

Genetic Demography of the Ladiya of Sagar District, Madhya Pradesh

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ABSTRACT The data of the present study were collected on 204 couples of the Ladiya, a sub-group of the Chamar scheduled caste community, residing in Pathariya Jat village of Sagar district of Madhya Pradesh. A genetical demographic survey was undertaken among them to understand the mechanism of microevolution undergoing in the population. The study reveals that the effective breeding population size is 457.86, which is 51.56 percent of total population size. Admixture rate is very low (0.0045) and propensity of drift is 0.000273, whereas, the coefficient of breeding isolation is 2.061. The indices of opportunity for natural selection calculated according to Crow (1958) is 0.5216.

INTRODUCTION

The human species is highly polymorphic in nature showing a wide range of variation in many phenotypic as well as genetic characteristics, and population genetics is basically concerned with the understanding of the nature and source of variation through interaction of evolutionary forces (Crow, 1958).

Fertility and mortality are the important demographic variables which are of considerable interest to the student of anthropological genetics as these variables are the important measures of micro-evolutionary dynamics. Differential fertility and mortality acting individually or jointly are most fundamental events of natural selection and selection is one of the major evolutionary factors that brings about changes in the gene frequencies in a population. Differential contribution to the gene pool is the important measure of natural selection which on the other hand is the function of fertility and survival differential (Barua, 1983).

Micro level study on these aspects is very few in the state of Madhya Pradesh. More so there is no such study among any scheduled caste group in this state. The present paper is an

attempt to understand same aspects of genetic demography among the Ladiya of Sagar, a scheduled caste of Madhya Pradesh.

MATERIAL AND METHODS

Data for the present study were collected on 204 couples of the Ladiya, a sub-group of Chamar scheduled caste community, residing in Pathariya Jat village of Sagar district, Madhya Pradesh. A door to door survey was conducted, using structural schedule, during the month of September 1998. This village lie between 23°48' north latitude and 78°47' east longitude. To obtain the data on age retrospective method depending on recall was applied and cross-checked from a number of elderly individuals.

RESULTS AND DISCUSSION

Effective Breeding Population Size: The contemporary breeding size (N) of the Ladiya population is 408. As per wright's (1938, 1940) method of estimation the effective size,

$$N_e = \frac{4N - 2}{K + 2} = 457.86$$

where K = variance due to family size.

This N_e is 51.56 percent of the breeding population (N)

Admixture Rate: Admixture is one of the sources of variation. As the human society do not restrict itself to distinct geographical and social boundaries there are always some scope of genetic admixture through marriage or otherwise (Panda and Satpathi 1996).

Method of estimating the admixture rate is given by Laskar (1952), which is as follows:

$$M = \frac{n/2 + n' - 1}{N}$$

where,

n = one parent from other population

n' = both parent from other population

N = total population

In the present population n , n' and N are found to be 6, 2 and 888 respectively. According to this formula the admixture rate among the Ladiya is found to be 0.0045, which indicates a low rate of admixture among them.

Drift: Variance due to random genetic drift according to the formula of Wright is :

$$VK^2dg = \frac{q(1-q)}{2Ne}$$

Where VK^2dg represents the variance due to drift, q stands for the gene frequency (here taken as 0.5) as Ne is effective size.

Propensity of drift according to this formula is 0.000273, which indicates a very low value in the studied population.

Coefficient of Breeding Isolation (Nem): It is obtained by multiplying effective population size by admixture rate. Nem according to this formula is found to be 2.061 among the Ladiya. Like the drift in this case also the obtained value indicates a very low level.

Opportunity of Selection: Natural selection is measured by the number of fertile progeny an individual leave in relation to other individuals in a population (Panda and Satpathi, 1996). This differential reproductive success is measured with the help of mathematical models.

Crow (1958) proposed a formula for the calculation of total intensity of selection (I). This method is useful for assessment of natural selection appearing in any human population, which is as follows :

$$I = I_m + I_f / P_s$$

where,

I_m = mortality component = P_d/P_s

I_f = fertility component ($Vf / \bar{x}^2$)

P_s = survivors to mortality

In the present study out of 204 mothers there were 64 mothers who stop breeding child. These women have been taken for completed fertility career. By using the values obtained from the Ladiya sample, the following results have been obtained by applying crows formula i.e,

$I_m = 0.3966$, $I_f = 0.0895$, $P_d = 0.2840$, $P_s = 0.7160$, and $I = 0.5216$.

This indicates that the component of mortality (I_m) is greater than the fertility (I_f) suggesting that natural selection broadly operating at the level of differential mortality than on differential fertility among the Ladiya. However, the intensity of total selection (I) is found to be moderate among them.

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