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PALMAR DERMATOGLYPHICS OF THE BENGALIS OF LUCKNOW (INDIA)

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Human populations are known to differ in terms of a number of characteristics of anthropological significance. It is largely believed that the genetically controlled traits retain their endowment through generations in the population. Even among the genetic traits, all those controlled by many genes are considered to be more effective and reliable in the study of population variation. The importance of dermatoglyphics in comparative human population studies hardly needs any emphasis for the simple reason that dermatoglyphic traits are under genetic control. Besides, they are known to vary considerably owing to the fact that they are controlled by many additive genes. In addition to this, they are less adaptive and are not known to be associated with post-natal modifications or any paratypic influences. As such dermatoglyphic patterns have been employed in the study of population variation (R i f e 1953). On the basis of five requirements recently H o l t (1966) has also testified the importance of dermatoglyphic traits in the study of population differences. In view of the importance of dermatoglyphics in the study of population variation the present paper aims to study the dermal ridge patterns in order to find out the variability of two caste groups of Bengali population (namely Kayasthas and Brahmins) living in Lucknow. The two groups considered here occupy a different status in the social hierarchy of Hindu Society. The present paper is restricted only to the discussion of palmar dermatoglyphics.

MATERIAL AND METHODS

The data for the present paper consists of 400 palm prints which were collected from the Bengalis living in Lucknow. Bilateral inked impressions of palms and fingers were obtained and analysed according to the methods given by C u m m i n s and M i d l o (1961). Every possible care was taken to avoid directly related subjects from consideration. The present paper deals with a discussion of palmar dermatoglyphics only. Finger print reports will be published later.

RESULTS AND DISCUSSION

The analysis of dermal formulations of 400 palms of Bengalis in Lucknow reveals that in general left palms exhibit a larger amount of heterogeneity in both groups. However, among Brahmins, males show 27 different types of formulae in the right and 40 in the left palm, females, on the other hand, show 29 different formulae in the right and 28 in the left palm. Among the Kayasthas we find more or less a similar situation. Here males show 25 different types of formulae in the right palm and 32 in the left palm. Females accordingly show 29 different formulae in the right and 33 in the left palm. These figures in general tell us about the extent of heterogeneity among the Bengalis of Lucknow in so far as their palmar formulations are concerned.

TAB. 1

Percentage frequencies of three principal main-line formulae

Population	Main-line formulae	Male			Female			Total		
		R	L	R+L	R	L	R+L	R	L	R+L
Bengali Kayasthas	11.9.7.—	38.0	16.0	27.0	24.0	12.0	18.0	31.0	14.0	22.5
	9.7.5.—	18.0	10.0	14.0	16.0	6.0	11.0	17.0	8.0	12.5
	7.5.5.—	10.0	20.0	15.0	28.0	30.0	29.0	19.0	25.0	22.0
	Others	34.0	54.0	44.0	32.0	52.0	42.0	33.0	53.0	43.0
Bengali Brahmins	11.9.7.—	40.0	20.0	30.0	28.0	20.0	24.0	34.0	20.0	27.0
	9.7.5.—	10.0	12.0	11.0	28.0	12.0	20.0	19.0	12.0	15.5
	7.5.5.—	12.0	16.0	14.0	12.0	26.0	19.0	12.0	21.0	16.5
	Others	38.0	52.0	45.0	32.0	42.0	37.0	35.0	47.0	41.0

An overall classification based on the three principal main-line formulae further reveals that the formulation 11.9.7.—is exhibited more frequently in both groups. Apart from 11.9.7.—among the Brahmins the formulae 9.7.5.—and 7.5.5.—are almost of equal occurrence. However, among Kayasthas the frequency of occurrence of 7.5.5.—obtains a higher proportion almost equal to 11.9.7.—, consequently the occurrence of 9.7.5.—is limited to only 12.5 percent cases.

The sex-wise classification in terms of these three main-line formulae further reveals that males in both groups invariably exhibit the formula 11.9.7—whereas Kayastha females show 7.5.5.—as the common formula but Brahmin females exhibit a pattern similar to males. Thus in this respect males in the two groups may be said to be exhibiting similar trends. When the two hands are considered separately we find that the right palm, among males, in both groups, shows a higher proportion of 11.9.7.—whereas, in the left palm the situation is not identical. Among Brahmins we have a slightly higher proportion of 11.9.7.—whereas, among Kayasthas we have a fairly high frequency of 7.5.5.—Besides, in a majority of cases the frequency of those who could not be classified in any of these three principal main-line formulae have been put under 'others' which indicates the extent of variability in the two groups. When females are taken into account we find that in general 7.5.5.—is the most preponderant main-line formula in the two palms in both groups with the exception of the right palm among the Brahmins where 11.9.7.—is exhibited in an equal proportion to 9.7.5.—.

The order of preponderance of the three main-line formulae among the two groups is of the same order, that is 11.9.7.—secures the highest count followed by 7.5.5.—and then the least is 9.7.5.

Kayasthas — 9.7.5.— < 7.5.5.— < 11.9.7.—
Brahmins — 9.7.5.— < 7.5.5.— < 11.9.7.—

TAB. II

Bi-sexual and inter-group differences

Groups compared	χ^2 value (d.f. - 3.)	P	Remark
B.K.M. × B.K.F.	6.6604	.10—.05	Homogeneous
B.B.M. × B.B.F.	4.8164	.20—.10	Homogeneous
B.K. × B.B.	1.5636	.70—.50	Homogeneous
Bimanual differences			
B.K.M.(R) × B.K.M.(L)	19.1270	.001—	Heterogeneous
B.K.F.(R) × B.K.F.(L)	13.3740	.01—.001	Heterogeneous
B.B.M.(R) × B.B.M.(L)	9.5974	.05—.02	Heterogeneous
B.B.F.(R) × B.B.F.(L)	26.2422	.001—	Heterogeneous

In Table II the inter-group differences in the distribution of main-line types have been shown by employing the X^2 test. It is quite evident that the present sample does not account for either the inter-group differences or the sexual variation. However, there is clear evidence of bimanual differences in the two groups (cf. tab. II).

When the terminations of line D are classified according to their respective positions we find a number of terminations, but 11, 9, and 7 are the positions where the terminations of line D are quite preponderant. The percentage frequency of three modal types of main line D is given in Table III.

TAB. III

Percentage frequencies of three model types of main-line D

Population	Model types	Male			Female		
		R	L	R+L	R	L	R+L
Bengali Kayasthas	11	50.0	24.0	37.0	32.0	31.0	31.5
	9	28.0	32.0	30.0	31.0	20.0	25.5
	7	18.0	42.0	30.0	29.0	42.0	35.5
Bengali Brahmins	11	44.0	30.0	37.0	47.0	27.0	37.0
	9	20.0	22.0	21.0	24.0	27.0	25.5
	7	28.0	42.0	35.0	23.0	39.0	31.0

It is noted that position 11 seems to be very common in the whole Bengali series irrespective of whether they are Kayasthas or Brahmins, males or females. However, a close examination of the Table indicates that in both groups, Kayasthas and Brahmins, no doubt, position 11 is most common but among female Kayasthas we find a reverse situation where position 7 seems to be much more common. It follows from this and is very clear from Table III. that position 9 is the least common in the whole series. When the two palms are considered separately in both groups we find that the termination of line D at position 11 is very common in the right palm, whereas the termination of this line at position 7 is very common in the left palm. Thus, in this sense it seems that the present series exhibits bimanual differences. The order of preponderance being $11 > 7 > 9$ in both groups with the exception of Kayastha females exhibiting $7 > 11 > 9$. Thus, it appears that the terminations of line D are confined mostly to the distal border and the radial side of the palm.

The D — A main-line index gives a comprehensive idea about the general inclination of ridges on the palm as expressed by the courses of the lines 'D' and 'A'. A smaller index value shows more longitudinal alignment and a greater value indicates a more transverse alignment. The percentage occurrence of main-line indices among the Bengalis is given in Table IV. A glance at this table indicates that the values in the two groups approach closely. A similar trend is followed even when the two sexes are considered separately. However, when the two palms are considered separately it is noted that the right palm display a slightly higher index value in both groups. From this point of view the right palms in both sexes in the two groups exhibit a

TAB. IV

Percentage occurrence of main-line indices

Population	Mean main-line index								
	Right			Left			Right + Left		
	Mean	S.D.	S.E.	Mean	S.D.	S.E.	Mean	S.D.	S.E.
Bengali Kayasthas									
Male	8.18	1.86	0.241	6.28	2.09	0.272	7.23	2.19	0.219
Female	6.54	2.21	0.286	6.04	2.41	0.312	6.29	2.32	0.232
Male + Female	7.36	2.22	0.222	6.16	2.26	0.226	6.76	2.32	0.163
Bengali Brahmins									
Male	7.60	3.34	0.436	6.30	3.05	0.395	6.95	3.27	0.327
Female	7.58	1.97	0.255	6.78	2.17	0.281	7.18	2.13	0.213
Male + Female	7.59	2.75	0.275	6.54	2.66	0.266	7.06	2.77	0.195

TAB. V

Percentage occurrence of the pattern types in different configurational areas

Group	Different configurational areas									
	Hypothenar		Thenar/1st		2nd inter.		3rd inter.		4th inter.	
	Presence	Absence	Presence	Absence	Presence	Absence	Presence	Absence	Presence	Absence
Bengali Kayasthas										
Male R	16.0	84.0	80.0	20.0	8.0	92.0	46.0	54.0	50.0	50.0
L	24.0	76.0	84.0	16.0	6.0	94.0	32.0	68.0	52.0	48.0
R + L	20.0	80.0	82.0	18.0	7.0	93.0	39.0	61.0	51.0	49.0
Female R	32.0	68.0	74.0	26.0	6.0	94.0	40.0	60.0	58.0	42.0
L	24.0	76.0	92.0	8.0	2.0	98.0	24.0	76.0	58.0	42.0
R + L	28.0	72.0	83.0	17.0	4.0	96.0	32.0	68.0	58.0	42.0
Bengali Brahmins										
Male R	36.0	64.0	72.0	28.0	6.0	94.0	50.0	50.0	54.0	46.0
L	22.0	78.0	90.0	10.0	8.0	92.0	34.0	66.0	52.0	48.0
R + L	29.0	71.0	81.0	19.0	7.0	93.0	42.0	58.0	53.0	47.0
Female R	30.0	70.0	78.0	22.0	—	100.0	38.0	62.0	50.0	50.0
L	20.0	80.0	90.0	10.0	2.0	98.0	30.0	70.0	54.0	46.0
R + L	25.0	75.0	84.0	16.0	1.0	99.0	34.0	66.0	52.0	48.0

slightly higher value with only a single exception of female Kayasthas in whose case the right and left palms approach very closely.

PATTERNS ON THE BENGALI PALMS

The presence and absence of pattern types in the hypothenar, thenar and the threē interdigital areas have been given in Table V. A comparative evaluation indicates that the presence of patterns in the thenar/1st interdigital area obtains the highest frequency and least in the 2nd interdigital area in the whole Bengali series. Considering the different configurational areas separately we find that in the hypothenar area there are fairly large number of cases having no patterns. However, considering the presence of patterns in this area we find that Brahmin palms are richer in patterns as compared to Kayasthas (cf. Table V.). When the two palms are considered separately it is noted that the occurrence of pattern types in the right palms is slightly greater than in the left with the only exception of Kayastha males. In the thenar/1st interdigital region, the frequency of occurrence of pattern types is almost in the same way in both the groups. In general it appears that the left palms are slightly richer than the right palms. In the interdigital areas, 2, 3, and 4, we find that the 2nd interdigital area is one where the presence of patterns is lowest, whereas the 4th interdigital area is one which exhibits the highest frequency of pattern types in the population under study. The 3rd interdigital area represents an intermediate stage, in so far as the presence of pattern is concerned between the 2nd and the 4th interdigitals (cf. Table V.).

The value of Chi Square suggests that the presence or absence of pattern types in the different areas is independent of either the caste groups or the sexes in the whole Bengali series (cf. Table VI.).

TAB. VI

Inter-group differences in the occurrence of pattern types

Configurational areas	Groups compared			
	B.K.M. × B.K.F. X^2	B.B.M. × B.B.F. X^2	B.B.M. × B.K.M. X^2	B.B.F. × B.K.F. X^2
Hypothenar	0.8771(6)	0.2028(5)	1.0947(7)	0.1155(4)
Thenar/1st Inter	0.0172(3)	0.1557(5)	0.0165(3)	0.0181(3)
2nd Inter.	0.4328(5)	2.3546(8)	0.0000	0.9230(6)
3rd Inter.	0.5349(6)	0.6790(6)	0.0933(4)	0.0452(3)
4th Inter.	0.4939(6)	0.0100(2)	0.0029(1)	0.3636(5)

Probability — (1) .98—.95 (5) .70—.50
(2) .95—.90 (6) .50—.30
(3) .90—.80 (7) .30—.20
(4) .80—.70 (8) .20—.10.
Remark — All homogeneous.

CONCLUSION

The foregoing analysis of the palm prints of Bengalis of Lucknow (India) shows that the frequencies of various characters exhibit almost a similar pattern in the two groups under study. The test of significance also fails to record any differences in so far as the principal main-line formulae and pattern types are concerned. The present study also fails to record any significant sexual variation (cf. Table II. and VI.). However, it has been found that there are bimanual differences in the occurrence of the principal main-line formulae (cf. Table II.). The present series needs a careful investigation of other genetical traits which would enable us to arrive at some valid conclusions regarding the variability of the two caste groups of the Bengali population under study.

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