

Natural Selection Intensity among Kapu Caste Population of Coastal Andhra Pradesh, India

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ABSTRACT The selection intensity indices were computed based on the demographic information pertaining to fertility and mortality among the Kapu, an endogamous caste population of Andhra Pradesh. The indices were computed by original formula of Crow and modified formula of Johnston and Kensinger. The total fertility and mortality indices are slightly higher than other Andhra populations studied earlier. In the present population, the selection is manifested mainly through differential fertility rather than mortality, which is a deviation from general trend.

INTRODUCTION

Natural selection is 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 to constitute the next generation of a population. Darwin's "survival of the fittest" refers to the differential mortality of individuals within a species and includes 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 the more effective agent. According to the Fisher's "fundamental theorem of natural selection", the rate of increase of fitness of any organism at any time is equal to its genetic variation in fitness at that time (Fisher 1958). Based on these concepts, Crow (1958) devised an index (I_v) of the opportunity for natural selection to quantify the influence of selection inherent in evolutionary process, and it is partitioned into two components (due to mortality prior to the reproductive age and due to differences in fertility among women who have reached reproductive age). Later, Johnston and Kensinger's (1971) revised the computation of the index by considering the prenatal mortality also. The present paper reports the intensity of selection in terms of Crow's as well as Johnston and Kensinger's indices among the Kapu, an endogamous caste population of coastal Andhra

Pradesh. Kapu, an agricultural caste distributed in almost all districts, is one of the dominant castes of Andhra Pradesh.

MATERIALS AND METHODS

The paper is based on the demographic data collected from 101 married women of Kapu caste, 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 personnel interviews using a pre-tested schedule. The collected data covers the mortality rates at both prenatal (abortions and still births) and postnatal mortality (childhood/pre-reproductive deaths). In the present study, indices of opportunity for natural selection were computed based on original formula of Crow (1958) and modified formula of Johnston and Kensinger (1971).

RESULTS AND DISCUSSION

The indices of intensity of selection based on the methods of Crow as well as Johnston and Kensinger' among the Kapu are presented in Table 1. Crow's total index of opportunity for natural selection is 0.5348. The components of fertility and mortality are 0.4924 and 0.0424, respectively. The contribution of fertility to the total index is greater than the contribution of mortality. The total index based on Johnston and Kensinger's method (0.5927) is slightly higher than the index of Crow (0.5348), due to the additional contribution of prenatal mortality. The fertility component is 0.4758. The contribution

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

Selection component	Value
<i>Crow's Index</i>	
Mortality component (I_m)	0.0424
Fertility component (I_f)	0.4924
Total Index (I_t)	0.5348
Percentage of fertility component	92.07
Percentage of mortality component	7.93
<i>Johnston and Kensing's Index</i>	
Prenatal mortality component (I_{me})	0.0745
Postnatal mortality Component (I_{mc})	0.0424
Fertility Component (I_f)	0.4758
Total index (I_t)	0.5927
Percentage of fertility component	80.28
Percentage of prenatal mortality component	12.57
Percentage of postnatal mortality component	7.15

of prenatal mortality (0.0745) is more than the contribution of postnatal contribution (0.0424). This trend is unusual as in majority of populations, the postnatal mortality contribute more than prenatal mortality to the total index of opportunity of natural selection (Reddy and Chopra 1990). Also, in the present population, the selection is mainly manifested through the fertility, rather than mortality. Studies from India and elsewhere indicated that mortality contribute heavily to the total selection among tribal, pre-agrarian and agrarian populations. While in developed and industrialized societies, the contribution of mortality is low and selection is mainly manifested through fertility (Spuhler 1976; Reddy and Chopra 1990). However, several of the recent studies undertaken among tribal and rural agrarian populations reported the lower contribution of mortality and inferred that the natural selection is manifested mainly through the fertility (Babu et al. 1995; Babu and Kusuma 2002; Bhasin and Kshatriya 1990; Bhasin and Nag 2002, 2007; Reddy and Reddy 1984; Reddy et al. 1987; Sudhakar et al. 1998). Probably the influence of lower fertility rates and accessibility to health care may be responsible for the changing trend, i.e., lower contribution of mortality. Changing fertility

and mortality patterns due to major socio-economic development have a profound effect on natural selection in human population (Cavalli-Sforza and Bodmer 1971).

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