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Natural Selection Intensity among Chembadi: An Endogamous Population of Andhra Pradesh

P. Neela Rani, G. Sudhakar and O. Sudhakar*

Department of Human Genetics, Andhra University, Visakhapatnam, Andhra Pradesh, India
**College of Fishery Science, Muthukur, Nellore Dist, Andhra Pradesh, India*

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ABSTRACT Information pertaining to fertility and mortality were collected from 240 Chembadi married women (in the age range of 15 to 40 years) belonging to Nellore District, Andhra Pradesh. Based on the data collected, natural selection intensity indices were computed as per the methods described by Crow, Johnston and Kesinger. The results are compared with other endogamous populations of the state and presented here in this paper.

INTRODUCTION

The natural selection is measured on the chances of survival and reproduction of individuals who have different genotypes. It is identified by the fertility and mortality rates of different genotypes. If there is no genetic variation in fitness, there can be no differential selection and hence, in general, no significant evolutionary change in the genetic content of a population. According to Fisher's (1958), "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. The people of India are socially organized into a number of distinct groups that are largely more or less endogamous and reproductively isolated. This nature provides a good opportunity to understand the dynamics of evolution. Several theories are developed by different population geneticists to study populations in this direction (Fisher 1958; Wright 1938). Crow developed an index that facilitates quantitative estimation of selective pressure provided the reproductive pattern of a population is known (Crow 1958). Later Johnston and Kesinger modified Crow's index by incorporating prenatal mortality (Johnston and Kesinger 1971).

Address for correspondence:
Dr. O. Sudhakar
Associate Professor and Head
Instructional Freshwater Fish Farm,
College of Fishery Science,
Muthukur 524 344,
Nellore District
Andhra Pradesh
Telephone: 0861 - 2377477 (O); 2321455 (R)
Mobile: 09441955481
Fax: 2377579 (F)
E-mail: ogiralasudhakar@gmail.com

METHODOLOGY

Anthropologically fertility is defined as the child bearing activity of a population. Biologically, this term can be defined as the capacity to bear children. The child bearing capacity of Indian women is generally assumed to exist in the age range of 15 to 40 years (Anu and Pravin 2013). For the purpose of the present study, 240 Chembadi married women (in the age range of 15 to 40 years) have been interviewed from Nellore District, Andhra Pradesh. A pre-tested schedule was used for this purpose – covering different aspects such as personal details, age, and detailed information regarding marriage, reproductive performance, fertility and mortality. Other aspects like marriage distance; village endogamy, consanguinity etc. were also covered. Computing of natural selection intensity indices were done using the original formula given by Crow (1958) and modified formula of Johnston and Kesinger (1971).

RESULTS AND DISCUSSION

Consolidated data of fertility and mortality parameters is given in Table 1. This data was used to compute different indices as per the methods described by Crow (1958) and Johnston and Kesinger (1971). The values of the indices are given in the Table 2. The Crow's total index value of the Chembadi population of Andhra Pradesh was found to be 0.4762. The mortality

Table 1: Consolidated fertility and mortality parameters among Chembadis of Andhra Pradesh

Details	*Numbers*
Number of conceptions	619
Abortions	66
Still births	44
Total prenatal deaths	110
Live births	509
Neonatal deaths	49
Infantile deaths	38
Juvenile deaths	22
Adolescent deaths	19
Total Postnatal deaths	128
Total deaths	238
Total surviving offspring	381

Table 2: Natural selection indices among Chembadis of Andhra Pradesh

Selection component	*Value*
Crow's Index	
Mortality component (I_m)	0.0874
Fertility component (I_f/P_s)	0.3888
Total Index (I)	0.4762
% of fertility component	81.65
% of mortality component	18.35
Johnston and Kesinger's Index	
Prenatal mortality component (I_{me})	0.0482
Postnatal mortality component (I_{me}/P_b)	0.1056
Fertility component (If/P_bP_s)	0.3883
Total Index (I)	0.5421
% of fertility component	71.63
% of prenatal mortality component	8.89
% of postnatal mortality component	19.48

component was found to be 0.0874 while the fertility component was observed to be 0.3888. In terms of percentage, the fertility component was observed to be 81.65% while mortality component was observed to be 18.35%. Hence, the contribution of fertility component to the total of index is more than that of mortality component of Chembadi population. Similar trends were reported by Raju and Prakash (2009) in Kapus; Dharani et al. (2003) in Kshatriyas; Lakshmi et al. (2005) in Arya Vysya, Kalinga Vysya and Trivarnika communities. Sarma (2013) had reported much higher mortality component among Mishing Minyong.

As per the modified formula of Johnston and Kesinger (1971), total index value was found to be 0.5421. Fertility component was observed to be 0.3883, while the prenatal and postnatal mortality components were found to be 0.0482 and 0.1056 respectively. In terms of percentage the fertility component was 71.63%, while the prenatal and postnatal mortality components were observed to be 8.89 % and 19.48 % respectively. This index was found to have higher value than Crow's index because of the contribution of prenatal mortality. Contribution of postnatal mortality is higher than the prenatal mortality. Similar trends were reported by several other workers

CONCLUSION

In Chembadi population, the fertility component was observed to be to be more than mortality component. The contribution of postnatal mortality is found to be higher than the prenatal mortality. This shows improved health services to the Chembadi population.

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