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Micro-Evolutionary Dynamics in Reddis of Andhra Pradesh

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INTRODUCTION

Evolution is an ongoing process mainly through selection and selection itself manifests through fertility and mortality differentials in any population. The demographic processes namely fertility and mortality are the chief features of a population as they directly relate to breeding and effective size, and opportunity of selection. All these put together turn out to be micro-evolutionary dynamics of a population with specific gene pool. Wright (1951), Schull and Mac Cluer (1968) have emphasized the importance of these evolutionary pressures in understanding the genetic structure of a population. They however suggest that mating systems and effective size constitute the essential components of a population structure.

There are quite good number of studies on different populations all over the country highlighting the demographic data mostly for opportunity of selection (Basu, 1967; Barua, 1976; Chengle Reddy and Lakshmanudu, 1979;Mohan Reddy and Chopra, 1987; Suri Babu and Bhasin, 1991; Reddy, K.N., 1991). Continued data on other aspects like, the breeding and effective size, genetic drift and migration, if any, or meagre. Further, an integrated approach of all these evolutionary pressures on the demographic situation of a population is yet not possible. The present paper attempts to integrate the outcome of evolutionary pressures like breeding size, effective size, migration and genetic drift on the demographic situation in four endogamous subcastes of Reddis, namely Desuri Reddis (DSR), Pedakanti Reddis (PKR), Motati Reddis (MTR) and Kodide Reddis (KDR) from Chittoor, Cuddapah and Anantapur districts of Rayalaseema region in Andhra Pradesh.

MATERIAL AND METHODS

The materials for the study are drawn from the Reddis, the Telugu speaking, most numerous single caste in Andhra Pradesh. More than 88 sub castes are reported among them. In certain areas some sub castes are more dominant both numerically and economically than in other areas. They are mostly cultivators and land owners. Agriculture is their mainstay of economy. Subcaste endogamy is strictly maintained. Monogamy is the general pattern of marriage. Literacy rate is high compared to the neighbouring caste populations.

Data on 800 couples,200 from each of the four subgroups of the Reddis have been utilized for the present analysis. Out of these 800 couples,585 women are those in the current fertility age, *i.e.*, 15-44 years, while 215 are those women who have completed the reproductive age of 45 years and above. The index of total selection has been computed following Crow's 1958 and Johnston and Kensinger (1971). The effective population size is calculated according to Wright's formulae (cf. Sen,1976).

RESULTS AND DISCUSSION

The breeding size (N), effective size (Ne) and genetic drift calculated for Reddis are shown in table 1 and a comparison of these with some Indian populations in table 2. The breeding and

Table 1: Effective population size and genetic drift among the Reddis

Population	*Breeding size (N)*	*Mean No. of living children*	*Variance of living children*	*Effective population size (Ne)*	$\sigma^2 dq$
DSR	474	2.10	0.72	694	0.0001801
KDR	550	2.47	1.10	709	0.0001763
MTR	541	2.21	0.66	813	0.0001538
PKR	496	2.49	0.89	685	0.0001822
Pooled	2061	2.33	0.91	2832	0.00004414

Table 2: Breeding size, effective size and genetic drift in some populations

Population	*Breeding size (N)*	*Effective size (Ne)*	*No. of living children per couple*		*Genetic drift*	*Source*
			Mean	*Variance*		
Reddi	2061	2832	2.33	0.91	0.00004414	Present study
Kota*	509	347	3.73	8.87	-	Ghosh, 1976
Irula*	1426	1290	3.86	5.43	-	Reddi, K.N. 1991
Sugali*	579	496	2.45	2.66	0.00025	RamachandraReddy,1984
Tangala Mala**	802	652	2.59	4.13	-	Chengal Reddy, 1979
Madiga**	2071	1759	2.81	4.21	0.0000711	Rajasekhara Reddy, 1984
Dhobi***	720	563	2.76	4.89	0.0002224	Subhashini, 1984

* Tribal population
** Scheduled population
*** Backward population

effective sizes assume their importance in the overall genetic composition of the populations. It is expected in all traditional communities that the effective size is always much smaller than breeding size. This is mainly due to the fact that the effective population size is a measure of the reproductive potential of the population, *i.e.*, the number of individuals really contributed to the genetic composition of the next generation. If the variance of the mean number of children of the parents and the variance due to random drift varies greatly then the effective size is reduced considerably. Otherwise, if there is no variance in the offsprings of the parents and in the absence of drift or migration and reduced mortality, the population gets reversal, there by the smaller breeding size and larger effective size. This trend is observed in the present series of Reddi population, where the breeding size among the pooled Reddis is lower (2061) than the effective size (2822). This is due to the smaller mean number of children (2.33) and lower values of variance of living children (0.91). Further, as has been found that there occured no migration among the studied groups of Reddis in the recent past and thus the variance due to random genetic drift is also negligible (0.00004414). The results indicate that the Reddis are modern and technologically developed population. The comparison between Reddi and other populations (Table 2) further strengthens the view where Reddis fall apart from tribal, schedule and other backward castes in whom the breeding size is larger than effective size because of higher variance and mean number of children.

The breeding and effective sizes have given us only a limited picture of the demographic situations of the population. However, the dynamics of demographic processes namely fertility and mortality would add to the total picture as the opportunity of selection is a measure of differential fertility and mortality of the population. The indices of mortality, fertility and total selection potential of the Reddis are given in table 3. The selection intensity (I) in the pooled Reddi population according io original method of Crow is 0.4128 in which index of selection due to fertility component (If :0.2748) is moderately higher than the index of mortality component (Im:0.2022). However, the total selection intensity (I) value varies according to the modified method of Johnston and Kensinger (I:0.6552). The values of the selection intensity through fertility and mortality indices for subcaste wise also show the same trend. Further, it is clear that the rate of change due to fertility, and mortality differentials by selection is more due to the fertility than the mortality component. Table 3 also highlights that in the present series of Reddi populations the proportion of survivals to births is greater than the proportion of premature deaths, which means the lower mortality within the mean living children.

The results of the present study have been compared with those of some tribal and caste populations to assess the role of selection potential through differential fertility and mortality (Table 4). It highlights on the whole that the total selection potential is higher among the tribal populations indicating higher prenatal and child mortality to the process of natural selection. However, the selection is moderate in many of

Table 3: Indices of selection potential among the Reddi groups

Reddi groups	*Basic data*			*Indices of selection potential*						
				(Crow, 1958)			*(Johnston & Kensinger, 1971)*			
	Mothers completed manopausal	*Preg-nancies*	*Survivors upto 15 yrs*	*Im*	*IF*	*I*	*Ime*	*Imc*	I_f	*I*
DSR	63	221	164	0.2195	0.3005	0.4764	0.1099	0.2195	0.3005	0.7573
KDR	43	245	188	0.2501	0.2066	0.3008	0.0425	0.25	0.2066	0.5723
MTR	65	300	234	0.1966	0.2153	0.3433	0.0857	0.1966	0.2153	0.5724
PKR	44	187	151	0.1325	0.2227	0.3561	0.9941	0.1325	0.2227	0.5201
Pooled	215	953	737	0.2022	0.2748	0.4128	0.0824	0.2022	0.2748	0.6552

Table 4: Index of opportunity of selection in some Andhra populations

S.No.	*Population*	*Selection potential*			*Source*
		Im	*If*	*I*	
1	Reddi	0.20	0.27	0.66	Present study
2	Vadde-I	0.03	0.76	0.58	Mukherjee, 1974
3	Madiga-I	0.30	0.07	0.39	Mukherjee, 1974
4	Vadde-II	0.07	0.34	0.33	Mukherjee, 1974
5	Mala-I	0.01	0.21	0.24	Mukherjee, 1974
6	Pardhan*	0.80	0.38	1.19	Murthy & Ramesh, 1978
7	Manne Kolam*	0.54	0.47	1.01	Murthy & Ramesh, 1978
8	Hill Kolam*	0.35	0.38	0.73	Murthy & Ramesh, 1978
9	Raj Gond*	0.35	0.38	0.72	Murthy & Ramesh, 1978
10	Madiga-II	0.24	0.43	0.77	Chengal Reddy & Lakshmanudu, 1979
11	Mala-II	0.22	0.29	0.58	Chengal Reddy & Lakshmanudu, 1979
12	Palli Reddi	0.34	0.19	0.73	Subhashini, 1981
13	Balija	0.20	0.26	0.63	Gunasundaramma, 1980
14	Yerukala*	0.44	0.35	0.94	Narahari, 1982
15	Pokanati Reddi	0.17	0.16	0.35	Rami Reddy & Chandrasekhar Reddy, 1984
16	Pedakanti Reddi	0.21	0.22	0.54	Rami Reddy & Chandrasekhar Reddy, 1984
17	Madiga-III	0.42	0.19	0.68	Rajasekhar Reddy, 1984
18	Sugali*	0.39	0.23	0.61	Ramachandra Reddy, 1984
19	Dhobi	0.20	0.21	0.61	Subhashini, 1986
20	Pattapu	0.61	0.27	1.05	Manohar, 1989

* Tribal populations

the caste populations and even among them the mortality component is more and the selection is operating mainly through mortality. Contrary to this trend the present series of Reddi population show that the opportunity of selection is due to the index of fertility than due to the mortality index.

Thus, the results of the present study and their comparisons to the available data indicate that the Reddi population (pooled as well as subgroups) appear to be modern, technologically developed in the contemporary populations. It is because that the population has achieved lower mortality index than the fertility index. This has further strengthened through their lower breeding size and higher effective size, which has resulted due to the smaller variance of the mean number of offspring. All these could be attributed to developed socio-economic conditions, improvement in education and health status and adoption of small family norm among Reddis of Andhra Pradesh.

KEY WORDS Breeding and Effective Size. Selection Intensity. Reddis.

ABSTRACT An integrated approach of understanding micro-evolutionary dynamics of a population through Breeding size, effective size, migration and drift and opportunity of selection, is considered in the present paper. The data for the present study have drawn on pregnancy outcome of 585 women from the four subgroups of larger Reddi population of Andhra Pradesh. The breeding size for the pooled population is lower (2061) than the effective size (2822). This is mainly due to smaller mean number of children (2.33) for the couples and lower values of variance (0.91). The selection intensity (I) in the pooled Reddi population is again lower, *i.e.*, (0.4128) and selection is operating through index of fertility (0.2748). The demographic

situation of Reddis for these chief aspects of micro-evolutionary dynamics of its population structure indicates that the Reddis appear to be modern and technologically developed population and proves to be the same even in its comparison with contemporary populations.

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