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Selection Intensities Among Occupationally Different Communities: Yadavas and Kammas in Andhra Pradesh

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KEY WORDS Selection Intensity. Yadavas. Kammas. Fertility. Mortality. Andhra Pradesh.

ABSTRACT Selection potential based on differential fertility and mortality has been computed for Yadavas and Kammas of Krishna and Guntur districts of Andhra Pradesh inhabiting similar geo-climatic and environmental conditions. Irrespective of the methodology, the total index of selection was found to be high among Kammas than Yadavas.

Crow (1958) devised an index that facilitate quantitative estimation of the selective pressure, given the reproductive pattern of a population. This is a generation analogue of Fisher's (1930) fundamental theorem of natural selection and measures the proportion by which fitness would increase with specific birth and death rates if they were all selective and the heritability of fitness were complete (Crow, 1972). But, in reality, the genetic component in differential fertility and mortality is rather small, as the reproductive outcome of an individual and/or a population is a result of the interaction of a variety of socio-cultural factors (Crow, 1966; Cruz-Coke et al., 1966). Therefore, the index sets only an upper limit for the potential action of natural selection and is accordingly renamed as Opportunity for Natural Selection (Crow, 1966). It can be divided into two components—one due to differential fertility and the other due to differential mortality—and does not reveal more than that which is contained in vital statistics. It is therefore descriptive and not analytical (Crow, 1972).

In a number of recent papers, attempts have been made to explore the relationship between the indices of selection and socio-economic conditions (Rajanikumari et al., 1985) and other population structural measures like population size (Reddy and Lakshmanudu, 1979) and inbreeding (Barua, 1976; Rao and Murty, 1984). Few studies have implicated the note of family planning programmes in imposing characteristic differential fertility. In India, Rajnikumari et al. (1985) found a lower index of total selection among the women who had completed their fertility by family planning methods than in women who completed their fertility by attaining menopause. In the present study we have estimated the index of selection potential among Yadavas and Kammas of Krishna and Guntur districts of Andhra Pradesh.

MATERIAL AND METHODS

The study sample was collected from Krishna and Guntur districts of Andhra Pradesh and comprised of 66 Kamma and Yadava mothers who have completed their reproductive life span.

The fertility and mortality data were collected using the questionnaires on different aspects of socio-economic variables and reproductive performance of the women. The index of total selection has been computed following Crow (1958) and Johnston and Kensinger (1971).

RESULTS AND DISCUSSION

Selection intensity has been computed for Yadavas, Kammas and for total of both communities, which was based on differential fertility and mortality. The methodology of Crow (1958) and Johnston and Kensinger (1971) was used for this purpose. The total index of selection was found to be higher among Kammas using

Crow's and Johnston and Kensinger's approach.

Table 1 shows analysis of fertility and mortality data in 66 Yadava and Kamma community women who have completed their reproductive life span. Yadavas show higher average number of live births (5.41 ± 3.29) than Kammas (4.56 ± 2.69). The proportion of survivors from birth to reproductive age (Ps) was higher among Yadavas (0.814) than Kammas (0.739).

The indices of total selection (Crow, 1958) among Yadavas, Kammas and for Total of both communities have been computed and presented in table 2. The highest index of selection was found among Kammas (0.827). For Yadavas the index of selection is 0.684, and for total of both it is 0.752.

Table 1: Demographic variables used in calculating selection intensity

Group	*No. of mothers*	*No. of reported pregnancies*	*No. of live births*	*Average no. of live births ± S*	*Variance of live births $V_{\bar{x}}$*	P_s	P_d	P_b	P_s
Yadavas	31	168	156	5.41 ± 3.29	10.85	0.814	0.186	0.928	0.755
Kammas	35	159	138	4.56 ± 2.69	7.28	0.739	0.261	0.868	0.641
Total	66	327	294	4.96 ± 2.99	8.98	0.779	0.221	0.899	0.700

Where: P_s = Proportion of survivors from birth to reproductive age
$P_d = (1 - P_s)$ proportion of pre-reproductive deaths
P_b = Proportion of survivors to death
$P_b P_s$ = Proportion of survivors from early embryo to reproductive age

Table 2: Selection intensities based on live births and subsequent pre-reproductive mortality (Crow, 1958)

Group	I_i	I_m	I_f	I_f/P_s	*Percentage of fertility component*	*Percentage of post-natal mortality component*
Yadavas	0.684	0.228	0.371	0.456	66.67	33.33
Kammas	0.827	0.353	0.350	0.474	57.32	42.68
Total	0.752	0.284	0.365	0.468	62.23	37.77

$I_i = I_m + 1/P_s \times I_f$
where $I_m = P_d/P_s$, and $I_f = V_x/(x)^2$

Table 3: Selection potential based on total pregnancies and total pre-reproductive mortality including embryonic mortality (Johnston and Kensinger, 1971)

Group	I_2	I_{me}	I_{mc}	I_f	$P_b P_s$	I_{mc}/P_b	*Percentage of fertility component*	*post-natal mortality component*	*of embryonic mortality component*
Yadavas	0.815	0.077	0.229	0.371	0.491	0.247	60.25	30.28	9.45
Kammas	1.105	0.152	0.353	0.350	0.546	0.407	49.41	36.80	13.76
Total	0.949	0.112	0.284	0.365	0.521	0.316	54.89	33.29	11.80

$I_2 = I_{me} + 1/P_b I_{mc} + 1/P_b P_s \times I_f$
Where $I_{me} = (1 - P_b)/P_b$ and $I_{mc} = (1 - P_s)/P_s$

The contribution of fertility component is higher in Yadavas (66.67). The percentage of post-natal mortality component is lower in Yadavas (33.33) because of higher percentage of fertility component in the same community. The toatal selection intensity and its components along with fecundity computed by the modified method (Johnston and Kensinger) are given in table 3. Here also Kammas show higher index of selection potential (1.105) than Yadavas (0.815). The contribution of prenatal mortality to the total index of selection is higher in Kammas 13.76 than in Yadavas (9.45). A comparative study of some genetic and genetico-environmental disorders may reflect role of genetic factors in differential prenatal mortality among these two communities.

Further, it can be noted that higher selection intensities are associated with higher mean live births and a higher mortality component in the selection index. However, among Kammas lesser mean number of live births and higher mortality component are recorded. Thus a wide variation is found to be observed in selection intensity among both the communities. Similarly a wide variation in selection indices is found among Vadde, a fishing community of Andhra Pradesh in both fertility and mortality between the villages (Reddy et al., 1986).

Studies among Indian tribes indicate that prereproductive mortality contributes heavily to the process of natural selection, whereas in the populations of industrially developed countries prereproductive mortality is extremely low (Spuhler, 1962; Cavalli-Sforza and Bodmer, 1971). The wandering habits of the Lamanis of Karnataka in the past and their exposure to the natural environment reduced their mortality on one hand and increased the fitness of the population on the other (Srivastava, 1985). While the extent of prereproductive mortality associated with nongenetic causes is not known, it can be presumed that endemic diseases such as malaria, cholera and gastro-intenstinal parasites, which are characteristic of the forest habitat, are responsible for the higher incidence of pre-reproductive mortality. The differences in the relative contribution of fertility component to the total index of selection may also indicate the influence of culture, behaviour, heritability of fertility, and other environmental factors on the fitness of the population. The relatively high incidence of embryonic mortality in the present study indicate that some genetic factors may be responsible for imposing characteristic mortality. differentials through the process of natural selection.

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