

Palmar Dermatoglyphics in Maharashtrians of India

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Introduction

The author had the opportunity to collect the palmar and sole prints of Maharashtra boys and girls studying in an Educational Institution of Delhi, a few months back. This is the second paper on the Maharashtrians, the first one being in press. It is the first time that this kind of work is undertaken on this population.

Material and methods

The data consist of 296 palmar prints of 75 males and 73 females. The age range for both males and females is between 8 and 18 years. Only unrelated subjects were taken. The printing of palms and soles and their formulations were done as prescribed by Cummins and Midlo (1961). Each individual is represented with bilateral prints in this investigation.

Results and discussion

Tab. 1 shows the total frequency distribution of the different main line formulae among the subjects. The total number of the different main line formulae is 36 for the males, 30 for the females, and 41 for both sexes together. Females show a lower number of different main line formulae than males. The lowest dissimilarity (Tab. 1-A) is shown by the right hand of females, and the highest is shown by the left hand of males. But both in males and females, the left hand shows a higher percentage of dissimilarity than the right one. This is also true when both sexes are considered together, i.e. the left hand shows a higher dissimilarity than the right one (24.3% vs. 20.3%). In general, males show a higher percentage (24.0%) of dissimilarity than females (20.0%).

Tab. 2 shows the percentage distribution of three principal main line formulae. Arranging these formulae in the ascending order, males show the order of 7.5.5; 9.7.5; 11.9.7; whereas females show the order of 9.7.5; 7.5.5; 11.9.7. For both sexes together the order of the formulae is similar to the one exhibited by the females. Right hand of both males and females show the maximum percentage of the formula 11.9.7 and minimum percentage of the formula 7.5.5; formula 9.7.5 being in between.

The left hand of females shows the following preponderance order of formulae: 11.9.7; 7.5.5; 9.7.5; though the percentage for formula 11.9.7 in the left hand of males is low but the other two formulae exhibit equal percentages. When combining both sexes the right hand shows the highest percentage of formula 11.9.7, and the lowest

Tab. 1. Total number of different main line formulae among Maharashtrians

♂			♀			♂ + ♀		
R	L	R+L	R	L	R+L	R	L	R+L
25	29	36	20	25	30	30	36	41

Tab. 1a. Percentages of dissimilarity

Series	R	L	R+L
♂ (75)	33.33	38.76	24.00
♀ (73)	27.39	34.24	20.55
♂ + ♀ (184)	20.27	24.32	13.85

Tab. 2. Percentage frequencies of three principal main line formulae

Types	♂			♀			♂ + ♀		
	R	L	R+L	R	L	R+L	R	L	R+L
11.9.7	41.3	22.6	31.9	43.8	28.7	36.7	43.2	25.6	34.4
9.7.5	10.6	18.6	14.6	13.6	9.6	11.6	11.5	14.2	12.8
7.5.5	9.3	18.6	13.9	12.3	19.2	15.7	10.6	16.9	14.7

percentage of formula 7.5.5, formula 9.7.5 being in between. Left hand in this case shows the following preponderance order of formulae: 11.9.7; 7.5.5; 9.7.5.

In Tab. 3, the percentage frequencies of the termination of the main lines have been shown.

Line D. Line D shows most radialward termination (position 11) which is true for both sexes; the frequency in males is 48.05% whereas in females it is 52.05%. Right hands of both sexes show almost similar frequencies in the termination of this line in position 11. In the left hand, the value for females in connection with the termination to position 11, is higher than in males. It is evident of course that in both sexes separately, Line D shows more terminations towards 11 in the right than left hand. Next in order comes the termination of this line to positions 9,7,10, and 8.

Tab. 3. Percentage frequencies of termination of palmar main lines in Maharashtrian series (148)

Endings	♂ (75)						♀ (73)					
	Right		Left		R+L		Right		Left		R+L	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
<i>Line D</i>												
11	44	58.66	28	37.33	72	48.05	43	58.90	33	45.21	76	52.05
10	6	8.00	6	8.00	12	8.00	5	6.84	9	12.32	14	9.05
9	15	20.00	24	32.00	39	26.00	14	19.17	16	21.91	30	20.54
8	3	4.00	1	1.33	4	2.65	2	2.73	—	—	2	1.36
7	7	9.33	16	21.33	23	15.33	9	12.32	14	19.17	23	15.75
5	—	—	—	—	—	—	—	—	1	1.36	1	0.68
<i>Line C</i>												
11	2	2.66	—	—	—	—	2	2.74	—	—	2	1.36
10	6	8.00	1	1.33	7	4.65	3	4.11	1	1.36	4	2.73
9	35	46.66	25	33.33	60	40.00	37	50.68	32	43.83	69	47.26
7	10	13.33	16	21.33	26	17.30	13	17.80	8	10.95	21	14.38
6	4	5.33	—	—	—	—	2	2.74	—	—	2	1.36
5	8	10.66	15	20.02	23	15.36	9	12.32	15	20.54	24	16.43
X	6	8.00	13	17.33	19	12.65	3	4.11	9	12.32	12	8.21
0	4	5.33	5	6.66	9	6.00	4	5.47	8	10.95	12	8.21
<i>Line B</i>												
9	2	2.66	—	—	—	—	2	2.74	1	1.36	3	2.05
8	6	8.00	2	2.66	8	5.33	3	4.11	1	1.36	4	2.73
7	36	4.80	27	36.00	63	42.00	38	52.00	31	42.46	69	47.26
6	4	5.33	4	5.33	8	5.33	5	6.85	9	12.33	14	9.58
5	27	36.00	42	56.00	69	46.00	25	34.23	31	42.46	56	38.35
<i>Line A</i>												
5	51	68.00	23	30.66	74	49.33	48	65.70	36	49.31	84	57.53
3	24	32.00	49	65.00	73	48.65	24	32.90	34	46.57	58	39.72
1	—	—	3	4.00	—	—	1	1.40	3	4.09	4	2.73

This order is followed by both sexes. The percentage distribution of the terminations to positions 9 & 7 is 26.00 and 15.3, respectively, in males, and 20.5 and 15.7, respectively, in females. It means that the termination to position 7 in both sexes is almost similar. The termination to positions 10 & 8 is rare, Line D terminates to position 5 in one of the females only.

Line C. The maximum percentage of the terminations of this line is to position 9, both in males and females. But females show higher value of the termination to this position than males. The percentage frequency is 40.00 for males and 47.2 for females. Taking both hands separately, in both sexes, the line terminates much more frequently to this position (9) in the right than in the left hand. The second and third maximum values for the termination is at positions 7 & 5 for males, and 5 & 7 for females. The termination is minimum to position 6. The values of this line for states X & O are 12.65 and 6.00 in males and 8.7 and 8.1 in females.

Line B. The termination of this line (of the maximum value) is different for the two sexes. The termination is maximum at position 5 in males and at position 7 in

females. The percentage frequency is almost the same in these two cases: 46.00% in males (position 5) and 47.2% in females (position 7). In males the percentage frequency of termination of line B to position 7 is 42.00, whereas to positions 6 & 8 it is almost equal. Position 9 shows a minimum value in the males. In females the termination to position 5 has a frequency of 38.3% and the one to position 6 of 9.6%. The line terminates mostly to positions 8 & 9. Considering separately right and left hands in both sexes, it has been seen that while at position 7 the right hand shows a higher value of its termination than the left hand, at position 5 the left hand shows a higher value of its termination than the right hand.

Line A. The preponderance order of termination of this line is to positions 5, 3 and 1. The percentage frequency to positions 5 and 3 is almost equal in males (49.33%, 48.65% respectively), but in females there is a significant difference. At position 5 the frequency is 57.5%. In general, the termination is more ulnarward.

Terminations to position 5 show higher values for right than for left hands in both sexes, while the opposite is true for position 3. In both sexes, position 1 has the minimum value of the termination of this line.

The percentages of axial triradii have been given in tab. 4. It shows shifting of the triradius more distally in males than in females. The percentage distribution of 't' is 76.00 in males and 71.23 in females. The presence of 't' shows remarkable

Tab. 4. Distribution of the axial triradii among Maharashtrians

Axial triradius	♂					♀				
	Right	%	Left	%	(R+L %)	Right	%	Left	%	(R+L %)
t	57	76.00	58	77.33	76.66	52	71.23	52	71.23	71.23
t'	12	16.00	10	13.33	14.66	11	15.21	11	15.21	15.21
t''	1	1.33	1	1.33	1.33	2	2.74	3	4.11	3.42
tt'	1	1.33	2	2.66	2.00	4	5.48	3	4.11	4.79
tt''	3	4.00	2	2.66	3.33	4	5.48	1	1.37	3.42
t't''	1	1.33	2	2.66	2.00	—	—	3	4.11	—

symmetry for right and left hand in both sexes. In males the frequency of 't' is 76.00% in the right and 77.33% in the left hand, while females show the same value (71.23%) for both hands. The frequency of 't'' is almost the same in both sexes. It is 14.66% in males and 15.21% in females. The percentages of other axial triradii are very rare, as has been listed in Tab. 4.

Frequencies of the different patterns in hypthenar, thenar and interdigital areas have been tabulated in Tables 5, 6 & 7, respectively. The frequency of whorls in hypthenar area is very low: it is only 4.09% in right hand of females. In the right and left hands of males as well as in the left hand of females this pattern is lacking, only arches have their maximum frequency in the hypthenar area. It is 74.82% in males and 63.05% in females. The frequency of arches in this area (hypthenar) in males is higher in the right than in the left hand, whereas the opposite is true in females.

Loops are more frequent in females than in males, the frequency being 34.87% and 25.30%, respectively. In both sexes the left hand shows more loops than the right hand, the difference being not very significant.

Surprisingly enough, in the thenar/I-Interdigital area, neither whorl, nor loop nor any other kind of true pattern has been found in this study of 148 Maharashtrians.

Tab. 5. Percentage frequencies of pattern in hypothenar area

Pattern	♂			♀		
	R	L	R+L	R	L	R+L
Whorls	—	—	—	4.09	—	2.04
Loops	22.66	27.95	25.30	34.20	35.35	34.87
Arches	77.33	72.32	74.82	61.70	64.34	63.05

Tab. 6. Frequency of the patterns of thenar/I interdigital

Types	♂				♀			
	Right	%	Left	%	Right	%	Left	%
V	2	2.66	2	2.66	2	2.74	5	6.85
P	73	97.33	73	97.33	71	97.26	68	93.15

Tab. 7. Percentages frequencies of patterns in three interdigital areas

Interdigital area	Patterns	♂			♀		
		R	L	R+L	R	L	R+L
II	Loops	2.66	—	1.33	6.84	2.72	4.28
	Vestiges	—	—	—	1.36	1.36	1.36
	Open Fields	97.33	100.00	98.66	91.79	95.89	93.84
III	Loops	57.33	42.66	50.00	54.79	47.95	51.37
	Vestiges	4.00	2.66	3.33	1.36	1.36	1.36
	Open Fields	38.66	54.66	46.66	43.83	50.68	47.51
IV	Loops	45.33	59.99	52.66	43.83	41.16	42.49
	Vestiges	8.00	9.33	8.65	6.84	5.49	6.66
	Open Fields	46.66	30.67	38.66	49.32	53.42	51.38

Only a very low frequency of vestiges has been found as shown in tab. 6. Open fields have been observed in the frequency of 97.33% in males and 93.15% in females; the rest being vestiges.

In the three interdigital areas only loops, vestiges and open fields have been observed. The fourth interdigital area in males shows the maximum occurrence of loops

(52.66%). In females the frequency of loops is maximum in the third interdigital area (51.37%).

In the third interdigital area loops are more frequent in the right than in the left hand in both sexes. In the fourth interdigital area the left hand of males shows more loops than the right hand, while the opposite is true for females.

The frequency of open fields is higher in the left than in the right hand in both sexes, in all three interdigital areas, except in males in the fourth interdigital area, where the right hand shows a higher frequency of open fields than the left one.

The highest frequency of open fields has been observed in the second interdigital area of both sexes. The presence of vestiges in all three interdigital areas is below 10% in both sexes but its value is maximum in the fourth interdigital area.

Summary

Both palm prints of 75 ♂ and 73 ♀ unrelated Maharashtrian students aged 8-18 have been collected and analysed according to Cummins & Midlo's methodology. The results are tabulated and discussed.

They concern the principal main line formulae and their terminations at Lines D, C, B, A; the distribution of the axial triradius, as well as the frequencies of whorls, loops, arches, vestiges and open-fields in the hypothenar, thenar and in the interdigital areas.

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RIASSUNTO

Sono state rilevate le impronte di ambedue le palme di 75 maschi e 73 femmine non imparentati da una popolazione di studenti Maharashtrian in età dagli 8 ai 18 anni, seguendo la metodologia di Cummins e Midlo. I risultati vengono tabulati e discussi. Essi si riferiscono alla

formulazione delle linee principali ed alle loro terminazioni alle linee D, C, B, A; alla distribuzione del triradio assiale ed alle frequenze di vortici, anse, archi, vestigia e campi aperti nelle aree ipotenare, tenare ed interdigitali.

RÉSUMÉ

Les empreintes des deux paumes ont été recueillies chez une population d'étudiants Maharashtrais (75 mâles et 73 femelles) non-consanguins, de 8 à 18 ans, d'après les méthodes par Cummins et Midlo. Les résultats, tabulés et discutés, se réfèrent aux formules des lignes prin-

cipales, ainsi qu'à leurs terminaisons aux lignes D, C, B, A; à la distribution du triradius axial et aux fréquences de tourbillons, anses, arches, vestiges et champs ouverts dans les régions hypothénare, thénare et interdigitales.

ZUSAMMENFASSUNG

Der Methode von Cummins und Midlo folgend wurden von 75 männlichen und 73 weiblichen nicht miteinander verwandten Maharashtrian Schulkindern im Alter von 8 bis 18 Jahren die Abdrücke beider Handflächen genommen. Die diesbezüglichen Ergebnisse wurden auf Tabellen übertragen und dann erörtert. Sie beziehen sich auf die Formeln der Hauptleisten; auf deren Übergang in die Linien D, C, B, A; auf die Verteilung des Achsentriradius sowie auf das Vorkommen von Wirbeln, Schleifen, Bögen, Spuren und offenen Feldern im Bereich des großen und kleinen Ballens und zwischen den Fingern.