# Some aspects of Population Genetics of the Goswami of Chhattisgarh

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## *ABSTRACT*

*Some parameters of population genetics are dealt for the Goswami population of Chhattisgarh. Ne is found to be 54% of the breeding population. Rate of admixture is very low (0.0008) in this population. It appears from the value of indices of selection intensity that fertility component is greater than the mortality component, suggesting natural selection is operating at the level of differential fertility than mortality.*

***Key words:** Population Genetics. Natural Selection. Goswami. Chhattisgarh*

## INTRODUCTION

Population genetics is concerned with the genetic composition of a population, which deals with Mendelian population. According to Dobzhansky, a Mendelian population can be defined as a reproductive community of individuals, which share a common gene pool. Different caste groups in India, bound together by a network of marriages and of common descent, generally form Mendelian population.

Crow (1958) is of the opinion that," 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 (cf. Panda and Satpathi 1996)".

Although through marriage gene exchange takes place it does not occur at random within a population. In human populations, assortative mating play a vital role. Evolutionary processes operate through demographic structure and events occurring in the population

determine the type of genetic materials that would be transmitted to the succeeding generations (Panda and Satpathi 1996).

In this study, an attempt has been made to examine some aspects of population genetics among the Goswami community of Chhattisgarh.

MATERIAL AND METHODS

As the Goswami are very scattered in distribution, necessary information, related to present study, have been collected from different locations of Chhattisgarh. Different villages of Raipur, Balod, Rajnandgaon, Durg, and Bastar districts in the state of Chhattisgarh were visited in the months of    February and March, 2022. Altogether 131 mothers have been interviewed. A total of ever married Goswami women 48 were older than 45 years. The index of opportunity of selection (I) and its fertility and mortality components (If and Im) were calculated following the formulae of Crow (1958) and Johnston and Kensinger (1971).

Goswami is an order of religious mendicants who worship Lord Shiva. We can observe a lot of variation in the Primary occupation of the Goswami. A high percent of the males are engaged in various private jobs (13.04%) like steel plant, various companies, industries, shops and schools. While the second major portion of male are manual labour (11.59%).They speak in Chattisgari and Hindi languages. In Chattisgarh, the Goswami have been incorporated in the list of Backward Classes/Other Backward Class and the Government of India also categorized them as Backward Classes/Other Backward Class. Goswami are follower of *Sanatana Dharma* of Hindu religion. Goswami prefer caste endogamous marriage, and practice clan (Madhi) exogamy.

RESULTS AND DISCUSSION

In this paper, some aspects of population genetics like effective population size, genetic drift, co-efficient of breeding isolation, admixture rate and opportunity for natural selection of the studied population are dealt with.

Effective population size

According to Wright's method of estimation, the effective population size

$$Ne = \frac{4N-2}{K+2} = 145$$

Where, N= number of spouses who are in wedlock and breeding and breeded (including the recently married husbands and wives)

K= variance due to fertility

This Ne (i.e. 145) is 54% of the breeding population (N).

Genetic drift:

Variance due to random genetic drift according to Wright's method is

$$VK^2dg = \frac{q(1-q)}{2\,Ne} = 0.00043$$

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

Coefficient of breeding isolation (Nem):

It is obtained by multiplying effective population size by admixture rate.

Therefore, Nem = 145×0.0008 = 0.116

Admixture rate:

Lasker (1952) offered method of estimating rate of admixture:

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

Where, n = one parent from other population

n' = both parent from other population

N = total population

Therefore, M = 0.00088 or 0.088%

Opportunity for natural selection:

In Table 1 the indices of selection intensity according to Crow (1958) and Johnston and Kensinger (1971) have been presented. It appears that the component of mortality (Im: 0.2621) is lower than the componentof fertility (If: 0.2708). In turn, embryonic mortality component (Ime: 0.0692) is found to be lower than that of the fertility component. Thus, it reveals from both the calculations that differential fertility contribute more towards the total opportunity for selection in comparison with differential mortality. It is further noticed that index of total selection (I) calculated according to Johnston and Kensinger (1971) is comparatively higher than that calculated according to Crow (1958), this is due to the inclusion of embryonic deaths in the earlier one.

Table 1: Indices of selection intensity

| Calculated according to Crow's (1958) formula | | | Calculated according to Johnston and Kensinger (1971) formula | | | |
|---|---|---|---|---|---|---|
| $I_m$ | $I_f$ | $I$ | $I_{me}$ | $I_m$ | $I_f$ | $I$ |
| 0.2621 | 0.2708 | 0.6039 | 0.0692 | 0.2621 | 0.2708 | 0.7148 |

In the present study Ne is found to be 54% of the breeding population. Panda and Satpathi (1996) are of the opinion that propensity of genetic fluctuation between generations is dependent on the effective size (Ne) of population. Results of the present study corroborate the view of Panda and Satpathi (1996). Admixture is one of the sources of variation. As the human society doesn't restrict itself to distinct geographical and social boundaries, there is always some scope of genetic admixture through marriage or otherwise (Panda and Satpathi 1996). Among the Goswami of Chhattisgarh rate of admixture is found to be 0.00088, which indicates a very low rate of admixture. It appears from the indices of selection intensity that the component of fertility is greater than the mortality suggesting that natural selection is operating at the level of differential fertility than on differential mortality.

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