

Qualitative Finger Dermatoglyphic Variation and Distance Among Four Reddi Populations of Andhra Pradesh

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INTRODUCTION

The dermal configurations are perhaps the most effective ones in the study of population variation owing to their high variability with less adaptive value, associated with no post-natal modifications. These dermatoglyphic studies are useful in ascertaining intra- and interpopulation variations and affinities. In India and outside numerous investigations have been made to study populational, geographic, linguistic and cultural variations in caste and tribal populations (Jantz et al., 1978; Gualdi-Russo et al., 1982; Bhasin et al., 1986; Bansal et al., 1987; Chandrasekhar Reddy et al., 1990; Mohan Reddy and Chengal Reddy, 1993, among others). An attempt is made here to compute the inter- and intra population distances, using qualitative characters between the four endogamous sub populations of Reddis from Andhra Pradesh, India.

THE PEOPLE

The Reddis as the most numerous single caste in South India are mainly concentrated in Andhra Pradesh. Over 88 sub-castes are reported among them and are found over the entire state with particular sub-castes being dominant both numerically and economically in certain areas than in other areas. More than 80% of the people live in rural areas. Agriculture is the mainstay of their economy. Sub-caste endogamy is strictly followed. Monogamy is the general pattern of marriage. Nuclear family is of common occurrence and 40% of their marriages are consanguineous. In which First cross cousin marriages (23.75%) are more than uncle-niece marriages (11.63%) and 1½ cousin and beyond amount to 5.13%.

The four sub-castes selected for this study are Desuri Reddis (DSR), Pedakanti Reddis (PKR), Motati Reddis (MTR) and Kodide Reddis (KDR). They are predominantly found in Chittoor, Cuddapah and Anantapur districts of

Rayalaseema region of the state. These Reddi populations present a nearly uniform socio-cultural level.

MATERIAL AND METHODS

The data were drawn from thirty randomly selected villages in 16 mandals of Chittoor, Cuddapah and Anantapur districts of Rayalaseema region of Andhra Pradesh. The total population of four subgroups inhabiting in these 30 villages are found to be 5074 (DSR: 1084; PKR: 1192; MTR: 1248 and KDR: 1150). Fully rolled bilateral fingerball prints were collected from 800 unrelated males, 200 each of the four sub-castes in the age range of 15-60 years. Finger prints were analysed for the qualitative characters of pattern types of Galton and Henry and symmetrical and asymmetrical basic pattern types of homologous fingers and monomorphic hands. The analysis was made following the methods of Cummins and Midlo (1961), Plato (1970), Mavalwala (1978).

These traits have been used to assess the dermatoglyphic distances between the study samples according to Balakrishnan and Sanghvi's B^2 (1968). Using genetic distance between the pairs of populations, a dendrogram was constructed by the fusion method by binary split (Balakrishnan et al., 1975). An approximate three dimensional representation was made to visualize the distances between populations, using the first three principal co-ordinates following the method of Sanghvi et al. (1971).

RESULTS AND DISCUSSION

The frequency distribution of basic pattern types of Galton and Henry on each hand and both hands (Table 1) shows the frequent occurrence of loops, followed by whorls and arches ($L > W > A$) irrespective of population and side in the study groups. Loops and arches are more common on left than right hand in all samples

Table 1: Percentage frequency of finger-ball pattern types

Popul- ation	Hand	Arch				Loop			Whorl				Total
		PA	TA	Acc	Total	UL	RL	Total	W	LPL	CPL	TL	
MTR	R	3.70	0.40	0.30	4.40	56.70	2.40	59.00	27.30	4.40	3.70	1.10	36.50
	L	5.00	1.20	0.00	6.20	56.10	2.30	58.00	22.60	4.20	4.80	3.80	35.40
	R+L	4.35	0.80	0.50	5.30	56.40	2.30	59.00	7.80	0.00	2.50	4.30	35.90
PKR	R	3.20	0.50	0.00	3.70	55.40	1.90	57.00	30.00	4.00	4.60	0.40	39.00
	L	3.80	0.90	0.00	4.70	54.50	2.90	57.00	26.90	4.10	5.00	1.90	37.90
	R+L	3.50	0.70	0.00	4.20	55.00	2.40	57.00	28.50	4.00	4.80	1.20	38.40
KDR	R	5.90	0.80	0.00	6.70	51.30	1.50	53.00	30.40	3.90	5.60	0.60	40.50
	L	6.70	0.70	0.60	8.00	54.40	2.70	57.00	23.90	3.10	5.70	2.70	34.90
	R+L	6.30	0.80	0.30	7.30	52.90	2.10	55.00	27.20	3.50	5.70	1.40	37.70
DSR	R	5.80	1.00	0.10	6.90	57.40	2.90	60.00	27.20	2.30	2.70	0.60	32.80
	L	7.10	1.10	0.40	8.60	62.40	2.70	65.00	19.10	1.60	3.90	1.70	26.30
	R+L	6.45	1.10	0.25	7.70	59.00	2.80	63.00	23.20	2.00	3.38	1.20	29.50

but MTR, in whom the proportion of loops is more on the right hand. On the other hand whorls are more common on the right than the left hand in all groups. The frequency of loops ranges from 54.95% in KDR to 62.70% in DSR where as that of whorls varies from 29.50% in DSR to 38.40% in PKR. The arch frequency is more among DSR (7.70%), followed by KDR (7.30%), MTR (5.30%) and PKR (4.20%). Accidentals (Acc) are of a very meagre proportion and hence they are included in the arches.

As shown in table 2, the proportion of symmetry, including whorls, loops and arches is much higher than the asymmetry in all the Reddi groups. There is negligible variation in the occurrence of similarity in pattern types on homologous fingers of right hand and left hands among the four sub-castes; it ranges from 76.3% among the MTR to 79.7% among the DSR. The proportion of loop symmetry is high, followed by whorl and arch proportions. The highest frequencies of loop symmetry occurs in DSR (52.9%), whorl symmetry in PKR and KDR (28.6%) and arch symmetry in KDR (4.8%). Loop symmetry on V digit, whorl symmetry on IV digit and arch symmetry on II digit are very high in all populations. The group chi-square value for IV finger and for all fingers are significant while for others the values are insignificant.

As can be seen in table 3, the left monomorphic hands occur in higher proportions in all the Reddi groups excepting KDR. The overall occurrence of monomorphic hands is higher in PKR (58.5%) and lower in KDR (48.1%). The

pattern wise incidence of considering the monomorphic hands by pattern, it is found in all groups that loop monomorphy occurs in left hands, while whorl monomorphy is more frequent in right hands. Interestingly in MTR arch monomorphy is completely absent in right hands, while in other groups the percentage is in very low proportions. The trait shows significant inter group difference for left hands whereas for right hands the difference is insignificant.

The B² distance analysis of Balakrishnan and Sanghvi (1981) has been made using the qualitative finger data. The B² distances (Table 4) and the dendrogram (Fig. 1) reveal that the MTR and PKR form the minimal cluster formation for highest value within variability. The KDR deviated and joined at second level of clustering as expected owing to trait frequency similarities. However, the major split is between the DSR and the other three sub-castes, indicating greater divergence of the former from the other groups as a whole. This finding reflects in its differences with other groups in population size, socio-cultural aspects and other features.

The principal coordinate analysis (Table 5) and three dimensional representations (Fig. 2) also show the same trend. The three coordinates (I, II and III) present variability as indicated by their respective percentages (44.52, 34.25 and 21.23). The qualitative characters supported by their distance measures clearly suggest the heterogeneous nature of the selected endogamous Reddi populations. The disparity present among them can be viewed as the outcome of their long isolation from each other and their practice of

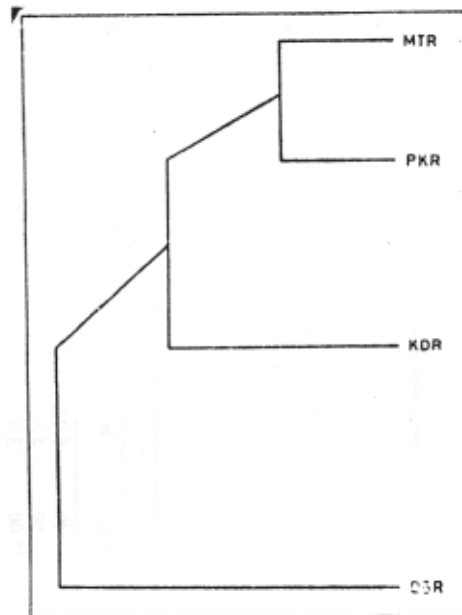


Fig. 1. Finger dermatoglyphics-qualitative: clusters by binary split (Fusion)

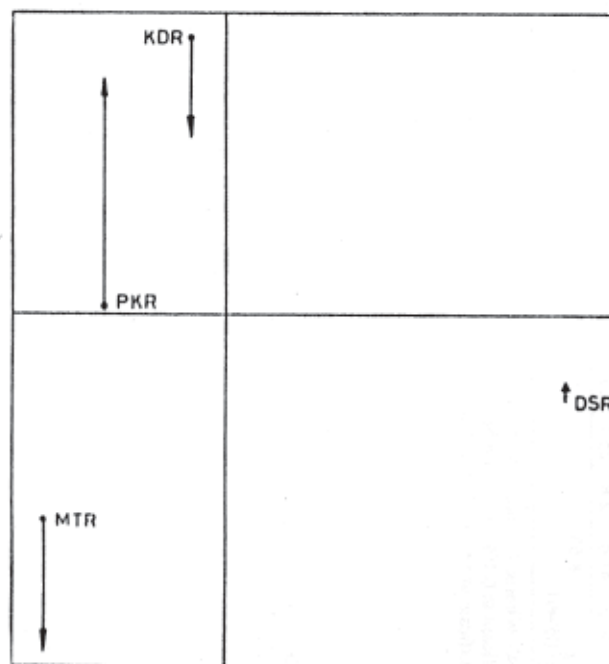


Fig. 2. Finger dermatoglyphics-qualitative: principal co-ordinate analysis

Table 2 : Percentage frequency of digitwise symmetry and asymmetry

Popula- tion	Digit I				Digit II				Digit III				Digit IV				Digit V				All																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
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Note: W- Whorls; L- Loops; A- Arches; AS- Asymmetry

*Significant at 0.1% level of probability

** Significant at 5% level of probability

Table 3: Percentage frequency of monomorphic hands

Population	Right			Left			Both			Bilaterality					
	W	L	A	NM	W	L	A	NM	W	L	A	NM	χ^2 value (DF=3)		
MTR	10.00	17.00	0.00	73.00	9.50	18.50	1.00	71.00	5.00	9.50	0.00	85.50	2.21		
PKR	8.50	19.00	0.50	72.00	10.00	20.00	0.50	69.50	4.50	12.00	0.50	83.00	0.38		
KDR	10.00	14.00	1.00	75.50	5.00	16.50	1.50	77.00	3.00	8.00	1.00	88.00	4.00		
DSR	7.00	19.00	1.00	73.50	3.50	23.50	1.00	72.00	2.50	13.00	1.00	83.50	3.30		
ALL	8.88	17.25	0.63	73.25	7.00	19.63	1.00	72.88	3.75	10.62	0.62	85.00			
Group χ^2 value (DF=6)	5.67			13.54*			7.78								

* Significant at 5% level of probability

Table 4: Per character B² (Lower) and B (Upper) values for qualitative dermatoglyphic distance

Population	MTR	PKR	KDR	DSR
MTR		1.176490	1.424382	1.549856
PKR	1.384128		1.221335	1.462598
KDR	2.028863	1.491658		1.462598
DSR	2.402054	2.139193	2.198628	

Table 5: Principal coordinates for qualitative dermatoglyphic distance

Population	I	II	III
MTR	-0.508876	-0.577946	-0.364696
PKR	-0.345366	0.016168	0.637513
KDR	-0.098643	0.783458	-0.280120
DSR	0.952885	-0.221680	0.007303
Variability explained	1.295953	0.997231	0.617947
% Explained	44.52	34.25	21.23
Total Variability	2.911131		

strict endogamy for many generations. The distinctive cluster formation of the present population groups points to the probable role of founder's effect and/or drift in the divergence of dermatoglyphic features among the sub-populations, as in the Nandiwalla groups of Maharashtra (Malhotra et al., 1981).

KEY WORDS Finger Dermatoglyphics. Reddis. B² distance.

ABSTRACT In a sample of 800 unrelated male individuals, 200 from each sub-castes of Desuri Reddis (DSR), Pedakanti Reddis (PKR), Motati Reddis (MTR) and Kodide Reddis (KDR) were studied to estimate variation and distance among and between the populations by using qualitative finger dermatoglyphic characters such as finger pattern types, symmetrical and asymmetrical distributions and monomorphic hands. The highest (2.402054) and lowest (1.384128) B² values are observed between the DSR- MTR and PKR-MTR groups, respectively. The cluster analysis dendrogram and principal coordinate analysis depict clearly the heterogenous nature of the selected Reddi groups.

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