

Opportunity for Natural Selection in Manne Dora : A Tribal Population of Andhra Pradesh

G. V. Ramana*

Department of Anthropology, Andhra University, Visakhapatnam 530 003, Andhra Pradesh, India

KEY WORDS Selection Intensity. Tribals. South India.

ABSTRACT Pregnancy histories of 277 ever married women aged 40 years and above belonging to Manne Dora tribe of Andhra Pradesh were analysed to estimate Crow's as well as Johnston and Kesinger's index for natural selection and the values are 0.7175 and 0.8207, respectively. The relative contribution of mortality component to the total selection is higher than the fertility component.

INTRODUCTION

The underlying assumptions of the genetic equilibrium model are random mating and absence of selection. The extent of which natural selection can occur in a population is measured by the index of total selection (Crow, 1958) since named index of opportunity for natural selection. This index measures the maximum change in selection, which the population's mortality and fertility components could bring-forth. The Crow's index takes into account only live births and pre-reproductive deaths. Later, Johnston and Kensinger (1971) modified the selection intensity index by taking into consideration pregnancies, prenatal mortality and postnatal mortality prior to reproductive age. Reddy and Chopra (1990) reviewed the data on opportunity for natural selection among Indian populations according to religion, habitat and socio-economic backgrounds and observed a gradual decline in I_m and I with improving socio-economic and technological status.

The present paper reports the estimates of opportunity for natural selection in Manne Dora, an endogamous tribal population of Andhra Pradesh. The Manne Dora number

around 20,000 according to 1981 Census. The detailed ethnographic account is presented elsewhere (Naidu and Ramana, 1995).

MATERIAL AND METHODS

Data on the pregnancy histories of 277 ever married women of Manne Dora tribe aged 40 years and above are utilised for analysis. Age assessment was made by the recall method coinciding with the lunar calendar and important festivals. The head of the family was present at the time of age assessment. The Crow's (1958) and Johnston and Kensinger's (1971) formulae were followed for calculation the index of natural selection.

RESULTS AND DISCUSSION

The demographic variables for computing indices of natural selection is presented in table-1. The mean livebirths in Manne Dora is 4.6750 which is well within the range (3.70 - 8.84) re-

Table 1: Demographic variables for Crow's Index in Manne Dora

Variables	Value
Number of Women	277
Number of Pregnancies	1359
Number of livebirths	1294
Proportion of survivors upto birth (P_b)	0.9433
Proportion of surviving (P_s)	0.7295
Mean Livebirths (X_b)	4.6750
Variance of livebirths (V_b)	5.1448
Index of mortality (P_b / P_s)	0.3898
Index of fertility (V_b / X_b)	0.3277
Index for Opportunity for natural selection $I = I_m + I_f - P_s$	0.7175

* Present Address : G. V. Ramana, Department of Genetics, Osmania University, Hyderabad 500 007, Andhra Pradesh, India.

ported for Indian populations. The selection intensity recorded for Manne Dora population

is 0.7175. The contribution to the total index of selection due to mortality component is rather higher (0.3898) than the fertility component (0.3277). This phenomenon is a characteristic feature reported in tribal and agrarian societies (Cavalli-Sforza and Bodmer, 1971). In Manne Dora the natural selection operates through the mortality component. Though, the extent of prereproductive mortality associated with genetic cause is unknown, it can be presumed that endemic diseases such as malaria, small pox,

majority of populations.

The opportunity for natural selection based on total number of pregnancies calculated using Johnston and Kensinger's (1971) method is presented in table 2. The component due to prenatal mortality is rather low (0.0601) among Manne Dora. The contributions of prenatal mortality, childhood mortality and fertility component to the total selection area 7.32%, 50.35% and 42.33%, respectively. The total index arrived through this method is higher com-

Table 2: Opportunity for natural selection (Johnston and Kensinger's Index) among Manne Dora

Population	I	I_m	I_m/P_b	$I_f/P_b \cdot P_s$	% of fertility component
Manne Dora	0.8207	0.0601	0.4132	0.3474	42.33

cholera, dysentery and a variety of communicable and infectious diseases may be responsible for the higher incidence of prereproductive deaths. The relative contribution of fertility and mortality components to the measure of selection is 45.67% and 54.33%, respectively.

When the results of the present study is compared with the data on the tribal and caste populations of Andhra Pradesh the total index varies from 0.26 from a sub-group of Yanadi tribe (Vasulu, 1987) to 1.69 among Mala (Rao and Murty, 1984) a caste population predominantly found in the coastal areas. However, the total index among Indian populations varies from 0.26 to 2.25 (Reddy and Chopra, 1990). The total index exceeding the value of 1 is found among the tribal groups and lower castes only. Among 24 populations, 13 (48.15%) show a larger index value of mortality than fertility, thus corroborating the present study. However, all the four sub-groups of the Yanadi tribe show a greater fertility than mortality component considering that majority of tribal populations studied show larger mortality component. The consistently lower I_m and I_f among Yanadi is an interesting finding. The probable reason as opined by the author is due to better accessibility to public health facility in that area. The contribution of mortality components is two times higher than that of fertility component in

pared to Crow's method. However, the contributions of fertility component to the total measure of selection intensity is lesser compared to Crow's index.

The range of selection intensity varies from 0.61 (Mala-Reddy and Lakshamandu, 1979) to 0.88 (Pardhan-Murty and Ramesh, 1978). The component due to prenatal mortality ranges between 0.01 for a group of Kolam as well as Pradhan and 0.14 in Brahmin group (Rajani Kumari et al., 1985). However, this component is found to be rather small for a majority of Indian populations. In Manne Dora, the selection is mainly due to differential mortality. Similar observations were made in Kolam and Pradhan (Murty and Ramesh, 1978) and Madiga (Reddy, 1984). It is reported that among Mala and Madiga caste populations (Reddy and Lashmanudu, 1979) natural selection appears to operate through differential fertility. The relative contributions of fertility component to the total index would depend upon the influence of culture, behaviour, heritability of fertility and other environmental agents (genetic and non-genetic) on the fitness of the population.

It is worth mentioning that the observed higher contributions of mortality component is an usual trend expected in tribes and in low socio-economic caste groups. These populations are characterised by a very poor accessibility to

modern medical care, lesser social mobility and inadequate efforts to control population growth.

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