

Raji – A Food Gatherer and Hunter Primitive Tribe of Uttaranchal: A Study of Selection Intensity

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INTRODUCTION

Differential fertility and differential mortality are two major forces of natural selection, responsible for changes in the gene frequencies in a population. Selection intensity is a measure of the fitness of population as expressed by the going patterns of differential fertility and differential mortality combined in a particular manner. The index of opportunity for selection measures the maximum potential rate of change by selection, where zero indicates no change (Livingston and Spuhler, 1976). An indirect method for computing the index of total selection based on the maximum amount of differential fertility and differential mortality in a population was formulated by Crow (1958) and modified by Johnston and Kensinger (1971) incorporating the embryonic mortality component.

Bio-demographic consideration like differential fertility and differential mortality vary not only with biogenetic factors but also with sociocultural, religious, ethnic and environmental. Since Crow (1958) introduced the total index of opportunity for natural selection, several populations have been studied to find out the evidence that socioeconomic and cultural levels play an important role in the relative contribution of the mortality and fertility components to the total index of selection (Spuhler, 1962; Cavalli-Sforza and Bodmer, 1971). Studies on Indian caste and tribal population (Ghosh, 1970; Basu, 1971; Reddy and Lakshmanudu, 1979; Gopalkrishnan et al., 1980; Murthy and Ramesh, 1978; Garg et al., 1980; Sirajuddin and Basu, 1984; Padmanabhan, 1985; Basu et al., 1988; Khongsdier, 1990, 1994; Patra and Kapoor, 1997; Sarkar, 1997; Kapoor and Kshatriya, 2000), which are generally characterized by poor nutrition, higher incidence of diseases, and large family size, have supported this observation. In a critical review of data among the Indian populations, Reddy and Chopra (1990) have shown how I_m and I_f gradually decreases with improving socio-economic and technological status. Again they found that 70% of the tribal populations studied so far show larger mortality component and consistently lower I_m than I_f , about which they felt better accessibility

to public health is the reason.

In India within the tribals there are some population groups recognized by Government of India known as "primitive tribal groups" based on the criteria such as –pre-agricultural level of technology; low level of literacy and stagnant or diminishing population. There are 75 primitive tribes in India and the Central and State governments are making financial allocation to these primitive groups for their various developmental programmes. Several developmental programmes have been under taken to bring them into the mainstream of the nation. It has been observed that the rate of fertility varies not only from region to region but also within the source group in different section and it largely depends upon the environmental effects as well as the biological make up. Further it is observed that the ability of a population to adapt to its environment depends on its fertility, population growth, sociocultural norms and bio-physiological stress and strain. These studies are important on Himalayan populations for formulating and implementing better health care programmes because they are exposed to various type of health hazards which lead to higher mortality due to lack of modern health care facilities, differential altitude and awareness. In the present paper an attempt has been made to study the opportunity for natural selection based on Crow (1958) and Johnston and Kensinger (1971) formula, in Raji- A food gatherer and hunter primitive Tribe of Uttaranchal, formerly Uttar Pradesh, North India.

Each regions of Himalayas present a bio-cultural diversity. In the Central Himalayan region, which constitutes the eight hills districts of Uttaranchal State, there are only two primitive tribes namely the Raji and the Bhoksa. The Bhoksas are having agricultural economy where as the Raji are in a transitional stage between food hunters and gatherers and pre-agricultural economy. They are found in the sub-mountain region of district Pithoragarh of Uttaranchal. Outside Pithoragarh, Raji are to be found in neighbouring country of Nepal only, where they are known as Raute (Reinhard, 1974). The Raji are an extremely small tribe and it was estimated as 22 in number according to 1901 census.

Grierson (1909) estimated as 200 during the course of his linguistic survey and in 1950-51 it was reported to be 312 (Tiwari, 1980) and it was 226 (Census, 1971) and total population was reported to be 338 in 1977 survey (Tiwari, 1980). In 1979, the total number of Raji was 371 (Anonymous, 1979), in 1988 it was 456 (Bora, 1988) and it was 630 in 2001 (Patra, 2001). The total population is the present study has been found to be 473 in 1995-96. It has been observed that Raji moves to Nepal quite frequently for many reasons. They live in nine scattered villages covering three tehsils of the district Pithoragarh. Raji are divided into a number of exogamous patrilineage clans. In earlier days Raji were dependent on hunting gathering. In the post-independence era, the economies of Raji have undergone considerable change through various developmental programmes like resettlement, dairing, agricultural etc. At present, most of the male members are working as labourers (but not throughout the year) and the females keep themselves busy in cutting the firewood and grass and selling in the nearest markets. Few of the families in interior areas also practice food gathering and hunting activities till now. Rice is their staple food with some wild vegetables like tubers locally known as *Tarur* (Kapoor, 1998).

MATERIALS AND METHODS

For the present study, reproductive histories and family pedigrees were obtained from the Raji from nine villages namely Kimkhola, Bhoktirawa, Kantoli, Kuta Chaurani, Khirdwari, Altadi, Kutta Kanyal, Madanpuri and Ciphaltara in the Pithoragarh district of Uttaranchal State (Formerly Uttar Pradesh) during October 1995 to March 1996, the villages are very intensely situated in the dense forests and quite far away from the road and other facilities. Out of all 105 households, necessary information's were collected from 73 married women and the data presented here comprised of 28 women who has completed 40 years. The fertility and mortality data were collected using structured schedule, indepth interviews and detail pedigrees with more emphasis on fertility and mortality measures obtained by house-to-house visit. The age of the subjects were recorded following crude estimation of age and correlation with certain local events as there is no written record available for Raji. The index of opportunity for selection (I_s) and its fertility and mortality components (I_{fe} , I_{me}) were calculated following the formulae of Crow and

Johnston and Kensinger (1971)

RESULTS AND DISCUSSION

Table 1 presents the value used in computing the selection potentials included in addition to number of women aged 40+ years (28), number of reported pregnancies (155), number of livebirths (132), proportion of survivors to birth ($P_b=0.8516$), proportion of death before 15 years of age ($P_d=0.3106$) and of embryonic death ($P_{ed}=0.1742$), mean number of livebirths per women aged 40+ years ($\bar{x}=4.71$), and variance of livebirths due to fertility ($V_f=7.13$).

Table 2 shows the indices of selection intensity calculated according to both Crow (1958) and Johnston and Kensinger (1971). According to Crow's formula the values of I_s , I_{fe} and I_{me} are 0.4505, 0.3214 and 0.9167, respectively and when embryonic mortality was incorporated according to Johnston and Kensinger formula the values are found to be 0.2046, 0.4504, 0.3214 and 1.2810 for I_s , I_{fe} , I_{me} and I_e , respectively. Hence it is evident that mortality component contributes more to the total selection intensity than fertility component.

In a critical review of data on the index of total selection intensity calculated following Crow's formula among ninety-six Indian populations, Reddy and Chopra (1990) observed that the value of (I_s) varies from 0.258 among a subgroup of Yanadi of Andhra Pradesh to 2.250 among the Kota-I of Nilgiri Hills, Tamil Nadu. The fertility component (I_{fe}) varies from 0.018 among the Sao Tili of Maharashtra to 0.815 among the Kota, and the mortality component (I_{me}) varies from 0.053 among the Yanadi to 1.062 among the Mala of Andhra Pradesh. The results of the present study indicate that the value of I_s and its fertility and mortality components tends towards the

Table 1: Data used in calculating the index of total selection intensity among the Rajis

S. No.	Parameters	Values
1.	Number of Women Aged 40 years	28
2.	Number of Reported Pregnancies	155
3.	Number of Live Births	132
4.	Proportion of Survivors to Birth (P_b)	0.8516
5.	Proportion of Child Death; Death before 15 years (P_d)	0.3106
6.	Proportion of Embryonic Death (P_{ed})	0.1742
7.	Mean Number of Live Births per Mother aged 40+ years ($\bar{x}$)	4.71
8.	Variance (V_f)	7.13

Table 2: Indices of selection intensity among the Raji

According to Crow (1958)			According to Johnston and Kensinger (1971)			
I_m	I_f	I_t	I_{me}	I_{mf}	I_{ft}	I_t
0.4505	0.3214	0.9167	0.2046	0.4505	0.3214	1.2810

upper half of the range. These findings are in conformity with those for the Chenchu of Andhra Pradesh (Sirajuddin and Basu, 1984); Apathani of Arunachal Pradesh (Padmanabhan, 1982); Hajong (Barua, 1983); Pnar of War Khasi of Meghalaya (Khongsdier, 1990, 1994); Irula (Reddy, 1983); Kota-I (Basu, 1972), Kota-II (Ghosh, 1970); Bhoksa of Uttar Pradesh (Garg et al., 1980); Toto of West Bengal (Debnath and Sen, 1983).

Out of 75 primitive tribal groups, data on selection intensity are available only on eight primitive tribes so far. Table 3 presents the data on primitive tribes and the mean livebirths varies from 3.73 among the Kota II (Basu, 1972) to 7.63 among the Toto (Debnath and Sen, 1983). The total selection intensity (I_t) varies from 0.356 among the Bhoksa (Garg et al., 1980) to 2.250 among the Kota-I (Basu, 1972) [which incidentally is the highest value among Indian population groups] operates more through mortality component (I_m) varying from 0.282 among the Bhoksa (Garg et al., 1980) to 0.790 among the Kota-I (Basu, 1972). Again the fertility component (I_f) varies from 0.058 among the Bhoksa to 0.815 among the Kota-I. Here, the value of I_m , I_f and I_t among the Raji falls more towards the higher strata of ranges among the primitive tribal groups.

The different values of (I_m , I_f and I_t) on various Indian caste and tribal population groups reported by Reddy and Chopra (1990) when compared with the primitive tribal groups studied so far it has been observed that there is a clear trend of decrease in mean I_m and I_t and marginal decline in I_f . In most the cases (except Kota-I and

II) mortality is a more important force and also contributes more in the selective operation. The above situation among the primitive tribal groups may be the product of their less accession to socio cultural advancement and technological modernization, absence of awareness, low socio-economic conditions, hunting and gathering life style, lack of medical facilities, insanitary conditions, lack of personal hygiene, health education and ignorance, high birth rate, low proportion of survivors up to birth, high rate of embryonic and premature death and may be some genetic or epidemiological factors responsible for high selection intensity among the primitive tribes and with conformity among the Raji. It appears that the primitive tribes in India are in the first phase of demographic transition with more fertility and mortality.

In this present study, it has been observed that selection is due to mortality component rather than fertility. Hence, there is more scope for selection to act in primitive tribal groups in general and Raji in particular through differential mortality than fertility. The higher mortality among these primitive tribal groups and Raji in particular may be due to poor health infrastructure, differential altitude, socio-economic, socio-medical pattern and its low level of awareness.

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Table 3: Indices of opportunity for natural selection in primitive tribes of India

S. No.	Population	Live births		Crow (1958)			Reference
		Mean	Variance	I_m	I_f	I_t	
1.	Raji	4.17	7.13	0.4505	0.3214	0.9167	Present Study
2.	Chenchu	5.70	6.65	0.500	0.200	0.810	Sirajuddin & Basu (1984)
3.	Kolam	5.65	9.42	0.443	0.295	0.870	Murthy & Ramesh (1978)
4.	Irula	5.03	9.36	0.327	0.370	0.818	Reddy (1985)
5.	Kota-I	4.10	13.70	0.790	0.815	2.250	Basu (1972)
6.	Kota-II	3.73	8.87	0.445	0.638	1.367	Ghosh (1970)
7.	Bhoksa	6.45	2.40	0.282	0.058	0.356	Garg et al. (1980)
8.	Toto	7.63	5.82	0.320	0.100	0.550	Debnath and Sen (1983)

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KEY WORDS Selection Intensity. Fertility. Mortality. Primitive Tribe.

ABSTRACT The index of total opportunity for selection based on differential fertility and mortality have been calculated for the Raji – a primitive tribe of Central Himalayas of Uttaranchal State in Northern India. The value of total selection intensity (I_t) is found to be 0.9167 (according to Crow, 1958) and 1.2810 (according to Johnston and Kensinger, 1971) and which operates more through mortality component than fertility component by both the methods. It has been found to be more closer to the higher value of the caste and tribal population groups (0.258-2.250) in general and primitive tribes (0.356-2.250) in particular.

REFERENCES

- Anonymous: *Special Scheme for the Development of the Raji – a Primitive Tribal Group of U.P.*, Govt of U. P., Lucknow, India (1979).
- Basu, A.: A Demographic study of Kota of Nilgiri Hills. *J. Ind. Anthropol. Soc.*, 7: 29-45 (1972).
- Basu, S., Kshatriya, G. and Jindal A.: Fertility and mortality differential among the tribal population groups of Bastar district, Madhya Pradesh, India. *Hum. Biol.*, 60 (3): 407-416 (1988).
- Bora, H.S.: Cave dwellers of Himalayas- Rajis a primitive tribal group of Uttar Pradesh. In: *Seminar: Tribal Situation in U.P.* Yojana Bhawan, Lucknow, Feb. 19-21 (1988).
- Census of India 1971: *Uttar Pradesh*.
- Cavalli-Sforza, L. L. and Bodmer, W.F.: *The Genetics of Human Populations*. W.H. Freeman, San Francisco (1971).
- Crow, J.F.: Some Possibilities of measuring selection intensities in man. *Hum. Biol.*, 30: 1-13 (1958).
- Debnath, S.K. and Sen, T.: Selection intensity in the Toto of Jalpaiguri Hills, West Bengal. *J. Ind. Anthropol. Soc.*, 18: 79-81 (1983).
- Garg, S.K., Sankyan, A.R. and Tyagi, D.: Selection intensity in the Bhoksa of Doon Valley, Uttar Pradesh. *Bull. Anthropol. Surv. Ind.*, 28: 12-16 (1980).
- Ghosh, A.K.: Selection intensity in the Kota of Nilgiri Hills, Madras. *Soc. Biol.*, 17: 224-225 (1970).
- Gopalkrishnan, Rao, K.R. and Sahel, S.Y.: Genetical demography of the Car-Nicobarese (cited in Sirajuddin and Basu, 1984) (1977).
- Grierson, G.A.: *Linguistic Survey of India*. Govt. of India, New Delhi (1909).
- Johnston, F.E. and Kensinger, K.M.: Fertility and mortality differentials and their implications for micro-evolutionary change among the Cashi-nahua. *Hum. Biol.*, 43: 356-364 (1971).
- Kapoor, A.K. Dilemma of caste-tribe and tribe-caste transformation. pp. 119-138. In: *Backward Communities: Identity, Development and Transformations*. V.K. Pant and B.S. Bisht (Eds.). Gyan Publishing House, New Delhi (1998).
- Kapoor, A.K. and Kshatriya, G.K.: Fertility and mortality differentials among selected tribal populations groups of north-western and eastern India. *J. Bio Soc. Sci.*, 32: 253-264 (2000).
- Khongsdier, R.: The Pnar of Sutnga and Moopala villages: A study in selection intensity. *J. Ind. Anthropol. Soc.*, 25: 182-184 (1990).
- Khongsdier, R.: Opportunity for natural selection among the War Khasi of Meghalaya, India. *J. Hum. Ecol.*, 5: 307-310 (1994).
- Livingston, F.B. and Spuhler, J.N.: Cultural determinants of natural selection. *Int. Soc. Sc. Journ.*, 17: 118-120 (1965).
- Murthy, J.S. and Ramesh, A.: Selection intensities among the tribal populations of Adilabas District, Andhra Pradesh, India. *Soc. Biol.*, 25: 302-305 (1978).
- Padmanabhan, P.B.S.V.: Selection intensity among the rural and urban Naika of Gujarat. *Anthropology*, 23: 101-103 (1985).
- Patra, P.K. and Kapoor A.K.: Opportunity for natural selection among the Dalu of West Garo Hills, Meghalaya. *J. Hum. Ecol.*, 8(2): 127-129 (1997).
- Patra, P.K.: *Demographic Profile with References to Development Programmes Among the Rajis: A Primitive Tribe of Uttaranchal*. Ph. D. Thesis Submitted to the University of Delhi (Unpublished) (2001).
- Reddy, B.M.: Opportunity for natural selection among the three migrant Groups of fishermen of Puri, India. *Soc. Biol.*, 30: 335-338 (1983).
- Reddy, B.M. and Chopra, V.P.: Opportunity for natural selection among the India population. *Am. J. Phys. Anthropol.*, 83: 281-296 (1990).
- Reddy, P.C. and Lakshmanudu, M.L.: Indices of opportunity of selection in Mala, Madiga and other Indian populations. *J. Ind. Anthropol. Soc.*, 14: 245-252 (1979).
- Reinhard, J.: The Barrajs – A vanishing Himalayan tribe. *J. of the Institute of Nepal and Asian Studies*, 4(1): 1-21 (1976).
- Sarkar, N.C.: Opportunity for natural selection among the Muklom of Arunachal Pradesh. *Curr. Anthropol.*, 38: 140-143 (1997).
- Sirajuddin, SM. and Basu, A.: Population structure, consanguinity and its effect on fertility and mortality among Chenchu of Andhra Pradesh. *Hum. Sci.*, 33: 179-200 (1984).
- Spuhler, J.N.: The maximum opportunity for natural selection in some human populations. In: E.B.S. Zubro (Ed.): *Demographic Anthropology: Quantitative Approaches*. University of New Mexico Press, Albuquerque (1976).
- Tiwari, S.C.: Population structure and changing subsistence pattern of the Raji: A hunting gathering community of the Indo-Tibetan Border. In: I.P. Singh and S.C. Tiwari (Eds.). Concept Publishing Company, New Delhi (1980).

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