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Opportunity for Natural Selection in Yerukula Tribe of Coastal Andhra Pradesh

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ABSTRACT The selection intensity indices were computed based on the demographic information pertaining to fertility and mortality among Yerukula, an endogamous tribal population of Andhra Pradesh. The total as well as fertility and mortality indices are slightly higher than other Andhra populations studied earlier. In the present tribal population, the selection is manifested mainly through differential fertility rather than mortality. The results are discussed in the light of earlier studies on Andhra Pradesh caste and tribal populations.

INTRODUCTION

The concept of natural selection 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 potentially produce the offspring to constitute the next generation of a population. It is probable that natural selection operating through differential mortality is less important among modern human populations where differential fertility appears to be the more effective agent. Based on these concepts, Crow (1958) devised an index of the opportunity for natural selection (I_t) to quantify the influence of selection inherent in evolutionary process. It possessed two components: (i) due to mortality prior to the reproductive age (I_m) and (ii) due to differences in fertility among women who have reached reproductive age (I_f). Since this index covers mortality only at the postnatal age, Johnston and Kensinger revised this computation by considering the prenatal mortality too (Johnston and Kensinger 1971). The present paper aimed to estimate the intensity of selection in terms of Crow's as well as Johnston and Kensinger's indices among Yerukula, an endogamous tribal population of coastal Andhra Pradesh.

MATERIALS AND METHODS

The present paper is based on the demographic data on the reproductive histories of 101 women of Yerukula tribe living in rural and semi urban areas of West Godavari district of Andhra Pradesh. The demographic information pertaining to fertility and mortality was obtained through interviewing married women using a pre-tested schedule. The collected data covered the fertility rate, and the mortality rates at both prenatal (abortions and still births) and postnatal stages (childhood/pre reproductive deaths). In the present study, indices of opportunity for natural selection were computed by using original formula of Crow (1958) and modified formula of Johnston and Kensinger (1971).

RESULTS AND DISCUSSION

The indices of intensity of natural selection among Yerukula tribe are presented in Table 1. The Crow's total index of natural selection is

Table 1: Indices of opportunity for natural selection intensity among Yerukula tribe population of coastal Andhra Pradesh

Selection component	*Value*
Crow's Index	
Mortality component (I_m)	0.1905
Fertility component (I_f/P_s)	1.0519
Total index (I_t)	1.2424
% of fertility component	84.67
% of mortality component	15.33
Johnson and Kensinger's Index	
Prenatal mortality component (I_{me})	0.1633
Post natal mortality component (I_{mc}/P_b)	0.1059
Fertility component ($I_f/P_b.P_s$)	1.3411
Total index (I_t)	1.6103
% of fertility component	83.28
% of prenatal mortality component	10.14
% of postnatal mortality component	6.58

1.2424. The fertility and mortality components of Crow's index are 1.0519 and 0.1905, respectively. The contribution of fertility to the total index is greater than the contribution of mortality in this tribe. It depicts that the selection in this populations is manifested through fertility component, rather than mortality. The total index based on Johnston and Kensinger's method (1.6103) is slightly higher than the index of Crow (1.2424), due to additional contribution of prenatal mortality. The contribution of prenatal mortality (0.1633) is higher than that of postnatal mortality (0.1059).

The present study results are compared with the data available for other caste and tribal populations of Andhra Pradesh (Table 2). Among Andhra castes, the lowest and the highest values of total selection intensity index were recorded by Rajaka, a washermen community belonged to backward class (Parvatheesam and Babu 1998) and Mala II, a scheduled caste (Rao and Murthy 1984), respectively. Among tribes, these values are recorded by Bod Mali (Babu and Kusuma 2002) and Chenchu (Sirajuddin 1984), respectively. The index of the present study tribal population is within the range of these populations. The range of index of fertility among caste populations is 0.12 (Jalari - Rajani Kumari et al. 1985 and Rajaka - Parvatheesam and Babu 1998) to 0.63 (Mala II - Rao and Murthy 1984); and among tribal populations, this range is from 0.35 (Manne Dora – Ramana 1991) to 1.05 (Yerukula of the present study). The index of mortality varies from 0.06 reported among Koppala Velama, a backward caste in Hindu hierarchy, sampled from urban areas with better health and socio-economic background (Sudhakar et al. 1998) to 1.06 found among Mala, a scheduled caste living in rural areas (Rao and Murthy 1984). Among tribes, the index of mortality varies from 0.19 among the Yerukula of the present study to 0.49 among Chenchu (Sirajuddin 1984). The component of prenatal mortality is very low among majority of Andhra populations and slightly higher values were recorded by Koppala Velama caste (Sudhakar et al. 1998) and present

Table 2: Selection intensity indices* among some Andhra castes and tribes

Populations	*I*	I_f	I_m	I_{me}	*Source*
Castes					
Brahmin	0.33	0.20	0.13	-	Rajani Kumari et al. 1985
Chakali	0.63	0.43	0.20	0.02	Babu et al. 1995
Jalari	0.31	0.12	0.19	-	Rajani Kumari et al. 1985
Koppala velama	0.37	0.30	0.06	0.18	Sudhakar et al.1998
Kshatriya	0.43	0.33	0.10	0.09	Dharani Priya et al. 2003
Kummari	0.95	0.63	0.32	-	Babu et al. 1995
Madiga I	0.70	0.47	0.23	0.02	Babu et al. 1995
Maheswari	0.50	0.30	0.20	-	Rao and Murthy 1984
Mala I	0.58	0.36	0.22	0.02	Reddy and Lakshmandu 1979
Mala II	1.69	0.63	1.06	-	Rao and Murthy 1984
Mangali	0.68	0.48	0.20	0.04	Babu et al. 1995
Palle	0.65	0.16	0.38	0.024	Rao 1991
Palle	0.94	0.50	0.44	-	Reddy et al. 1987
Pattapu	0.67	0.19	0.37	0.011	Rao1991
Rajaka	0.28	0.12	0.16	0.03	Parvatheesam and Babu1998
Reddy I	0.61	0.40	0.21	-	Reddy and Reddy 1984
Reddy II	0.43	0.26	0.17	-	Reddy and Reddy 1984
Reddy III	0.75	0.33	0.42	-	Rao and Murthy 1984
Vada	0.69	0.34	0.35	-	Reddy et al. 1987
Vyshya	0.70	0.28	0.42	-	Rao and Murthy 1984
Tribes					
Yerukala	1.24	1.05	0.19	0.16	Present Study
Bod Mali	0.65	0.45	0.20	0.04	Babu and Kusuma 2002
Chenchu	1.45	0.96	0.49	-	Sirajuddin 1984
Kolam	0.86	0.41	0.44	0.01	Murthy and Ramesh 1978
Manne Dora	0.82	0.35	0.41	0.06	Ramana 1991
Manzai Mali	0.71	0.50	0.21	0.07	Babu and Kusuma 2002
Pardhan	0.88	0.41	0.46	0.01	Murthy and Ramesh 1978
RajGond	0.73	0.38	0.35	-	Murthy and Ramesh 1978
Yerukala	0.79	0.44	0.35	-	Narahari 1982

*I, I_f and I_m are based on Crow's method, and I_{me} is based on Johnston and Kensinger's method.

study Yerukula tribe. Of the 22 caste groups listed in the table, the selection is manifested through fertility component rather than mortality among 13 groups. In nine caste groups, the mortality component is higher than that of fertility. Similarly, six out of nine tribes reported higher contribution of fertility to the total selection intensity.

The present study tribe along with majority of Andhra populations is deviate from the general trend observed among tribal and agrarian societies where the contribution of mortality is higher than that of fertility (Cavalli-Sforza and Bodmer 1971). The present study people of Yerukula tribe are inhabitants of well-developed rural and semi urban area with better public health care and modern facilities, and hence the mortality is playing lesser role in the manifestation of selection. However, these indices give an indication of relative opportunity for natural selection as these results are based on the data in which both genetic and non-genetic elements are involved.

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