

Plantar Interdigital Ridge Among The Gond of Madhya Pradesh

Dipak Kumar Adak

Anthropological Survey of India, Shillong 793001, Meghalaya, India

KEY WORDS The Gond, Plantar Ridge Counts, Cluster Formation.

ABSTRACT The present study deals with the plantar interdigital ridge counts of the Gond of Sagar, Madhya Pradesh. The study reveals that there is no significant bilateral or bisexual difference. In both sexes the Gond and Tibetan independently form two clusters, whereas the Brahman and Bhangi combinedly form another cluster.

INTRODUCTION

Anthropometric traits are often used for taxonomic classifications of human population. Of late, the emphasis is being given to genetic traits for such purposes. All human physical traits, as for example skin colour, nasal profile, height or dermatoglyphic traits (ridge count and pattern on fingers, palms and soles), are determined by many loci, which are subject to selection process (Narain, 1993).

The qualitative and quantitative variabilities in plantar dermatoglyphics have been studied widely in different ways. "The degree of separation between different triradii on the human sole could provide us interesting and meaningful details regarding the ridge configurations" (Tiwari and Bhasin, 1967). However, only a very few studies have so far been reported on plantar interdigital ridge counts in India. Tiwari and Bhasin (1967) have studied a-b, b-c and c-d plantar interdigital ridge counts among the Tibetan of Himachal Pradesh. Pateria (1973) has reported the same type of study among the Brahman and Bhangi of Sagar, Madhya Pradesh.

The Gond is one of the numerically dominant tribes of Central India. A study on the distribution of various palmar dermatoglyphics among the Gond of Madhya Pradesh has already been reported (Ghosh, 1975). But no report on plantar interdigital ridge counts among the Gond is

still available. So, the present study on plantar interdigital ridge counts has been carried out with a view to finding out the morphological distance between the Gond, and the other three Indian populations, so far studied on the basis of such traits.

MATERIALS AND METHODS

The sample consists of bilateral plantar prints on 90 males and 85 females of Jamunia and Chauka villages of the Kesli Block in Sagar District of Madhya Pradesh. The field work for the present study was carried out in 1987. A care was always taken to exclude related individuals from the present sample, though no statistical sampling was done. The method, proposed by Cummins and Midlo (1961) to collect sole prints, was essentially followed, and for ridge-count the method, described by Pateria (1973), was followed. To find out the morphological distance data on the Brahman, Bhangi and Tibetan as well as the present population *i.e.*, the Gond have been taken into consideration, according to the methods, given by Penrose (1947, 1954) and Rao (1952).

RESULTS AND DISCUSSION

The mean interdigital ridge counts of the Gond, given separately for each area and sex, are presented in table 1. The mean value of a-b ridge counts among the female is greater than that in the male, whereas other two values *i.e.*, b-c and c-d are greater in males than in females. However, in respect of all these three counts no significant difference between sexes is noticed.

In table 2 the mean interdigital ridge counts, by sex and side-wise, are shown. It is evident that in both sexes the a-b, b-c and c-d mean

Table 1: Distribution of mean a-b, b-c and c-d ridge counts of plantar interdigital areas in the Gond

Interdigital area		Male	Female	t-test value
a-b	Mean	46.50	50.84	1.49
	C.V.	41.81	37.78	
	S.D.	19.44	19.21	
b-c	Mean	64.55	63.69	0.40
	C.V.	23.07	20.98	
	S.D.	14.89	13.36	
c-d	Mean	69.44	69.25	0.08
	C.V.	21.41	22.09	
	S.D.	14.87	15.30	

Table 2: Bilateral difference in mean a-b, b-c and c-d ridge counts in the Gond

Sex	Sole	a-b	b-c	c-d
Male	Right	23.11	32.02	34.52
	S.E.	±1.16	±0.78	±0.79
	Left	23.39	32.53	34.92
	S.E.	±0.98	±0.85	±0.84
	t-test value	0.18	0.44	0.35
Female	Right	25.25	32.87	34.13
	S.E.	±1.11	±0.66	±0.84
	Left	25.59	30.82	35.12
	S.E.	±0.03	±0.98	±0.89
	t-test value	0.22	1.74	0.81

ridge count exhibit greater values on left than on right side, except in case of the b-c mean ridge count in females. However, no significant bilateral difference is found. Figure 1 represents the distribution of the a-b, b-c and c-d plantar mean interdigital ridge counts in the present population.

The mean values of plantar interdigital ridge counts among the Gond have been compared with the available data on the Brahman, Bhangi and Tibetan. The results have been shown in table 3. The mean a-b value, in case of the male, is slightly higher among the Tibetan than that among the Gond, Brahman or Bhangi, whereas the mean a-b value in case of the female, is much higher among the Gond than that among the Brahman and Bhangi. The Tibetan females, in turn, exhibit almost the similar value as found among the Gond females. The mean b-c values (for both the sexes) are higher among the Gond than those among the Brahman, Bhangi and Tibetan. In case of the mean c-d values the Brahman and Bhangi display slightly lower values than that found in the Gond. However, this value is found to be much lower among the Tibetan in comparison with the Gond. It appears from

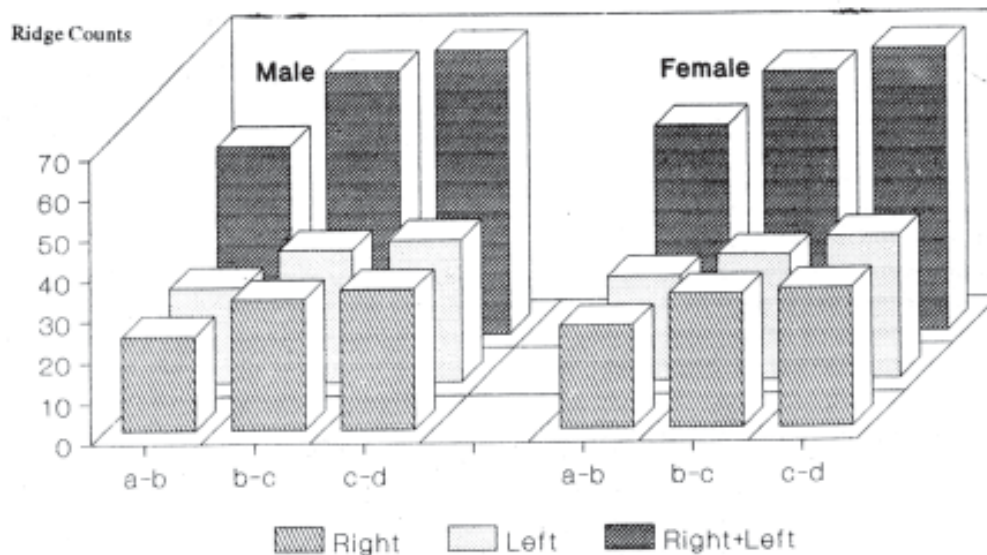


Fig. 1. Distribution of mean a-b, b-c and c-d plantar interdigital ridge counts among the Gond

Table 3 : Mean a-b, b-c and c-d ridge counts of plantar interdigital areas according to populations

Interdigital area		Gond (Present study)		t- test value	Brahman (Pateria, 1973)		t- test value	Bhangi (Pateria, 1973)		t- test value	Tibetan (Tiwari and Bhasin, 1967)		t- test value
		Male	Female		Male	Female		Male	Female		Male	Female	
a-b	Mean	46.50	50.84		44.73	42.13		45.59	43.18		48.17	50.30	
	C.V.	41.81	37.78	1.49	17.25	15.03	2.71*	16.62	18.80	1.62	16.30	14.71	1.69
	S.D.	19.44	19.21		7.63	6.43		7.46	8.12		7.85	7.40	
b-c	Mean	64.55	63.69		56.87	55.78		59.89	57.89		60.40	61.56	
	C.V.	23.07	20.98	0.40	14.66	13.49	0.98	15.71	14.28	1.83	13.08	12.75	0.87
	S.D.	14.89	13.36		8.34	7.53		9.41	8.23		7.90	7.85	
c-d	Mean	69.44	69.25		68.80	66.13		65.92	64.37		61.61	62.99	
	C.V.	21.41	22.09	0.08	13.61	13.11	2.18	15.51	14.36	1.12	13.63	13.73	0.98
	S.D.	14.87	15.30		9.37	8.67		10.36	9.24		8.40	8.65	

* Significant at 0.01 level of probability

the present study that the Gond differ from the Brahman, Bhangi and Tibetan in respect of a-b, b-c and c-d plantar interdigital ridge counts, and it holds true for both sexes.

Morphological Distance

Morphological distance between and among the populations in terms of these three plantar interdigital ridge counts have been estimated. The values of size (*i.e.*, C^2_o) and shape (*i.e.*, C^2_s) distances between any two populations have been shown in table 4 and 5, respectively. This has been done for an overall view about the size and shape factors which are involved to find out

Table 4: Values of size distance (C^2_o) between populations

Population	Gond	Brahman	Bhangi	Tibetan
Gond	-	0.30	0.24	0.30
Brahman	1.17	-	0.00	0.00
Bhangi	1.02	0.00	-	0.00
Tibetan	0.00	0.36	0.27	-

Males - Upper triangular matrix
Females - Lower triangular matrix

Table 5: Values of shape distance (C^2_s) between populations

Population	Gond	Brahman	Bhangi	Tibetan
Gond	-	0.27	0.06	0.39
Brahman	0.18	-	0.15	0.63
Bhangi	0.03	0.09	-	0.21
Tibetan	0.72	0.63	0.30	-

Males - Upper triangular matrix
Females - Lower triangular matrix

the divergence among the population groups.

The computed mean value for size distance between six pairs is found to be 0.14 and 0.47, respectively for males and females, whereas the mean values for shape distance between six pairs for males and females are 0.29 and 0.33, respectively. It shows that the value of shape distance is larger than the size distance among the males and the reverse is true among the females. Thus, it appears that these four populations show a tendency to differ more in shape distance than in size distance in case of males, whereas the situation is just reversed in case of females. However, in males the shape distance and in females the size distance play some important roles for overall morphological differences among these populations. The positions of the Brahman, Bhangi and Tibetan in relation to the Gond in terms of shape and size distance have been shown in figures 2 and 3 for males and females, respectively.

Table 6 shows the matrix of C^2_H values for both the sexes. In table 7 the values of C^2_H on all the six pairs have been shown in an increasing order of magnitude. It appears that in case of the males the Bhangi is closely related with the Brahman (0.15), whereas the Gond is comparatively distantly related with the Bhangi (0.30), Brahman (0.57) and Tibetan (0.69). In females it is seen that the Bhangi is very closely related with the Brahman (0.09) and compar-

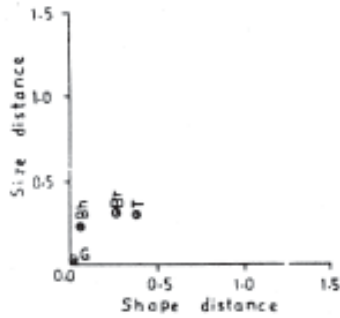


Fig. 2. The position of the Brahman, Bhangi and Tibetan in relation to Gond in terms of size and shape factors - Male

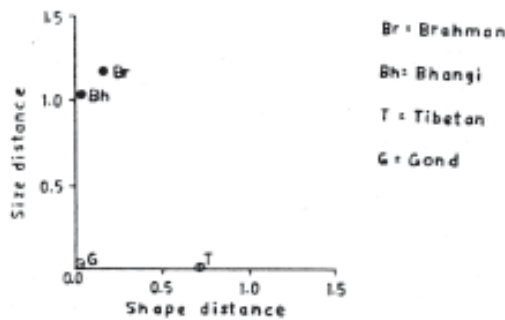


Fig. 3. The position of the Brahman, Bhangi and Tibetan in relation to Gond in terms of size and shape factors - Female

atively distantly related with the Tibetan (0.57), whereas the Gond maintain a distant position with the Tibetan (0.72), Bhangi (1.05) and Brahman (1.35). However, the distance between the Brahman and Bhangi is close in case of males, but more closer in case of females.

Table 6: Morphological distance of quantitative traits

Population	Gond	Brahman	Bhangi	Tibetan
Gond	-	0.57	0.30	0.69
Brahman	1.35	-	0.15	0.63
Bhangi	1.05	0.09	-	0.21
Tibetan	0.72	0.99	0.57	-

Males - Upper triangular matrix

Females - Lower triangular matrix

In table 8 the values of C^2_H are presented with a view to examining the position of intra and inter cluster average among the four groups. To draw a clear view of the situation, the figure 4 (for males) and figure 5 (for females) seem to be useful for the approximate configuration.

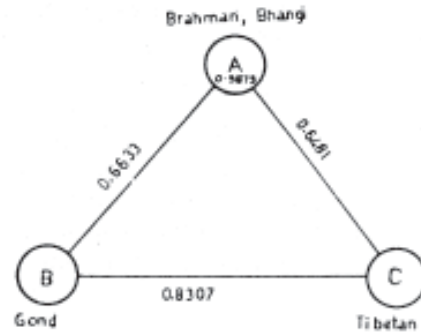


Fig. 4. Clusters and their inter-relationships-Male

Table 9 shows the change in average C^2_H . It appears that in both the sexes the Brahman is forming cluster(A) combinedly with the Bhangi, whereas the Gond and Tibetan are independently forming two clusters (B and C, respectively). The three clusters maintain a consider-

Table 7: Values of C^2_H (based on 3 characters) between populations, by sex

Gond		Brahman		Bhangi		Tibetan	
Male	Female	Male	Female	Male	Female	Male	Female
0.30	0.72	0.15	0.09	0.15	0.09	0.21	0.57
Bhangi	Tibetan	Bhangi	Bhangi	Brahman	Brahman	Bhangi	Bhangi
0.57	1.05	0.57	0.99	0.21	0.57	0.63	0.72
Brahman	Bhangi	Gond	Tibetan	Tibetan	Tibetan	Brahman	Gond
0.69	1.35	0.63	1.35	0.30	1.05	0.69	0.99
Tibetan	Brahman	Tibetan	Gond	Gond	Gond	Gond	Brahman

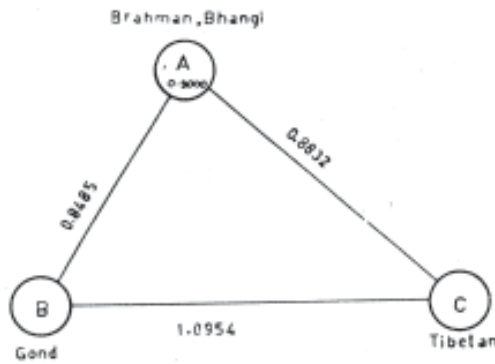


Fig. 5. Clusters and their inter-relationships-Female

able distance from one another.

It may be evaluated that the Gond differ considerably in respect of mean a-b, b-c and c-d plantar interdigital ridge counts from the other three populations, considered for the present purpose. This difference is evident in both sexes.

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Table 8 : Intra and inter-cluster average C^2_H

Cluster	Population	A	B	C
Male				
A	Brahman Bhangi	0.15	0.44	0.42
B	Gond	0.44	-	0.69
C	Tibetan	0.42	0.69	-
Female				
A	Brahman Bhangi	0.09	0.78	1.20
B	Tibetan	0.78	-	0.72
C	Gond	1.20	0.72	-

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Table 9 : Computational scheme for cluster

Population added to cluster	C^2_H	No. of terms (n)	Increasing in D_p^2 Increasing in n	Average D_p^2	Cluster
Male					
Brahman, Bhangi	0.15	1	.....	0.15	(A)
Tibetan	0.99	3	0.42	0.33	Brahman, Bhangi
Gond, Bhangi	0.30	1	.....	0.30	(B) Gond
Tibetan, Bhangi	0.21	1	.....	0.21	(C) Tibetan
Female					
Brahman, Bhangi	0.09	1	.....	0.09	(A)
Tibetan	1.65	3	0.78	0.55	Brahman Bhangi
Gond, Tibetan	0.72	1	0.72	(B) Gond
Tibetan, Bhangi	0.57	1	0.57	(C) Tibetan

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