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VARIABILITY OF PALMAR TRIRADII IN TWELVE CENTRAL INDIAN POPULATIONS

ABSTRACT. — There are certain complexities and subjective elements in the conventional study of palmar patterns which have also stood in the way of proper understanding and interpretation of the data. The number of palmar triradii, which to a larger extent indicates intensity of palmar patterns, has been studied on twelve Central Indian populations. It suggests a general homogeneity of the populations under study with relatively larger values of palmar triradii in comparison to other Indian populations. There appears to be no consistent direction of sex differences but it strongly suggests sinisteral excess of palmar triradii in each sex.

INTRODUCTION

Most of the dermatoglyphic comparisons of human populations are so far based on incidences and intensities of patterns on fingers. Consequently, available data on palmar dermatoglyphs do not indicate geographical and ethnic variations as clearly as that on finger dermatoglyphs. Certain complexities and subjective elements in conventional study of palmar patterns have also stood in the way of proper understanding and interpretation of the data. Neither the mean frequency of all palmar patterns in a population nor any measure of total pattern intensities for individuals were available for palms as in the case of fingers. It is for this reason that Cummins and Midlo (1943) found it difficult to interpret the complex ramifications of palmar patterns. Only some broad racial trends in the incidence of patterns and vestiges on specific areas such as high frequencies in thenar areas in the American Indians and Africans and that in hypothenar areas among the Caucasoids have been tentatively observed (Rife, 1954).

But even such subjective and general comparisons have not been possible to attempt within and between genetic populations or endogamous groups. These breeding isolates, however, are the proper units of study of microvariation and microevolution, which are being more and more emphasised in modern physical anthropology.

In this background, Mukherjee's (1966) approach of studying the variation in the number of triradii on palms of individuals is a definite step forward.

It introduces the criteria of simplicity, objectivity, universality, anatomical homology and usefulness as a trait of individuals with a heritability (Mukherjee, 1974). Thus it not only gives a total score summing up of loops on the palms of individual but it also follows the topological principles of "one loop, one triradius" (Penrose, 1965). It permits a comparison of patterns on palms and other dermatoglyphic areas, as also intra and inter population comparisons of palmar dermatoglyphs.

However, the possibilities of population comparisons of the intensity of palmar patterns have not yet been fully explored although there are some positive indications of its utility for such studies. Comparisons of average values of the Bengali Brahman and other Bengali populations (Mukherjee, 1966, Mukherjee and Saha, 1970), four Nicobarese populations (Ganguly *et al* 1979) and tribes and casts of

north east India (Mukherjee, 1979) suggest some ethnic and geographical variation. It confirms that populations with strong Mongoloid affinities, such as the Naga, the Lushai have lower intensities of palmar patterns compared to some caste populations of Bengal and Assam. There is an apparent geographical cline in the population of Nicobar Archipelago.

The purpose of the present paper is to examine how the number of triradii on palm reflects genetic diversities within the cluster of Dravidian-speaking populations of Central India who have been otherwise broadly found to be homogeneous in physical characters.

Furthermore, earlier data on the palmar triradii do not confirm to the direction of sex difference observed in finger dermatoglyphs. Therefore, in the present study of 16 samples from 12 endogamous populations, the problems of sexual and bimanual variations have also been considered. The data were collected from Baster District in Madhya Pradesh of India, its adjoining district of Koraput in Orissa in the east and from the Chandrapur and Yeotmal District of Maharashtra in the west.

ANALYSIS AND DISCUSSION

The mean number of triradii on palms vary within a small range of values from 11 to 12 in each sex *(Table 1)*. The populations of Koraput show comparatively smaller values of palmar pattern intensity than that of the populations of Baster, Yeotmal and Chandrapur Districts. The Pardhan of Yeotmal, on the other hand, indicate closer affinities with the populations of Koraput in each sex. It is also seen that the diversity or distance between sub-samples of the same population, namely, the Muria or the Maria, is as much as that between most of the populations themselves. The average value for this cluster of populations appears to be highest so far, and it is comparable to the highvalues observed in the Jatav population of western U. P. (Mukherjee *et al* 1979), followed by that of the Bengalee population (Mukherjee, 1966).

It may be suggested that these Australoid tribes (Sarkar, 1954) show a relatively high intensity of patterns on palms along with a high value of pattern intensity on fingers (Ghosh, 1971). Thus, a combined study of pattern intensities on fingers and palms may be more sensitive for assessment of ethnic or genetic affiliations between populations. It is also observed that at the population level, the two measures of pattern intensities on fingers and palms are largely independent. For example, the populations of Nagaland show a high intensity of patterns on fingers and a low value for the palms, while the Bengali populations show a reverse trend. This adds to the utility of the combined studies of the two characters for obtaining genetic relationship between populations. A graphical analysis of the average values on both fingers and palms suggests a general homogeneity of the populations under study. Broadly speaking, the larger values for palmar triradii are represented by the populations inhabiting the central portion of the study area, viz., Bastar. There appears to be a geographical trend of decline towards both the east and west within this cluster of populations. This strengthens the prospect of utilising the number of triradii for population genetic study of dermatoglyphs.

There is no consistent direction of sex difference in the average value of the number of palmar triradii *(Table 1)*, although 8 out of the 16 samples suggest excess value in females and one reflects exactly equal values in the two sexes. In fact, the sex difference is quite small except in the Pengo sample in which it is significant at 0.05 level of probability. Until the further analysis of the problem, we can ignore the sex difference in the triradial number on palms. The data, however, indicate a consistent trend of sinisteral excess in each sex *(Tables 2 and 3)*. In two male samples the bimanual difference turns out to be even significant at 0.05 level of probability. This is apparently in the reverse direction of the bilateral trend of pattern intensity on fingers.

Incidentally, similar results have also been obtained among the Jatavs (Mukherjee *et al* 1979) and Nicobarese (Ganguly *et al* 1979). There is only one exception and that too only in the female sample from Hadza population of Tanzania, Africa, the male sample conforming to the present observation (Barnicot et al. 1972). This can obviously be ignored as the positive evidence from so many different samples outweighs this deviation from a general trend.

TABLE 1. *Sexwise distribution of number of Palmar triradii*

Sl. No.	Group	Male			Female			t Values
		N	Mean ± S. E.	S. D.	N	Mean ± S. E.	S. D.	
1.	Gond	127	11.55±0.16	1.81	86	11,75±0.20	1.90	0.78
2.	Pardhan	114	10.96±0.12	1.25	87	11.22±0.15	1.39	1.35
3.	Kolam	98	11.57±0.19	1.85	56	11.73±0.22	1.67	0.55
4.	Naik Gond	105	11.51±0.14	1.48	78	11.42±0.17	1.55	0.41
5.	Maria of Gadchiroli	77	11.78±0.21	1.82	35	11.40±0.25	1.46	1.16
6.	Maria of Allapally	47	12.11±0.26	1.78	27	12.11±0.40	2.08	0
7.	Raja Muria	120	11.77±0.19	2.05	121	11.55±0.15	1.68	0.91
8.	Kondagaon Muria	108	11.64±0.15	1.57	103	11.83±0.17	1.74	0.84
9.	Narainpur Muria	109	11.58±0.14	1.48	111	11.89±0.17	1.84	1.41
10.	Dorla	107	11.79±0.16	1.70	132	11.83±0.15	1.74	0.18
11.	Dhurwa	143	11.68±0.14	1.66	125	11.59±0.16	1.75	0.42
12.	Bison-horn Maria	109	11.89±0.17	1.78				
13.	Nunkadora	103	11.42±0.14	1.47	105	11.31±0.15	1.56	0.54
14.	Ollar Gadaba	100	11.13±0.13	1.28	100	11.26±0.14	1.45	0.68
15.	Pengo	120	11.42±0.16	1.80	115	10.96±0.13	1.37	2.23*
16.	Kond	120	11.16±0.11	1.23	125	11.35±0.13	1.51	1.12

* Significant at 0.05 level of probability

TABLE 2. *Handwise distribution of number of palmar triradii : : Male*

Sl. No.	Group	N	Left		Right		t Values
			Mean ± S. E.	S. D.	Mean ± S. E.	S. D.	
1.	Gond	127	5.87±0.10	1.10	5.68±0.08	0.96	1.48
2.	Pardhan	114	5.53±0.07	0.80	5.44±0.06	0.07	0.98
3.	Kolam	98	5.83±0.10	0.97	5.74±0.11	1.08	0.61
4.	Naik Gond	105	5.80±0.09	0.96	5.71±0.08	0.82	0.75
5.	Maria of Gadchiroli	77	5.95±0.12	1.06	5.83±0.11	0.99	0.74
6.	Maria of Allapally	47	6.15±0.16	1.08	5.96±0.14	0.95	0.89
7.	Raja Muria	120	6.01±0.19	1.30	5.75±0.09	1.04	1.24
8.	Kondagoan Muria	108	5.92±0.09	0.97	5.72±0.08	0.88	1.66
9.	Narainpur Muria	109	5.88±0.09	0.99	5.70±0.07	0.76	1.58
10.	Dorla	107	5.99±0.10	1.05	5.80±0.09	0.91	1.41
11.	Dhurwa	143	5.90±0.08	0.99	5.78±0.08	1.02	1.06
12.	Bison-horn Maria	109	5.99±0.10	1.04	5.90±0.10	1.06	0.64
13.	Nunkadora	103	5.74±0.09	0.95	5.68±0.08	0.82	0.50
14.	Ollar Gadaba	100	5.68±0.08	0.81	5.45±0.07	0.70	2.16*
15.	Pengo	120	5.75±0.10	1.10	5.67±0.08	0.93	0.62
16.	Kond	120	5.68±0.08	0.84	5.47±0.06	0.70	2.10*

* Significant at 0.05 level of probability

TABLE 3. *Handwise distribution of number of Palmar triradii : : Female*

Sl. No.	Group	N	Left		Right		t Values
			Mean ± S. E.	S. D.	Mean ± S. E.	S. D.	
1.	Gond	86	5.94±0.11	1.07	5.81±0.11	1.02	0.84
2.	Pardhan	87	5.64±0.09	0.83	5.57±0.08	0.74	0.58
3.	Kolam	56	5.91±0.13	0.98	5.82±0.12	0.92	0.51
4.	Naik Gond	78	5.77±0.12	1.07	5.65±0.08	0.73	0.83
5.	Maria of Gadchiroli	35	5.80±0.15	0.90	5.60±0.12	0.69	1.04
6.	Maria of Allapally	27	6.22±0.24	1.25	5.89±0.20	1.05	1.06
7.	Raja Muria	121	5.89±0.09	1.03	5.66±0.08	0.89	1.91
8.	Kondagaon Muria	103	6.01±0.10	1.07	5.82±0.09	0.93	1.41
9.	Narainpur Muria	111	6.08±0.10	1.08	5.81±0.10	1.02	1.91
10.	Dorla	132	5.91±0.09	1.05	5.92±0.08	0.77	0.08
11.	Dhurwa	125	5.89±0.09	0.99	5.70±0.09	1.03	1.49
12.	Nunkadora	105	5.70±0.09	0.93	5.61±0.08	0.86	0.75
13.	Ollar Gadaba	100	5.70±0.09	0.88	5.56±0.08	0.81	1.16
14.	Pengo	115	5.53±0.08	0.90	5.43±0.07	0.71	0.94
15.	Kond	125	5.71±0.08	0.90	5.58±0.08	0.91	1.15

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