the relationship between inbreeding and some of the presumed effects. Later, Crow (1958) defined genetic load as the relative decrease in the average fitness of a population, with respect to the fitness it would have if all individuals in the population had the genotype that has the maximum fitness. Thus genetic load is a quantity designed to measure the loss of fitness of a population resulting from selection against the deleterious homozygotes (Cavalli-Sforza and Bodmer 1971).

The present paper reports the inbreeding effects on the reproductive wastage in terms of genetic load among the tribal endogamous human population, namely Yerukala living in Coastal Andhra Pradesh. Yerukula is tribe living in plain areas. They mostly depend on daily-wage labouring, in addition to traditional occupation like pig breeding, basket making, sooth saying, etc.

MATERIALS & METHODS:

Estimates of genetic load were calculated from the data on the reproductive histories of 101 couples belonged to Yerukula tribe. These couples were selected randomly from rural and semi-urban areas of Narsapuram mandal of West Godavari district of Andhra Pradesh. The stillbirths and abortions were considered as prenatal loss while deaths up to 15 years of age were considered as pre-reproductive postnatal mortality. The inbreeding effects in terms of genetic load on foetal loss and prereproductive mortality were estimated by an exponential regression model as illustrated by Rao (1988).

$Pi = 1 - e^{-(A+B\,Fi)}$ where, Pi is the expected proportion of survivors and Fi is Wright's coefficient of inbreeding of the ith subgroup based on the type of marriage. Coefficient 'A' and 'B' were obtained by iterative computational method. The B/A ratio explains the relative influence of mutational and segregation loci in maintaining genetic load. Usually the B/A ratio will be 10, if the load is predominantly mutational; and »2 if the load is predominantly segregational (Morton et al. 1956).

The demographic information pertaining to fertility and mortality was obtained through personnel interview by schedule method. The collected data covers the mortality rates at both prenatal (abortions and still births) and postnatal (childhood / pre reproductive deaths) mortality. The selected tribal group was enumerated and house to house survey was made by personally interviewing the wife and husband of each family for demographic information. The questions in the demographic schedule posed to the subjects and answers elicited. The answers were cross checked by checking the information given by the couple from the people who were present at the time of interview along with the couple.

RESULTS AND DISCUSIONS:

Estimates of *Inbreeding Effects of Reproductive wastage (*genetic load) among the Yerukula tribe an endogamous human population is shown in table 1.

The estimation of genetic load of Yerukula Tribe

Mortality	Estimates of Genetic Load		
	A	B	B/A
Prenatal	0.1633	- 0.2761	- 1.6907
Postnatal	0.6180	0.0757	8.1638
Total	0.2192	0.8257	3.7668

The regression coefficients 'B' for pre-natal wastage while among Yerukula tribe, it is a negative value. It indicates that foetal loss was reduced with an increased inbreeding coefficient among the Yerukula, which is a deviant from general observation. The B/A values suggest that the pre-natal genetic load is segregational among Yerukula population. For pre-reproductive post-natal mortality, the relation between mortality and inbreeding was positive. The B/A values indicated that the load is predominantly segregational. The analysis based on total mortality data revealed that the association between mortality and inbreeding is negative. Also according to B/A value, the load is segregational among Yerukula.

The regression coefficient values of genetic load also determine lethal equivalents per gamete which lies between B and A+B. The coefficient 'A' measures the mortality of the non-inbred fraction supposed to be an index of public health and developmental conditions of the population. The values of 'A' are highest for Yerukula. The value of slope B is higher (0.8257) for total mortality while lowest and negative value (-0.2761) for prenatal loss. The B/A value which categorizes the load into mutational and segregational, indicates that the load is mainly segregational for both postnatal and total mortality among Yerukala. The lower value (negative) for prenatal mortality indicates that the load is dominantly mutational or segregational which might have resulted for lower B value and corresponding higher A value. It is worth to mention that the value of genetic load indicating a trend of manifestation of decreasing inbreeding coefficient effectively at prenatal stage. The regression coefficient values of genetic load also determine lethal equivalents per gamete which lie between B and A+B. The range of lethal equivalents per gamete lie between -0.2761 and -11.28 for prenatal mortality. And postnatal mortality the range varies between 0.0757 and 0.6937 and whereas for total mortality, these lethal equivalents lie between 0.8257 and 1.0449. The value of A is negative at B slope indicates that the high prenatal loss among Yerukala. A measures the mortality of the non-inbred fraction, supposed to be an index of health conditions. The value is 0.6180 for

postnatal mortality and lowest 0.1633 for prenatal loss. The value of intercept A among Yerukala is comparatively low which are consistent with low socio-economic status and very poor and bad health conditions and lack of medical care.

CONCLUSION:

The genetic load is measured to estimate the inbreeding effects on reproductive wastage. The B/A ratios indicate that the genetic load is segregational. In Yerukula tribe the Inbreeding Effects of Reproductive wastage (genetic load) records both mutational and segregational. The results of genetic load estimated to evaluate inbreeding effects on prenatal losses in Yerukula tribe records the highest value (1.633).

The socioeconomic condition of the Yerukula tribal population is very backward, and access and utilization levels of health care are also very poor. A review of literature of studies of genetic load among Andhra populations revealed that among majority of populations the relation between mortality and inbreeding is positive (Rao and Murty 1986; Reddy 1992; Babu et al. 1994;Naidu et al. 1995). Although studies are available on effect of inbreeding, methodologically it is very difficult to explain the effect of inbreeding on mortality due to presence of several confounding factors of mortality. It is to be acknowledged that higher levels of inbreeding do not always elevate the prenatal and postnatal mortality as expected, especially among contemporary Indian populations, due to elimination of deleterious genes through prolonged cultural practice of consanguineous marriages and high levels of inbreeding over several generations (Sanghvi 1966).

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CONFLICT OF INTEREST:- Non declared

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