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APICAL DERMAL CONFIGURATIONS OF THE KOKNAS — A TRIBE OF SOUTH GUJARAT, WESTERN INDIA

ABSTRACT: *Koknas are one of the numerous schedule tribes of South Gujarat. They are also well known under their different synonyms like Kukna, Kokni, etc. Their total number of population in Gujarat is 203,511 according to the 1981 Census. They are mainly distributed in Valsad and Dang districts of Gujarat. In Valsad their main concentration is in only two places — Dharampur and Vansda. Koknas are now settled agriculturists and some landless Kokna work as agricultural labourers. They are Hindu in religion.*

The present study reveals the bilateral as well as sexual variations in finger pattern types and their indices. Comparative analysis of pattern type dermatoglyphs of different tribal populations of western India suggests that the Kokna tribe is close to other neighbouring tribes like Naikas, Warlis of Gujarat and Bhils, Meenas, Banjaras of Rajasthan and others, while they maintain considerable differences with the other studied tribal populations, viz. Charans, Padhars of Gujarat and Meenas of Rajasthan.

KEY WORDS: *Dermal configuration — Bilateral variation — Sexual variation — Finger pattern — Comparative study — Tribes — Western India.*

INTRODUCTION

Finger and palmar dermatoglyphics are exclusively individual in character but shows a definite trend for homogeneous groups. This trend can be utilized for confirmation of ethnic affinities in combination with other genetic parameters. These dermatoglyphic traits are less adaptive and show no post-natal modifications. The configuration types are individually variable but they vary within the limits which allow for systematic classification (Cummins and Midlo 1961).

Few pioneering scientists have done some research in finger-print studies concerning the morphology, classification, inheritance, racial variation and geographic variation within races, of which Galton

(1892), Wilder (1897), and Poll (1938) were the best known. Afterwards many scientists have worked in India on the above mentioned topics. But in India, especially in Gujarat there are very few studies on these subjects and most of the tribal populations have still not been studied by physical anthropologists.

The present study reveals the extent of variability of dermal patterns and sexual variation among the Kokna tribe of Gujarat and also highlights their ethnic variation with reference to other western-Indian tribal populations.

Kokna is a schedule tribe of Gujarat. According to the 1981 Census their population is 203,511. They have several synonyms like Kukna, Kokni etc. They are living mainly in Valsad and Dang districts of Gujarat and at two places in Valsad: Dharampur and

Vansda, where their population is more numerous. According to tribal sub-plan report, they came to India from the Mediterranean region with their special Kokni dialect. They are also found in Maharashtra State. Koknas are settled agriculturists and most of them have good amount of land for agriculture (Lal 1980) and some of the landless Kokna work as agricultural labourers. They are also dependent on some of the allied economic activities such as hunting, collection of edible roots, leaves, fruit from the forest, liquor making, labour work, etc.

The impact of Hindu religion on their traditional beliefs is considerable; they worship many Hindu gods and goddesses in addition to some deities of their own, viz. Himai Dev, Kansari Devi, etc. and some village deities, viz. Simaridev, Bogh Dev, etc. (Shah 1968). Among the other tribal groups of south Gujarat or elsewhere in western India, they enjoy higher status than others. Koknas are mainly dependent on their indigenous medical treatment and they use mainly local medicines from Bhua and Bhagat. The progress of education is very slow among them. They are medium statured with dark-brown complexion and mostly with brachycephalic heads and wavy hair. They prefer to live in forest areas.

TABLE 1. Percentile occurrence of basic three pattern types in both hands of Koknas.

Principal pattern types	Males				Total		Females				Total		Both sexes combined	
	RH		LH		R + L		RH		LH		R + L		R + L	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Whorl	224	45.25	226	45.66	450	45.45	217	43.4	231	46.2	448	44.8	898	45.12
Ulnar loop	248	50.10	238	48.08	486	49.10	260	52.00	240	48.00	500	50.0	986	49.55
Radial loop	9	1.82	9	1.82	18	1.82	2	0.4	5	1.00	7	0.7	25	1.26
Arch	14	2.83	22	4.44	36	3.63	21	4.2	24	4.8	45	4.5	81	4.07

χ^2 (Value for the three pattern types) = 0.0328, d.f. = 2 : 0.90 > P > 0.80 (N.S.)

TABLE 2. Percentile occurrence of detail pattern types among the male Koknas of Gujarat.

Pattern Types	RH					LH					R + H Combined				
	I	II	III	IV	V	I	II	III	IV	V	I	II	III	IV	V
Whorl (W)	44.44	43.43	22.22	52.52	21.21	38.38	42.42	22.22	54.54	26.26	41.41	42.92	22.22	53.53	23.73
Whorl double loop (WDL)	8.08	5.05	2.02	2.02	—	14.14	3.03	5.05	1.01	—	11.11	4.04	3.53	1.51	—
Central pocket loop (CPL)	2.02	3.03	2.02	5.05	10.10	—	4.04	4.04	6.06	3.03	—	—	—	—	—
Lateral pocket loop (LPL)	—	—	—	1.01	2.02	—	—	—	—	4.04	—	—	—	—	—
Ulnar loop (LU)	42.42	34.34	68.68	38.38	66.66	66.66	34.34	61.61	35.35	65.65	42.92	34.34	65.15	36.86	66.16
Radial loop (LR)	1.01	8.08	—	—	—	—	8.08	1.01	—	—	.50	8.08	.50	—	—
Plain arch (AP)	2.02	5.05	5.05	—	—	—	4.04	6.06	3.03	—	1.01	4.54	5.55	1.51	—
Tented arch (AT)	—	1.01	—	1.01	—	—	4.04	—	—	1.01	—	2.52	—	.50	.50

MATERIAL AND METHOD

Bilateral finger prints of 99 unrelated male and 100 female individuals of the Kokna tribe were studied during 1984–85 following standard techniques (Cummins and Midlo 1961) from the Bilpudi village of Dharampur taluka of Valsad district in Gujarat State.

The collected finger prints of 99 unrelated males and 100 females were classified according to the method of Galton (1892) into three main types of whorl, loop and arch and also detailed classification of all the three pattern types. Chi-square (χ^2) values are calculated by using Woolf's (1957) G-table and probabilities are determined from Fisher and Yates (1953). Angle atd was also measured following Cummins and Midlo (1961).

RESULT AND DISCUSSIONS

The percentile occurrence of three main papillary patterns in both the hands of Koknas for both the sexes, are shown in the Table 1. The total studied population has shown 45.12 % of whorls, 50.81 % of loops, including ulnar and radial, and 4.07 % of

TABLE 3. Percentile occurrence of detail pattern types among the female Koknas of Gujarat.

Pattern types	RH					LH					R + H Combined				
	I	II	III	IV	V	I	II	III	IV	V	I	II	III	IV	V
Whorl (W)	23.00	33.00	14.00	51.00	19.00	32.00	35.00	28.00	—	—	—	—	—	—	—
Whorl double loop (WDL)	29.00	8.00	7.00	5.00	3.00	18.00	10.00	3.00	—	—	—	—	—	—	—
Central pocket loop (CPL)	1.00	4.00	11.00	11.00	8.00	—	2.00	3.00	13.00	6.00	—	—	—	—	—
Lateral pocket loop (LPL)	—	—	—	1.00	—	—	—	—	—	—	—	—	—	0.50	—
Ulnar loop (LU)	42.00	45.00	75.00	31.00	67.00	45.00	36.00	61.00	31.00	67.00	—	—	—	—	—
Radial loop (LR)	1.00	1.00	5.00	—	—	—	—	—	—	—	—	—	—	—	—
Plain arch (AP)	4.00	6.00	2.00	1.00	3.00	5.00	10.00	2.00	1.00	1.00	—	—	—	—	—
Tented arch (AT)	—	3.00	1.00	—	—	—	2.00	3.00	—	—	—	—	—	—	—

arches which are very low in frequency in comparison to the whorl and loop types. Considering sexual difference it has been found that frequencies of whorls and loops are mostly the same and the frequency differences are only 0.65 % and 0.90 %. Finger prints of 99 males and 100 females in total have been analyzed and it has been clear that in both the hands of the two sexes, the frequency of whorls is mostly the same and a comparatively higher percentage (52.00) of ulnar loop is only in the females' right hand. It is quite rare that the percentage of loops is the same in the left hand of both sexes. Radial loops are less frequent in both the sexes but arches are comparatively less frequent in the males' right hand (2.83 %). Bilateral differences of both the sexes regarding the three main pattern types are non-significant and the chi-square (χ^2) value shows 0.0328, df = 2 : 90 p 80 (NS).

In Table 2 detailed frequency of different pattern types of male Koknas has been shown digitwise. The highest frequency of plain whorl (W) was found mainly in the 4th finger of the left hand while the other types of whorl, like whorl double loop (WDL), are higher in the 1st finger of the left hand. Central pocket loop (CPL), and lateral pocket loop (LPL) are in a very low frequency in all the digits of both the hands

TABLE 4. Sex-wise different indices among the Koknas.

Name of the indices	Total population	Males	Females
Pattern intensity Index	14.10	14.18	14.03
Furukata Index (W/L Index)	89.28	88.36	88.82
Dankmeijer Index (A/W Index)	8.00	10.04	9.02

For sexual difference: χ^2 value for sexual difference of P.I. = 0.001635, df = 1: 0.99 > P 0.98 (N.S.)
D.I. = 0.1906291, df = 1: 0.95 > P 0.90 (N.S.)
F.I. = 0.1452173, df = 1: 0.95 > P 0.90 (N.S.)

in males. Considering ulnar loop (LU) and radial loop (LR), it has been found that all the digits in both hands show higher frequency of ulnar loop than of the radial loop and this radial loop is also missing in some of the digits of male hands, e.g. in the 3rd, 4th and 5th fingers of the right hand and in the 1st, 4th and 5th fingers of the left hand. As far as the arch pattern type is concerned, both the arch types, plain arch (AP) and tented arch (AT) are found in much smaller frequency and they are not present at all in some of the fingers. The highest frequencies of plain arches are found in the 2nd and 3rd fingers of the right hand and in the 3rd finger of the left hand. Tented arches are found in very low frequency or they are completely missing in fingers of both the sexes. But comparatively the frequency of tented arch is higher (4.04) in the male left hand 2nd finger.

The different indices have been shown sexwise in Table 4 and their handwise frequency distribution in Table 5. Considering the Pattern of Intensity (from Table 4) it is clear that there is no significant chi-square value (χ^2 = 0.0011635, d.f. = 1: 99 > P > 0.98, (NS) by sex and bilaterally also there is no marked difference. The Furukata Index or Whorl-Loop Index shows mostly the same value, and here also the sexual difference is statistically non-significant and the Chi-square (χ^2) value is 0.1452173, d.f. = 1: 95 > P > 0.90. F. Index is somewhat higher in the female left hand than in the right hand and also higher than in male

TABLE 5. Handwise comparative indices value among the Koknas.

Hands	Males			Females		
	P.I.I.	F.I.	D.I.	P.I.I.	F.I.	D.I.
Right hand	7.12	87.15	6.25	6.96	82.82	9.67
Left hand	7.06	91.49	9.73	7.07	94.28	10.38
Both (R+L) combined	14.18	89.28	8.00	14.03	88.36	10.04

TABLE 6. Comparative finger dermatoglyphics among some western Indian tribal and non-tribal populations.

No.	Populations	Pattern type					Indices			Reference
		Sex	No.	Whorl	Loop	Arch	P.I.I.	F.I.	D.I.	
western Indian tribes										
1.	Koknas of Gujarat	M	99	45.45	50.92	3.63	14.18	89.28	8.00	Present study
		F	100	44.80	50.7	4.5	14.03	88.36	10.04	
2.	Bhils of Rajasthan	M	90	43.5	53.2	3.2	14.00	81.20	7.4	Biswas, 1957
3.	Bhils of Rajasthan	M	29	36.21	57.93	5.86	13.00	62.50	16.19	Srivastava, 1963
4.	Banjaras of Rajasthan	M	33	47.88	51.21	0.91	14.70	93.49	1.89	Srivastava, 1963
5.	Bhils of Rajasthan	M	100	39.4	58.4	2.2	13.90	73.40	5.42	Krishan, 1987
		F	100	37.7	59.0	3.3	13.44	65.61	8.75	
6.	Charans of Gujarat	M	50	52.6	45.6	1.8	21.08	110.96	3.42	Krishan, 1987
		F	50	38.8	52.8	8.4	13.04	73.48	21.65	
7.	Padhars of Gujarat	M	100	39.4	51.3	5.8	13.36	71.89	14.72	Krishan, 1987
		F	100	36.0	58.8	5.2	13.18	60.00	11.66	
8.	Rabaris of Gujarat	M	100	42.4	52.1	5.5	13.59	82.97	12.97	Krishan, 1987
9.	Meenas of Rajasthan	M	100	41.2	54.9	3.9	13.71	76.60	9.49	Krishan, 1987
		F	100	38.4	51.7	9.9	12.85	72.34	25.52	
10.	Naikas of Gujarat	M	100	49.9	47.7	2.4	14.75	104.61	4.8	Mukherjee, 1988
		F	100	40.8	56.3	2.9	13.74	72.46	7.10	
11.	Warlis of Gujarat	M	100	37.5	56.9	5.6	13.19	65.90	14.93	Mukherjee, 1985
		F	90	49.33	47.55	3.11	14.62	103.73	6.30	
W. Indian non-tribals										
12.	Brahmins of Rajasthan	M	70	44.1	49.6	6.3	13.78	88.91	14.28	Kumbanani, 1966
13.	Gujarati's	F	40	35.0	60.3	3.8	13.6	55.6	10.4	Kumbanani, 1966
14.	Gujjars of Jaipur	M	80	37.8	55.2	7.0	13.1	68.5	18.5	Gupta, 1971
15.	Gujarati Vaishyas	M	45	42.7	55.8	1.6	14.3	76.5	3.7	Ahluwalia, 1969
16.	Parsis	M	86	37.4	59.0	2.8	13.4	63.6	9.9	Bannerjee, 1976
		F	56	31.2	61.8	1.6	12.4	50.6	22.3	
17.	Raigers of Jaipur	M	80	46.3	50.3	3.5	14.3	92.0	7.6	Sharma, 1971
18.	Telis of Udaipur	M	50	56.94	39.23	3.82	15.22	112.72	8.51	Mukherjee, 1985
		F	50	44.49	50.70	4.0	13.94	145.12	6.71	

hands. Dankmeijer Index or Arch-Whorl Index is higher in males than in females but the sexual difference is statistically non-significant ($X^2 = 0.1906219$, d.f. = 1:95 > P > 0.90). Here also the D. Index value is higher in both the hands of females than in the males. But the differences are not significant.

Comparative finger dermatoglyphics of available data of western Indian tribal and non-tribal populations have been shown in Table 6. Very few populations have been studied in this western Indian zone. From the overall data available it is found that approximately the whorls are less than 53 % and in males the frequency range varies from 37.5 % (Mukherjee 1985) to 52.6 % (Krishan 1987) in the tribal populations whereas in the available studied caste populations it varies from 37.4 % (Bannerjee 1976) to 56.94 % (Mukherjee 1985). It is also found that the frequency of loops is mostly higher in all the populations of western India. The frequencies of arches are higher in tribal populations than in caste populations except for one or two populations. Arch-

Whorl Index in males ranges between 1.89 % in Banjara tribe (Srivastava 1963) to 18.5 % in Gujjars of Jaipur (Gupta 1971). Considering whorl and loop frequency it has been found that the Kokna tribal population of Gujarat has some close affinity with the Naikas (Mukherjee 1988), Bhils of Rajasthan (Biswas 1957), Banjaras (Srivastava 1963), Meenas of Rajasthan (Krishan 1987) and Warlis of Gujarat (Mukherjee 1985). But Charans of Gujarat (Krishan 1987) show different picture where loops have lower frequency than whorls. Females show marked arch frequency in Bhils (Srivastava 1963) and Meenas (Krishan 1987), whereas the Koknas show low frequency regarding this particular pattern type. Tribals manifest close similarity with the caste population, especially with the Telis of Udaipur (Mukherjee 1985).

The Pattern Intensity Index shows mostly close similarity with all the tribal and caste populations of western India except for Charan males where this index is higher (Krishan 1987). D. Indices show higher

percentage among the Koknas than in the nearby tribal population of Naika but the Koknas show lower Dankmeijer Indices than the Warlis, another tribal population of the same region. Considering all the three pattern types as well as indices, close affinity could be discerned between the Kokna and Naika populations. So the dermatoglyphic point of view supports the idea that the Kokna and Naika tribes originated from the same stock and they have close similarity not only in skin colour and body structure but also in the dermatoglyphic genetic characters.

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