

# Palmar Dermatoglyphs of South African Indians

## COMPARISON WITH THOSE OF BLACKS AND COLOURED

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### SUMMARY

Topological analysis of the palmar dermatoglyphs of 150 male and 200 female Indians is presented and compared with similar data from South African Blacks and Coloureds of the Durban area. A very high prevalence of loops in area III of both hands is an Indian characteristic; a high frequency of ulnar loops in the hypothenar area, and a low pattern intensity in area IV are caucasoid features which the Indians share with Europeans.

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A recent study<sup>1</sup> of the palm prints of Blacks and Coloureds in the Durban area has shown that the Coloureds have no characteristic dermatoglyphic features, and that the Blacks have an extremely high frequency of patterns in area IV of both hands, and a very low frequency of thenar patterns. The palmar dermatoglyphs of normal South African Indians have not previously been reported; and this article presents data from a study done in Durban.

### POPULATION SAMPLE AND METHODS

South African Indians are descendants of immigrants who arrived in Durban during the second half of the last century, principally from the southern and eastern coastal provinces of India. Palm prints were obtained from 150 males and 200 females; all were volunteers and were drawn from nursing staff, student teachers, and technical staff at institutions in Durban. Their digital dermatoglyphs have been reported.<sup>2</sup>

Prints were analysed using the topological method of Penrose and Loesch,<sup>3</sup> with some modification,<sup>1</sup> but for convenience the distribution of patterns is also shown in traditional notation.

### RESULTS

The distribution and frequency of palmar patterns and triradii are shown in Tables I and II. The intensity of palmar triradii is summarised in Table III, and in Table IV the pattern types are given in traditional form.

Indians were similar to the other races in that the

frequency of patterns in the thenar and IVth interdigital areas was greater on the left palm, and in areas II and III, on the right. Hypothenar patterns, which in other races showed little variation in frequency between the hands or the sexes, were less uniformly distributed in the Indians.

There were significantly more thenar triradii and patterns on the left palm in males ( $P < 0,0005$ ) and females ( $0,005 > P > 0,001$ ). Compared with females, males had a highly significant ( $P < 0,0005$ ) excess of  $I^r$  loops, but when all thenar patterns were considered, the dominance of the males was not impressive ( $0,05 > P > 0,025$ ). Both sexes had relatively more patterns in area II of the right hand, but the differences were insignificant. In area III both sexes had a huge excess ( $P < 0,0005$ ) of loops on the right palm; and in both sexes tented loops predominated on the left, but only in males was the difference significant ( $P < 0,0005$ ). The frequency of loops in area IV was higher on the left palm of males ( $P < 0,0005$ ) and females ( $0,01 > P > 0,005$ ). Males had more hypothenar patterns on the left hand than on the right; central ( $\hat{h}$ ) loops were particularly prevalent ( $0,025 > P > 0,01$ ), and the frequency of  $t^b$  triradii corresponded with this. In females the situation was reversed, and they had more radial ( $0,05 > P > 0,025$ ) and ulnar ( $0,025 > P > 0,01$ ) loops on the right hypothenar area than did males. Corresponding excesses of  $t^r$  and  $t^b$  triradii were recorded in females. Although there were no impressive differences between the sexes in the frequency of hypothenar loops on the left hand, males had more  $t^r$  ( $0,01 > P > 0,005$ ), and females more  $t^r$  ( $0,1 > P > 0,05$ ), triradii on the left hands.

### Interracial Comparisons

Indian males had a significantly higher ( $0,005 > P > 0,001$ ) number of thenar features than had Black males, although, taken separately, the right and left hands were not significantly different. There was no such discrepancy between Indian and Coloured males, and there were no outstanding differences between females of the 3 races.

A characteristic of Indians of both sexes was the highly significant prevalence of loops in area III of each hand. Compared with Coloureds, both hands had a highly significant excess ( $P < 0,0005$ ); and similarly, in comparison with Black males both left ( $P < 0,0005$ ) and right ( $0,001 > P > 0,0005$ ) hands had a higher pattern frequency. Indian females also showed this high prevalence of patterns in area III, and the difference between each hand and the corresponding hand of Coloured and Black females was significant ( $P < 0,0005$ ).

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TABLE I. FREQUENCY AND DISTRIBUTION OF PALMAR PATTERNS

	Males (n = 150)						Females (n = 200)						M + F %	
	L	%	R	%	L + R	%	L	%	R	%	L + R	%		
I	7	4,66			7	2,33	7	3,5	2	1,0	9	2,25	16	2,28
I'	8	5,33	2	1,33	10	3,33	2	1,0	2	1,0	4	1,0	14	2,0
*V	21	14,0	19	12,66	40	13,33	27	13,5	25	12,5	52	13,0	92	13,14
II	19	12,66	27	18,0	46	15,33	14	7,0	24	12,0	38	9,5	84	12,0
III	72	48,0	101	67,33	173	57,66	92	46,0	127	63,5	219	54,75	392	56,0
<sup>Δ</sup> III							1	0,5			1	0,25	1	0,14
III'	20	13,33	5	3,33	25	8,33	20	10,0	13	6,5	33	8,25	58	8,28
IV	108	72,0	79	52,66	187	62,33	135	67,5	109	54,5	244	61,0	431	61,56
<sup>Δ</sup> IV	1	0,66	1	0,66	2	0,66			2	1,0	2	0,5	4	0,56
H	24	16,0	19	12,66	43	14,33	34	17,0	44	22,0	78	19,5	121	17,28
<sup>Δ</sup> H														
H <sup>d</sup>	40	22,66	28	18,66	68	22,66	59	29,5	55	27,5	114	28,5	182	26,0
H <sup>d</sup>	1	0,66	1	0,66	2	0,66	2	1,0	1	0,5	3	0,75	5	0,7
Total	300		263		563		366		379		745		1 308	
PI	2,000		1,753		1,876		1,830		1,895		1,862		1,868	

\* Thenar vestiges are not included in calculation of pattern intensity (PI).

TABLE II. FREQUENCY AND DISTRIBUTION OF PALMAR TRIRADII

	Males (n = 150)						Females (n = 200)						M + F %	
	L	%	R	%	L + R	%	L	%	R	%	L + R	%		
e	15	10,0	2	1,33	17	6,0	9	4,5	4	2,0	13	3,25	30	4,42
t	137	91,33	134	89,33	271	90,33	163	81,5	168	84,0	331	82,75	602	86,0
t'	35	23,33	28	18,66	63	21,0	65	32,5	68	34,0	133	33,25	196	28,0
t''	2	1,33	5	3,33	7	2,33	7	3,5	8	4,0	15	3,75	22	3,15
t <sup>b</sup>	40	26,66	28	18,66	68	22,66	58	29,0	57	28,5	115	28,75	183	26,14
t <sup>r</sup>	1	0,66	1	0,66	2	0,66							2	0,28
t <sup>u</sup>	1	0,66	1	0,66	2	0,66	2	1,0			2	0,5	4	0,56
z'	1	0,66	1	0,66	2	0,66	5	2,5	3	1,5	8	2,0	10	1,42
z''							5	2,5			5	1,25	5	0,7
Total	232		200		432		314		308		622		1 054	
PI	1,546		1,333		1,440		1,570		1,540		1,555		1,505	

TABLE III. INTENSITY OF TRIRADII ON INDIANS' PALMS

		Number of triradii																	$\bar{x}$	SD
		3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19		
Left	M		1	54	52	34	7	1	1									5,993	0,9833	
	F		7	73	82	27	6	5										5,835	0,9787	
Right	M			65	60	19	6											5,773	0,8176	
	F		1	81	71	35	12											5,880	0,9082	
Both	M							1	39	29	34	28	12	3	1	1	1	11,766	1,8009	
	F						1	5	50	39	54	27	9	8	3	4		11,715	1,8869	

By contrast, Indians had fewer patterns in area IV. The difference between Indian and Black males was significant (left:  $P < 0,0005$ ; right:  $0,005 > P > 0,001$ ), but Coloureds and Indians had similar frequencies. Black females also had a higher frequency than did Indian females, the difference being highly significant ( $P < 0,0005$ ) for both hands. Coloured females also had a higher pattern intensity in area IV than had Indian females; on the left this was significant ( $0,01 > P > 0,005$ ), but the right hands were not so markedly different ( $0,025 > P > 0,01$ ).

Indians had the highest frequency of hypothenar ulnar loops. In males the difference between Black and Indian was significant on both hands (left:  $0,005 > P > 0,001$ ; right:  $0,001 > P > 0,0005$ ). Again, the difference between Indian and Coloured was not as great, and only on the left hand was it measurable ( $0,025 > P > 0,01$ ). Indian females had highly significant excesses over Coloured (left:  $0,005 > P > 0,001$ ; right:  $P < 0,0005$ ) and Black (left:  $0,005 > P > 0,001$ ; right:  $P < 0,0005$ ) females. Centrally directed ( $\overset{\Delta}{H}$ ) loops were more common in Coloured ( $0,005 > P > 0,001$ ) and Blacks ( $0,025 > P > 0,01$ ) males than in their Indian counterparts. The females did not show any discrepancy in this respect.

TABLE IV. DISTRIBUTION OF PALMAR PATTERNS IN INDIANS: TRADITIONAL NOTATION

	Males (n = 150)			Females (n = 200)		
	L	R	L+R	L	R	L+R
<b>Thenar</b>						
L	3		3	7	2	9
L'	4	2	6	2	2	4
L'/L	2		2			
W <sup>s</sup>	1		1			
W <sup>c</sup>	1		1			
<b>Hypothenar</b>						
L <sup>u</sup>	13	16	19	20	20	40
L'	31	25	56	46	34	80
L <sup>d</sup>	1	1	2	2	1	3
L <sup>u</sup> /L <sup>u</sup>	1		1		3	3
L'/L <sup>u</sup>	4	1	5	6	6	12
L'/L <sup>c</sup>					1	1
L'/A'				1	2	3
W <sup>s</sup>	3	1	4	3	10	13
W <sup>c</sup>	2	1	3	1	3	4
W <sup>u</sup> /L <sup>u</sup>				2		2

The prevalence of axial triradii at the *t* position was higher on both hands in Indian males than in Blacks ( $P < 0,0005$ ), but there was no difference between Indian and Coloured males. Conversely, Indian females had more *t* triradii than had Coloured females (left:  $0,01 > P > 0,005$ ; right:  $0,001 > P > 0,0005$ ) but in comparison with Black females, the excess was significant only on the right ( $P < 0,0005$ ). Indian males had fewer *t<sup>b</sup>* triradii than either Coloured ( $0,005 > P > 0,001$  or Blacks ( $0,01 > P > 0,005$ )). Coloured males had rather more shared interdigital triradii than had Indian males ( $0,025 > P > 0,01$ ).

## DISCUSSION

Indians showed the characteristic predominance of patterns in the left thenar and IVth interdigital areas, and in the right II<sup>nd</sup> and III<sup>rd</sup> areas. Unlike the other races, however, they had an unequal distribution of hypothenar patterns between the left and right hands of males and, in fact, males had fewer patterns in this area than did females. A possible explanation for this is that the sample of Indian males was smaller than any of the others, but confirmation of this point remains to be made.

It appears that the very high frequency of patterns in area III of both hands is an Indian characteristic. In Blacks and Coloureds the frequency for both sexes was 34% and 41%, respectively,<sup>2</sup> and in Europeans, 45%;<sup>3</sup> the Indians reported here had a prevalence of 56%. An interesting observation was that with a frequency of 61% in both Indians and Europeans, both caucasoid races have a lower frequency of patterns in area IV than do Blacks, with 83%; and that the Coloureds have an intermediate frequency of 68%.

A high prevalence of hypothenar ulnar loops is also a caucasoid feature; Penrose and Loesch<sup>3</sup> found the frequency in Europeans to be 16%, and the Indians of this study are, with 17%, very similar. But Blacks have only 6%, and Coloureds, 8%. It will be interesting to compare the data from these 3 races with those of White South Africans.

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## REFERENCES

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