Iranian J.Publ, Health
1984, Vol.13, No 1-4 (27-42)

DERMATOGLYPHICS OF THE CAUCASIANS OF SOUTH IRAN

M.Sharif Kamali,M.Sc.,Ph.D.*

Key words: Dermatoglyphics. Finger.Palm. Ridge Counts., Iranians.

ABSTRACT

Bilateral finger and palm printsof 500 males and 500 females of the Caucasian origin in South Iran have been collected and analyzed for both qualitative and quantitative dermatoglyhic features.Results show that most of the qualitative features on bilateral and bisexual differences are not significant. however, quantitative features frequently showed significant differences both bilaterally and bisexually. These results, when, compared with some Indian groups revealed nonsignificant differences in qualitative dermatoglyphics,while, the quantitative features frequently showed significant differences. The importance of quantitative dermatoglyphic features in population studies have been discussed.

INTRODUCTION

The Late Professor Harold Cummins used the word "dermatoglyphics" to describe the study of the patterns formed by the epidermal ridges on the fingers,palms , soles and toes of humans as well as certain higher primates . These ridges that are completed early in fetal life, the third and fourth months of gestation, does not seem to change untill after death except for increase in size as the

* *Centre for Iranian Anthropology (Markaz Mardom Shenasi Iran), Ministry of Culture and higher Education, Ostad-Nejatollahi Ave.,Tehran,Iran.*

hands and feet grow. Even after serious injuries the pattern regenerates, unless the lowest part of the epidermis is destroyed.

Galton(1892)mentioned the hereditary nature of finger prints for the first time. Abundant evidences are now at hand to prove that some dermatoglyphic features are indeed inherited. While reviewing these evidences,one has to remember that genetic factors have a large share in determining variations in dermatoglyphic features as identified by gradations of similarity observed among individuals having different degree of relationship. The closest possible genetic relationship is that of monozygotic twins (Cummins and Midlo, 1961).

Dermatoglyphics has been widely used in identification, primate studies, genetics,population genetics and in various diseases. Of special interest and importance are dermatoglyphic pecularities associated with abnormal chromosomes. The connection between chromosomal aberrations and growth distrubances in pathological conditions is now well established and dermatoglyphics has become a good diagnostic tool in Down's Syndrome, Edward's Syndrome and other chromosomal aberrations(Holt,1968) . Dermatoglyphic anomalities are also associated with abnormalities of the sex chromosomes and since 1959, when Down's Syndrome was shown to be due to the presence of an extra chromosome , extensive research on other diseases have been carried out and although much remains to be done,it is graftifying that investigations continue in many countries.

Classifications of people may be founded on physical characters, culture, lanuage and/or geographical distribution. Dermatoglyphics display racial variations which is in general, in accord with classifications based upon other traits. A large number of ethnic groups and populations have been studied using dermatoglyphic features in Iran and elsewhere(Bajatzadeh and Bernhard,1969;Mehdipour and Farhud,1978,1979;Kamali,1979-1981-1982-1982a).The aim of this study is to bring to light the various dermatoghyphic features of the Caucasians of the Hormozgan Province, Iran.

MATERIALS AND METHODS

Bilateral finger and palmar prints of 1000 unrelated adults,(500 Caucasian males and 500 Caucasian females)from Hormozgan Province, South Iran, were obtained. These data have been collected in four districts and the sample size in each district is shown in table 1. The obtained data have been analyzed according to the method suggested by Cummins and Midlo(1961) for the digital and palmar patterns, D-line terminations and accessory triradii.The modal types of the C-line terminations were analyzed according to Plato (70) and those of the palmar creases according to Bhanu (73). Ridge counting method and TRC were those suggested by Holt(68), a-b ridge count(after Fang,50),a-d ridge count(after Glanville,64),d-t ridge count (after Mukherjee,67) and atd angle(after Penrose,49). The a - t ridge count have also been analyzed.Chi-spuare and t-test have been used in comparing the bilateral, bisexual and population differences for qualitative and quantitative features, respectively.

Table 1

The Sample size of the Present Study

District	Sample Size		Total
	Males	Females	
Bandar Abbas	150	150	300
Minab	160	160	320
Bandar Lengeh	110	110	220
Aban	80	80	160
Total	500	500	1000

RESULTS

Digital Patterns:

Percent frequencies of the digital patterns are given in table 2. As is shown the loops are predominant in males(57.22%), while whorls are predominant in females (55 . 90%). Arches have the lowest frequencies in both sexes(6. 25% among males and 6.60% among females) . The bilateral differences are nonsignificant, whereas the bisexual differences are (table 6).

Table 2

Percent frequencis of the digital patterns among the Caucasians of South Iran

Digits	Arches		Ulnar Loops		Radial Loops		whorls	
	M	F	M	F	M	F	M	F
RI	6.6	6.0	47.4	30.0	0.0	0.0	36.0	64.0
RII	7.4	7.0	35.0	22.0	10.0	11.0	47.6	60.0
RIII	10.0	9.0	50.0	38.0	0.0	0.0	40.0	53.0
RIV	2.6	3.0	57.4	41.0	2.4	4.0	37.6	52.0
RV	2.4	5.0	67.6	40.0	0.0	0.0	30.0	55.0
R Total	5.8	6.0	51.4	34.2	2.48	3.0	40.32	54.8
LI	0.0	2.0	50.0	36.0	0.0	0.0	50.0	62.0
LII	15.0	11.0	55.0	33.0	10.0	12.0	20.0	44.0
LIII	10.0	13.0	52.4	35.0	2.6	3.0	35.0	49.0
LIV	5.0	5.0	50.0	38.0	2.4	1.0	42.6	56.0
LV	2.6	5.0	80.0	31.0	0.0	0.0	17.4	64.0
L Total	6.72	7.2	57.48	34.6	2.74	3.2	36.52	55.0
Total	6.26	6.6	54.44	34.4	2.61	3.1	38.42	54.9

Palmar Patterns:

The types and frequencies of patterns found on the palmar areas are given in table 3.Patterns on the III interdigital area show the highest frequencies in both sexes (18.10% among males and 13.45% among females) , While the frequencies of the patterns on the II interdigital area is the lowest(1.90% among males and 1.75% among females). The sigle loops predominate on the palmar areas in both sexes (13.20% among males and 11.50% among females),while whorls have the lowest frequencies(2.20% among males and 2.12% among females).

Both bilateral and bisexual differences are nonsignificant (table 6).

Modal Types of the C-line Terminations:

The types and frequencies of the C-line terminations are given in table 4. The ulnar type is predominant on the right hands of both sexes (55.00% among males and 45.60% among females), whereas radial type is predominant on the left hands(52.60% among males and 49.00% among females) . Modal type absent has the lowest frequencies on both hands in both sexes(2.50% on the right and 2.40% on the left hands of males, and 7.60% on the right and 1.60% on the left hands of females).

Bilateral differences are significant only among the females, while bisexual differences are nonsignificant (table 6).

Modal Types of the D-line Terminations:

The types and frequencies of the D-line terminations are given in table 4. The modal type 11 is predominant on both hands in both sexes (70.00% on the right and 70.00% on the left hands of males, and 50.00% on the right and 57.00 on the left hands of females), while modal type 9 has the lowest frequencies on both hands of males (12.60% on the right and 10.00% on the left hands) and the modal type 7 has the lowest frequencies on both hands of females (14.60% on the right and 12.00% on the lelt hands).

Percent frequencies of the Palmar Patterns among the Caucasians of South Iran

Table 3

Palmar Areas	Open/Arch		Vestiges		Single Loops		Double Loops		Whorls	
	M	F	M	F	M	F	M	F	M	F
R Hypothenar	58.0	70.6	2.6	2.8	10.0	12.0	5.0	9.2	3.6	5.4
R Thenar/I	76.2	93.4	1.2	0.6	7.0	5.0	0.8	0.4	0.8	0.6
R II	90.0	91.4	5.0	4.0	5.0	4.6	0.0	0.0	0.0	0.0
R III	37.6	50.8	28.4	21.0	37.6	26.0	2.6	1.2	0.8	1.0
R IV	45.0	52.0	30.0	28.0	17.4	15.0	3.8	2.4	3.6	2.6
L Hypothenar	55.4	70.4	3.6	3.2	11.2	13.4	2.4	6.0	5.0	7.0
L Thenar/I	86.4	95.2	1.2	0.8	3.6	3.0	0.6	0.6	0.8	0.4
L II	87.2	93.6	5.0	4.2	2.6	2.4	0.0	0.0	0.0	0.0
L III	50.8	54.2	21.0	20.2	26.0	26.0	1.2	0.4	1.0	1.2
L IV	50.0	60.6	32.4	25.0	10.0	9.6	2.6	1.8	5.0	3.0

Table 4

Percent friquencies of the C- and D-lines Terminations of the Caucasians of South Iran

Terminations	Right		Left	
	M	F	M	F
C-Line:				
Ulnar	55.0	45.6	42.4	46.0
Radial	32.5	37.4	52.6	49.0
Proximal	10.0	9.4	12.6	3.4
Absent	2.5	7.6	2.4	1.6
D-Line:				
7	17.4	14.6	20.0	12.0
9	12.6	35.4	10.0	31.0
11	70.0	50.0	70.0	57.0

Bilateral differences are nonsignificant but, the bisexual differences are significant (table 6).

Accessory Triradii:

The types and frequencies of the accessory triradii on the palmar areas are given in table 5. As is shown, the accessory triradii appear mostly on the axial and IV interdigital areas. The III interdigital area has the lowest frequency.

Both bilateral and bisexual differences are nonsignificant (table 6).

Palmar Creases:

The types and frequencies of the simian creases are given in table 5. The transitional type(TT) appears more

Table 5
Percent frequencies of the accessory triradii and Simian creases among the Caucasians of South Iran

Features	Males		Females	
	R	L	R	L
Accessory Triradii:				
Axial	7.6	5.0	15.4	12.0
II	5.0	2.4	4.6	3.0
III	0.7	0.6	1.6	1.0
IV	12.4	7.6	14.0	12.0
Simian Creases:				
TT	5.0	1.4	4.0	3.2
OSC	2.6	3.0	2.4	2.4
TSC	0.4	2.4	1.6	2.0

on the right hands of both sexes and on the left hands of females(5.00% on the right hands of males, 4.00% on the right and 3.4% on the left hands of females) , while the other simian creases (OSC) appears more on the left hands of females(3.00%).

Both bilateral and bisexual differences are nonsignificant (table 6).

Finger Ridge Counts and TRC:

The mean ridge counts on the individual fingers for both sexes are given in table 7. As is shown, finger 1 has the highest ridge counts on both hands of males , and

Table 6
Bilateral and bisexual differences of the qualitative dermatoglyphic features among the Caucasians of South Iran

Differences	Dermatoglyphic Features	X^2 values
Bilateral:		
	Digital Patterns (males)	1.16
	Digital Patterns (females)	0.15
	Palmar Patterns (males)	6.71*
	Palmar Patterns (females)	1.82
	C-line Terminations (males)	6.68*
	C-line Terminations (females)	8.28*
	D-line Terminations (males)	0.48
	D-line Terminations (females)	0.95
	Accessory Triradii (males)	0.15
	Accessory Triradii (females)	0.24
	Simian Crease (males)	3.42
	Simian Crease (females)	0.19
Bisexual:		
	Digital Patterns	8.48*
	Palmar Patterns	4.00
	C-line Terminations	2.63
	D-line Terminations	13.89*
	Accessory Triradii	0.05

+ $P < 0.05$ * $P < 0.001$

only on the left hands of females(20.97 on the right and 18.17 on the left hands of males, and 15.32 on the left hands of females), while the right finger III has the highest ridge counts among females (18). Finger V has the lowest ridge counts on the right hands of males and on both hands of females(16.73 on the right hands of males , 11.44 on the right and 6.29 on the left hands of females), while the left finger II has the lowest ridge counts in males (14.06).

The mean ridge counts in decreasing order of magnitude for both sexes are as follows:

Males right hands: I-II-III-IV-V.
Males left hands: I-III-IV-II.
Females right hands: III-I-II-IV-V.
Females left hands: I-II-IV-III-V.

TRC is higher in males (145.11 compared to129.38),and the bisexual differences are significant.

Table 7

Mean ridge counts on the individual fingers of the Caucasians of South Iran

Fingers	Males Mean ± SE	Females Mean ± SE	M-F
RI	20.97 ± 0.33	17.66 ± 0.20	+3.31
RII	19.53 ± 0.33	17.38 ± 0.28	+2.15
RIII	16.16 ± 0.38	18.00 ± 0.26	-1.84
RIV	15.16 ± 0.43	12.62 ± 0.31	+2.54
RV	14.73 ± 0.39	11.44 ± 0.29	+3.29
LI	18.17 ± 0.26	15.32 ± 0.43	+2.85
LII	14.06 ± 0.38	14.18 ± 0.13	-0.12
LIII	16.99 ± 0.31	12.15 ± 0.31	+5.67
LIV	16.55 ± 0.31	12.15 ± 0.31	+4.40
LV	14.29 ± 0.30	6.29 ± 0.30	+8.00
TRC	145.11 ± 3.22	129.38 ± 2.35	+15.73

Palmar Ridge Counts:

The mean values for the a-b,a-d,d-t and a-t ridge counts are given in table 8. The a-b has the lowest ridge counts among both sexes (36.17 on the right and 37.97 on the left hand of males,and 37.29 on the right and 38.07on the left hand of females), and d-t has the highest ridge counts among both sexes (107.09 on the right and 112.19on the left hand of males, and 116.94 on the right and121.60 on the left hand of females).

The mean palmar ridge counts in decreasing order of magnitude are as follows:

dt-at-ad-ab

Both bilateral differences in palmar ridge counts,except for the a-b ridge count, and bisexual differences , escept for the left hand a-b ridge count, are significant (table 9).

atd Angle:

The mean atd angle for both sexes are given in table 8. As is shown, females have a larger atd angle(42 .30 on the right and 42.40 on the left hands). Both bilateral differences in males and the bisexual differences on the right hands of both sexes are significant (table 9).

DISCUSSION

Results of the qualitative dermatoglypics on both hands as well as in both sexes are mostly nonsignificant (table 6). However, most of the quantitative differences showed statistical significance in bilateral and bisexual comparisons(table 9). Males showed higher finger ridge counts and TRC,while higher ridge counts were detected on the right fingers in both sexes. Females showed higher palmar ridge counts and both sexes showed higher palmar ridge counts on their left palms. Females showed a higher atd angle on their left palms, too.

These results are compared with some of the Indian

Table 8
Mean quantitative palmar dermatoglyphic features of the Cancasians of South Iran

Quantitative Features	Males		Females	
	Right Mean ± SE	Left Mean ± SE	Right Mean ± SE	Left Mean ± SE
a-b ridge count	36.13 ± 0.33	37.97 ± 1.22	37.29 ± 0.25	38.07 ± 0.46
a-d ridge count	65.77 ± 0.34	67.16 ± 0.35	66.64 ± 0.24	69.19 ± 0.49
d-t ridge count	107.09 ± 1.02	122.19 ± 0.62	116.94 ± 0.66	121.67 ± 0.79
a-t ridge count	68.63 ± 1.44	76.06 ± 1.09	89.02 ± 0.70	83.74 ± 1.48
atd angle	41.00 ± 0.23	42.26 ± 0.32	42.30 ± 0.40	42.40 ± 0.33

Table 9

Bilateral and bisexual differences of the quantitative palmar dermatoglyphics among the Cancasinas of South Iran

Differences	Features	t-Values
Bilateral:		
	a-b Ridge count (males)	1.43
	a-b Ridge count (females)	1.50
	a-d Ridge count (males)	2.36+
	a-d Ridge count (females)	4.71*
	d-t Ridge count (males)	4.27*
	d-t Ridge count (females)	4.59*
	a-t Ridge count (males)	4.01*
	a-t Ridge count (females)	3.23*
	atd Angle (males)	3.20*
	atd Angle (females)	0.11
Bisexual:		
	a-b Ridge count	R 2.88+ L 0.86
	a-d Ridge count	R 2.11+ L 3.40*
	d-t Ridge count	R 8.11* L 9.44*
	a-t Ridge count	R 12.62* L 4.18
	atd Angle	R 3.25* L 0.28

+ $P < 0.05$ * $P < 0.001$

Table 10

Comparison of the various dermatoglyphic features of the present study with some of the Indian groups

Groups Compared	Features	X^2 Values	t-values
Asian Indians	Digital Patterns	1.74	-
Asian Indians	Palmar Patterns	61.81*	-
Asian Indians	C-line Terminations	77.18*	-
Asian Indians	D-line Terminations	1.74	-
Parsi Males	TRC	-	1.17
Parsi Females	TRC	-	1.63
Mahar Males	TRC	-	0.60
Mahar Females	TRC	-	1.19
Bhils	TRC	-	1.73
Marathas	TRC	-	1.75
Ezhava Males	a-b Ridge count	-	3.27*
Ezhava Females	a-b Ridge count	-	0.44
Bengali Males	a-b Ridge count	-	7.05*
Bengali Females	a-b Ridge count	-	4.54*
Punjabi Males	a-b Ridge count	-	1.37
Punjabi Females	a-b Ridge count	-	3.24*
Maharashtrian Males	a-b Ridge count	-	10.17*
Maharashtrian Females	a-b Ridge count	-	1.25
Andhra Pradeshis	a-b Ridge count	-	2.63+
Ladakhis	a-b Ridge count	-	3.77*
Bengali Males	d-t Ridge count	-	44.33*
Bengali Females	d-t Ridge count	-	34.67*

+ $P < 0.05$ * $P < 0.001$

groups mainly because economic, social and cultural ties have bound these groups very closely during the past 4000 years, and remains of several Indian archacological sites reveals this connection (Sankalia,74).

Plato et al.(75) have reviewed the world wide distributions of the qualitative dermatoglyphic features . They have considered the Asian Indians separately from Caucasians and have given the range variations as well as means of the various dermatoglyphic features. The present data when compared with that of the Asian Indians, shows significant differences in palmar patterns ($P < 0.001$), in C-line terminations ($P < 0.05$) and, in a-b and d-t ridge counts(table 10).

The importance of the quantitative dermatoglyphics and quantitative methods are stressed by this paper for a number of purposes in dermatoglyphics . Finger ridge counts have been studied more extensively than measurements on palms. In recent years total finger ridge count(TRC) have been used in various parts of world for the study and comparison of populations. However, ridge counts between specific points on palms have been little used by physical anthropologists (Holt,68). In this study attention has also been given to the a-d,d-t and a-t ridge counts which have an important role in population studies , with the hope that such measurements be included in the future studies of populations.

REFERENCES

1 - *Bajatzadeh,M. and Bernhard,W. (1966) : Untersuchungen zur verteilung der haupttypen Fingerbeermuster in Iran (Persien). A.morph.Anth. 61:72-80.*

2 - *Bhanu,B.V.(1973): Simian Crease in Man;Some Methodological Considerations.J.Hum.Evol.2:153-160.*

3 - *Cummins,H. and Midlo,C.(1961): Finger Prints, Palms and Soles; An Introduction to Dermatolhyphics. Dover. New York.*

4 - *Holt,S.B.(1968): The Genetics of Dermal Ridges . C.C. Thomal.Springfield.*

5 - Holt,S.B.(1968a): Palmar ridge counts.The Anthropologist. Special Volume:117-120.

6 - Kamali,M.S.(1979): Bioanthropological Profiles of the People of South Iran.Ph.D.Thesis.University of Poona, Pune.India.

7 - Kamali,M.S.(1981): TFRC and ATFRC among the twelve Iranian endogamous groups.Ind.J.Phys.Anthrop.&Hum.Genet. 7:167-171.

8 - Kamali,M.S.(1982):Dermatoglyphics of Iranians of African descent. Dermatoglyphics.10:4-15.

9 - Kamali,M.S.(1982a): Finger ridge counts and TFRC among the five Turkman groups in Iran.Progress in Dermatoglyphic Research:317-323.

10- Mehdipour,P.and Farhud,D.D.(1978): A dermatoglyphic study of Iranian Muslims. Part 1: Finger patterns and ridge counts.Iranian J.Publ.Hlth.7:196-206.

11- Mehdipour,P. and Farhud,D.D.(1979): A dermatoglyphic study of Iranian Muslims.Part II:Palmar main -lines , patterns and axial triradius.Coll.Anthropol.3:113 117.

12- Plato,C.C.(1970): Polymorphism of the C-line of palmar dermatoglyphics with a new classification of the C - line terminations.Am.J.Phys.Anthrop.33:413-420.

13- Plato,c.C.;Cereghino J.J. and Steinberg,F.S. (1975) : Dermatoglyphics of the American Caucasians.Am.J.Phys. Anthrop.42:195-210.

14- Sankalia,H.(1974): Prehistory and Protohistory of India and Pakistan.Deccan College Publications . Pune . India.

Recieved : May- 1982