

Dermatoglyphics in Bulgarians — Finger Patterns

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The present report is an initial stage of a common dermatoglyphic status of the Bulgarian population. The material used consist of dermatoglyphics of 2431 clinically healthy Bulgarians from both sexes (1161 males and 1270 females) at the age 30 — 40 years from 116 settlements in Bulgaria. Data about type and frequency of the finger patterns and their distribution on every finger, as well as the index characteristics of the papillar patterns are reported. The results obtained in the present work are a part of the dermatoglyphic characterization of the Bulgarian population. Together with data about the outstanding dermatoglyphic features, they will give a complete and detailed morphological characterization of the skin relief of the healthy Bulgarian population.

Key words: dermatoglyphics, papillar patterns, index frequency, healthy Bulgarians.

Introduction

Dermatoglyphics of the person in a part of his complete anthropological characterization. In Bulgaria, the first dermatoglyphic studies of healthy individuals are made by A b e l [1], where upon M a r k o v, [7] in his doctor's thesis investigated the finger and palm patterns of 284 Bulgarians from both sexes at the age 19-60 years. The investigation is a comparative ethnical one to a certain extent, because "Bulgarians Mohammedan and Turks" are studied also. Unfortunately the results are presented totally for both sexes. K a l e v a [5] examined in detail "the finger papillar patterns of Bulgarian citizens with different ethnical and national origin". The investigation covers finger patterns of a large number Bulgarians from both sexes whose finger prints are taken in the local police offices in Plovdiv and Blagoevgrad. Some authors criticize the use of such prints from Police collections when investigating healthy people. K a r e v [6] carried out a dermatoglyphic study of Bulgarians from North — Eastern Bulgaria through 1979. His investigation is also in ethnical aspect to a certain degree. The dermatoglyphic studies of Kavgazova, S t o e v [4] during the past years are also ethnical and they investigate only 6 dermatoglyphic patterns. Studying the dermatoglyphics of people with different diseases, the Bulgarian authors have given also dermatoglyphic data about control groups of healthy people [8, 9, 10, 11]. But representative data about the dermatoglyphic characterization of the Bulgarian population are missing till now. That is why when the National Programme "Anthropologi-

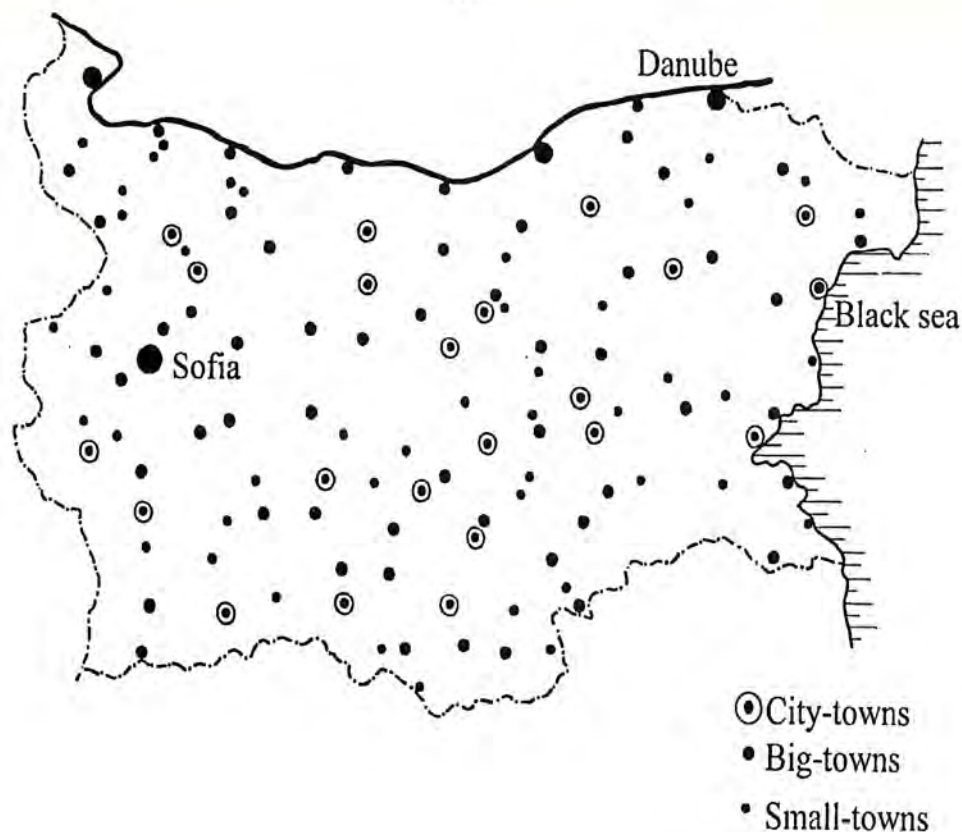


Fig. 1. Dermatoglyphical investigated settlements in Bulgaria

cal characterization of the Bulgarian population” was carried out during the years 1989–1993, a complete dermatoglyphic investigation was also included in it.

Material and Methods

The AIM of the present work is to characterize the finger patterns’ type and frequency, their distribution on the separate fingers, and the index characterization of the papillar patterns. Some bilateral and intersexual differences are also looked for.

The material used in this investigation consists of dermatoglyphics of 2431 clinically healthy Bulgarians from both sexes (1161 males and 1270 females) at the age of 30-40 years from 116 settlements in Bulgaria (Fig. 1). The finger patterns are determined by the methods of C u m m i n s , M i d l o , [2] and P e n r o s e , [3] and the bilateral and intersexual differences by the student’s *T*-criterion at $P < 0.05$.

Results

The analysis about frequency of finger papillar patterns (Table 1, Fig. 2) shows that both by sex and by each hand most frequent are the ulnar loops (*U*), followed by whorls (*W*). Lowest is the frequency of the radial loops (*R*). The formula about frequency of

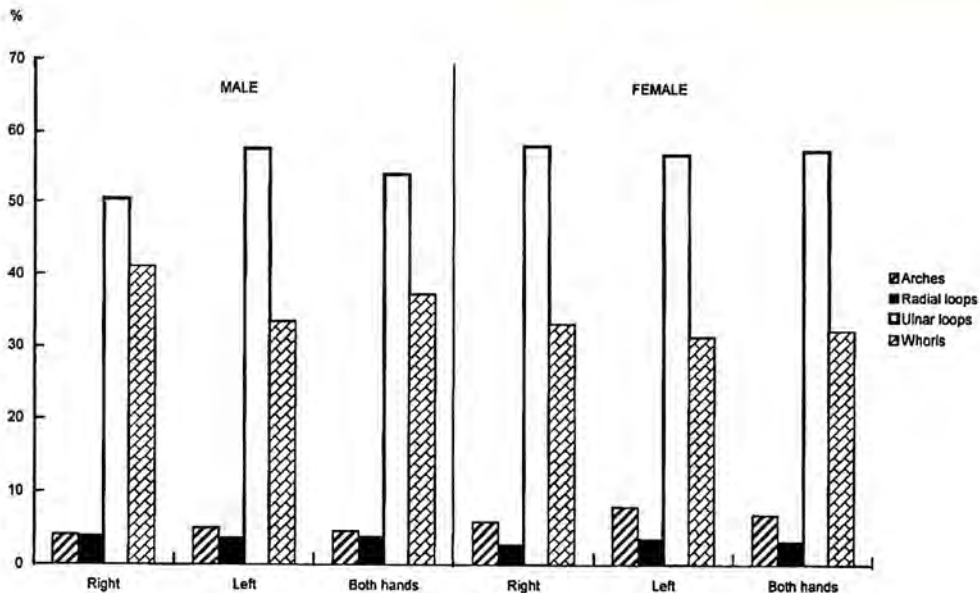


Fig. 2. Frequency of finger patterns

the finger papillar patterns is $U>W>A>R$. Whorls on all ten digits are found in 46 males (3.96%), and in 38 females (3.00%). Arches are missing for males on all ten digits, and in females they are found only in five cases (0.39%).

According to the bilateral comparison, the whorls' frequency is more high in males on right hand (r.h. — 41.18%; l.h. — 33.45%), and the ulnar loops — on left one (r.h. — 50.54%; l.h. — 57.70%) ($P<0.05$). Considerable bilateral differences are missing in females.

Comparing the total papillar patterns' frequency for both hands in males and females is established that whorls are more frequent in males (males — 37.31%; females — 32.31%), and ulnar loops in females (males — 54.12%; females — 57.52%) ($P<0.05$). The arches are more frequent in females, but the difference is not significant (males — 4.64%; females — 6.94%).

Two kinds of formulae are made about the distribution of papillar patterns on every digit. The first one presents the fingers' order according to the frequency of every papillar pattern separately both by each hand and sex (Table 2). The arches are most frequent on II-nd and III-rd digits for both sexes and both hands, and respectively least — on V-th digit. The radial loops are also most frequent on digit II. The formulae about ulnar loops are equal for both sexes, and both hands. The ulnar loops are most frequent for digit V, followed by digit III, and least for digit II. The whorls are most frequent for digit IV and most rare for digits V and III. The percentage frequency of the papillar patterns for every digit is calculated too, and on its basis are made the second kind of formulae which give the papillar patterns' order on every digit separately for both hands (Table 3 and 4; Fig. 3 and 4). It is obvious that variations exist as about every digit, so both for each hand and sex. The identical formula for every digit is marked respectively with the same sign in the tables (*, #, \$). The whorls are most frequent on digits I and IV in right for males, followed by the ulnar loops, and least (under 1%) are the radial loops. For the correlation whorls-ular loops the converse is

Table 1. Frequency of finger patterns

Sex	Hand	Patterns			
		arches	radial loops	ulnar loops	whorls
Male	right	4.20	4.08	50.54*	41.18*
	left	5.07	3.78	57.70*	33.45*
	both hands	4.64	3.93	54.12#	37.31#
Female	right	5.93	2.77	58.13	33.17
	left	7.96	3.68	56.91	31.45
	both hands	6.94	3.23	57.52#	32.31#

* - $P < 0.05$ (R/L)

- $P < 0.05$ (♂/♀)

Table 2. Formulae for the distribution of papillar patterns on fingers

Sex	Hand	Papillar patterns			
		arches	radial loops	ulnar loops	whorls
Male	right	II>III>I=IV>V	II>III>IV>I=V	V>III>I>IV>II	IV>I>II>III>V
	left	II>III>I>IV>V	II>III>IV=I>V	V>III>I>IV>II	IV>II>I>III>V
Female	right	II>III>I>IV>V	II>IV>III>I>V	V>III>I>IV>II	IV>I>II>V>III
	left	II>III>I>IV>V	II>III>IV>I>V	V>III>I>IV>II	IV>II>I>III>V

Table 3. Individual finger patterns in male (%)

Hand	Finger	Patterns				Formulae
		arches	radial loops	ulnar loops	whorls	
Right	I	1.64	0.09	47.89⊙	50.38⊙	W>U>A>R#
	II	9.96	18.72	28.77	42.55	W>U>R>AS
	III	6.73	1.12	65.72	26.43	U>W>A>R*
	IV	1.64	0.43	36.13⊙	61.80⊙	W>U>A>R#
	V	1.04	0.09	74.13⊙	24.74	U>W>A>R*
Left	I	2.50	0.26	58.81⊙	38.43⊙	U>W>A>R*
	II	12.45	16.68	32.06	38.81	W>U>R>AS
	III	7.25	1.73	66.32	24.70	U>W>A>R*
	IV	2.32	0.26	50.39⊙	47.03⊙	U>W>A>R*
	V	0.86	0	80.86⊙	18.28	U>W>A>R*

⊙ - $P < 0.05$ (R/L)

T a b l e 4. Individual finger patterns in female (%)

Hand	Finger	P a t t e r n s				Formulae
		arches	radial loops	ulnar loops	whorls	
Right	I	3.71	0.24	56.23	39.82	$U>W>A>R^*$
	II	12.62	12.07	35.88	39.43	$W>U>A\geq R\#$
	III	8.04	0.63	73.76⊙	17.57	$U>W>A>R^*$
	IV	2.84	0.79	46.18⊙	50.19⊙	$W>U>A>R\#$
	V	2.44	0.16	78.57	18.83	$U>W>A>R^*$
Left	I	5.91	0.47	56.47	37.15	$U>W>A>R^*$
	II	15.98	15.43	30.62	37.97	$W>U>A\geq R\#$
	III	11.83	1.74	64.59⊙	21.84	$U>W>A>R^*$
	IV	3.15	0.63	52.84⊙	43.38⊙	$U>W>A>R^*$
	V	2.92	0.16	80.02	16.90	$U>W>A>R^*$

⊙ - $P<0.05$ (R/L)

T a b l e 5. Finger pattern indexes in male and female

Sex	Hand	Index				
		Dankmeyer	Poll	Furuhata	Delta index	Geipel
Male	right	10.20	7.69	75.39	13.70	374.23
	reft	15.16	8.25	54.41	12.84	312.12
	both hands	12.44	7.99	64.27	13.27	291.46
Female	right	17.88	9.74	54.47	12.72	280.56
	left	25.31	13.14	51.91	12.35	321.70
	both hands	21.48	11.42	53.18	12.54	299.75

true about left hand on the same digit; i.e. the ulnar loops prevail over the whorls. The formula about papillar patterns on digit II is the same for both hands. The radial loops predominate over arches in contrast with all other digits. The formula $U>W>A>R$ is typical for $R_3, R_5, L_1, L_3, L_4, L_5$. Significant differences of the ulnar loops and whorls' frequency between right and left hand are available. The ulnar loops dominate on digits I, IV and V in left, and the whorls — on digits I and IV in right ($P<0.05$). In contrast of males the ulnar loops in females are more frequent than whorls on digit I in right. For digit II on both hands the frequency of arches and radial loops is nearly the same.

On other digits the formulae about females are the same as those about males. Significant bilateral differences of ulnar loops and whorls are also observed in females as in males, but they are comparatively less. The ulnar loops are more frequent on digit III in right, and on digit IV in left. The only significant difference about whorls is their higher frequency on digit IV in right.

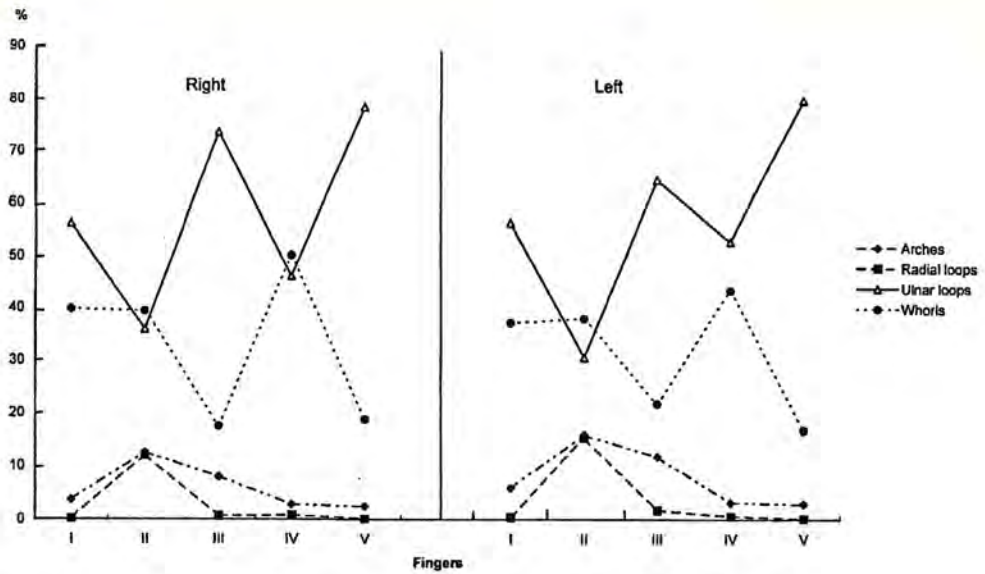


Fig. 3. Individual finger patterns in males

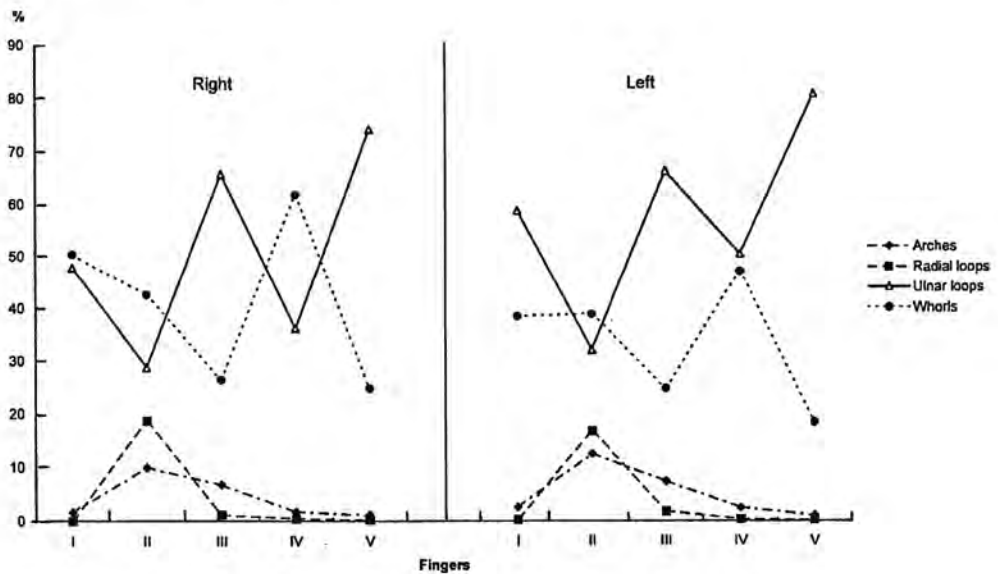


Fig. 4. Individual finger patterns in females

The mathematical expression of the frequency of different papillar patterns are the indexes submitted by some authors. About the more complete characteristics of the papillar patterns are calculated also the indexes of Dankmeyer, Poll, Furuhata, Geipel and delta index (Table 5). The Dankmeyer and Poll indexes have significantly more low values in males than in females, and about Furuhata index the converse is true - its values are significantly higher in males. These differences are a result from the sig-

nificant intersexual differences in the frequency of papillar patterns. About the mentioned above three indexes (Dankmeyer, Poll and Furuhata), only two papillar patterns are taken into consideration. That's why about the more complete characterization is calculated the delta index based on a morphological feature, to be more precise the presence of a triradius. Significant differences of its values are missing for both sexes, but yet it is higher in males as a result of the more high whorls' frequency in them. The Geipel index presents the whorls' distribution on every digit. Its higher values show that on digits I, II and III, the whorls' frequency is higher too.

Conclusion

In virtue of the obtained results the following characterization of the papillar finger patterns can be brought out:

1. Most frequent are the ulnar loops in both sexes and hands followed by the whorls.

2. Intersexual differences of the frequency of finger patterns are available — the ulnar loops prevail in females, and the whorls in males.

3. Bilateral differences exist for some papillar patterns demonstrated differently in both sexes (in males on I, IV and V digits the ulnar loops prevail in left, and the whorls on I and IV digits — in right; in females the bilateral differences are rare compared with males and are not systematic).

The results obtained in the present work are a part of the dermatoglyphic characterization of the Bulgarian population. Together with data about the outstanding dermatoglyphic features, they will give a complete and detailed morphological characterization of the skin relief of the healthy Bulgarian population.

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