

Dermatoglyphic Analysis of a Belgian Population Sample

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The occurrence of most dermatoglyphic features differs significantly, not only between the major racial groups, but also between relatively small ethnic groups and between males and females within the same ethnic group. Although the palm and finger prints are undoubtedly genetically determined, the mode of inheritance still remains obscure. In no case has the inheritance of a dermal trait been satisfactorily explained by a single factor. Multifactorial mode of inheritance is most likely (HOLT 1968a).

Therefore, it is important in any study of pathological dermatoglyphics to use a well matched control group, consisting of unrelated persons. The purpose of this study is to contribute to the knowledge of the "normal" variation of the digital and palmar dermatoglyphs of the Belgian population and to provide a control population for clinical use.

Material and Methods

Our sample consists of 280 males and 281 females and is subdivided in 3 age groups : the first contains children from around 2 to 6 years (109 ♂, 122 ♀), the second group consists of children between 6 and 14 years (50 ♂, 43 ♀), in the third group there are mainly adults (121 ♂, 116 ♀). All the children are pupils from 2 schools in the neighbourhood of Ghent, one in the suburbs and one in a more rural municipality. The adults are mainly personnel of the University of Ghent and belong to different social and educational classes. Most of the 561 individuals are from the province of East Flanders.

Individually rolled prints of each finger and palm prints with fully adducted fingers were taken from every subject. The prints were evaluated following the method described by Cummins and Midlo (1961), with some modifications added by Penrose (1968). For palmar patterns only loops and whorls were considered.

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Statistics

Statistical evaluation of the results is performed to test differences between males and females and between left and right hands.

a. QUANTITATIVE CHARACTERS

A "classic" t-test is used to test if the observed differences between males and females are significant :

$$t = \frac{|\bar{x}_m - \bar{x}_f|}{s_d} \text{ where } s_d^2 = s_{x_m}^2 + s_{x_f}^2$$

Because of the high correlation between left and right hand a "paired t-test" is more adequate to evaluate the differences between them :

$$t = \frac{|\bar{x}_l - \bar{x}_r|}{s_d} \text{ where } s_d^2 = s_{x_l}^2 + s_{x_r}^2 - 2rs_{x_l}s_{x_r}$$

b. QUALITATIVE CHARACTERS

Differences between frequencies are tested following a t-test :

$$t = \frac{|q_1 - q_2|}{s_d}$$

$$\text{where } s_d^2 = \bar{q}(1 - \bar{q})(1/n_1 + 1/n_2) \text{ and } \bar{q} = \frac{n_1q_1 + n_2q_2}{n_1 + n_2}$$

Results

Tables 1-2 give the results for the following quantitative characters together with their respective standard error and standard deviation :

- 1) pattern intensity (P.I.)
- 2) finger ridge-count (F.R.C.) : on each finger, each hand
- 3) main line index (M.L.I.)
- 4) a-b ridge-count
- 5) atd angle.

The following tables 3 to 5 show the frequency (in %) of some qualitative characters :

- 1) pattern type and direction on each finger and each hand
- 2) pattern type on the different palmar areas
- 3) termination of main lines
- 4) position of the axial triradius
- 5) simian crease.

Comments

The atd angle is age dependent, the differences between the children and the adults being significant as well in males as in females. The middle group (6-14 years) is, as variation is high, too small to give a good estimation of the atd angle.

Special attention will now be given to the differences between left and right hand in the same individual and between males and females.

I. ASYMMETRY

Both hands of the same person are different, but a high degree of symmetry exists. Table 6 shows the concordance between corresponding fingers and main line endings. For both features the degree of symmetry is higher in females than in males. This trend exists for all dermatoglyphic features.

A. *Quantitative characters*

High correlations (Table 7) between left and right hands exist for all quantitative characters, the lowest being for the main line index in both sexes. Similar correlation coefficients were found in other samples (HOLT 1968a, FANG 1950, VRYDAGH 1971).

Table 8 shows the results of the t-test together with the probability that the observed differences are due to chance. F.R.C. and P.I. are larger on the right hand than on the left, all differences being significant except for P.I. in females. The main line index is higher as well in males as in females on the right hand, corresponding with more transverse creases. In both sexes the a-b ridge-count is significantly larger on the left hand.

B. *Qualitative characters*

Table 9 shows the results of the t-test for differences in pattern type and direction between left and right fingers, in some palmar features and for the most frequent A-D combinations. In males there are significantly more loops and less whorls on the left hand than on the right, the same trend exists in females but the differences are not significant. In males there are significantly more ulnar and less radial patterns on the left hand; in females, however, there are less ulnar and more radial patterns on the left hand, but the difference is only slightly significant for the ulnar patterns.

In both sexes patterns are more frequent on the hypothenar and IIIrd interdigital area on the right hand, only the difference in females on the hypothenar is not significant. On thenar and on IVth interdigital area patterns are more frequent on the left. The differences are significant in both sexes. These trends are found in all samples of different populations (SCHAUMAN & ALTER 1976).

The C-line is more often abortive or absent on the left than on the right, the difference is significant in both sexes. In males as well as in females a simian

crease is more often found on the left hand, but the differences are not significant. In both sexes, the axial triradius is more often absent on the right, but the difference is only significant in females.

The A-D ending 3-7 is more frequent on the left hand and 5-11, on the right ; main lines are more longitudinal on the left, corresponding with a smaller M.L.I.

In general, in females both hands are more alike than in males : the differences between left and right hands are more often significant in males than in females.

II. SEXUAL DIMORPHISM

The results of the t-test for differences between males and females are given in tables 10 and 11.

A. *Quantitative characters*

Pattern intensity and a-b ridge-count are similar in both sexes. This phenomenon is found in nearly all population samples. Surprisingly, the T.F.R.C. differs not significantly between males and females. This seems to be due to a rather high T.F.R.C. in the females of our sample, probably due to sampling error.

The main line index shows that on the right hand the ridges are more transversal in males than in females, the difference is significant.

In children the atd angle is significantly larger in females than in males ($P < 0.001$). In the adults a small difference still persists, but it is no longer significant.

B. *Qualitative characters*

Finger pattern types are not significantly different between males and females. However, on the left hand, some significant differences between males and females exist : males have more loops, less radial and more ulnar patterns ; on the right hand males have significantly more radial patterns than females.

Males have significantly less patterns on hypothenar and IVth interdigital area and more patterns on hypothenar and IIInd interdigital area. The axial triradius is more often absent in females than in males, and more often distally displaced in females than in males.

Main line terminations are very similar in males and females, but on the right hand the A-D ending 5-11 is much more common in males than in females. Only slight differences between males and females are found, but we were not able to analyze the most differentiating feature : the number of ridges per centimeter or the ridge breadth. Females have more ridges per centimeter or smaller ridge breadth than males.

In this study the results show the same tendencies as found in other population samples (Table 12). However, comparing T.F.R.C. with other Caucasian samples, we found a relatively low T.F.R.C. for males and a rather high count for females, resulting in an only slight male-female difference.

The values for a-b ridge-count are very similar in different populations. Distribution of different pattern types on the fingertips in Caucasians show some peculiar features : lowest frequency of whorls and highest for arches in a Swedish population sample, with an unexpected high frequency of arches in the female sample of Destrijker *et al.* (1977). The frequency of loops is rather constant through Europe, with exception of the Italian sample, where the frequency of loops is very low (Table 13).

TABLE 1

Mean, standard error and standard deviation of total finger ridge count, pattern intensity, main line index, a-b ridge-count, and atd angle.

MALES	N	Left hand		Right hand		Left + Right		
		\bar{x}	s	\bar{x}	s	\bar{x}	s	
Fingers								
TFRC	270	65,6 ± 1,47	24,2	68,2 ± 1,43	23,6	133,8 ± 2,98	49,0	
P.I.	277	5,9 ± 0,1	1,58	6,3 ± 0,10	1,75	12,2 ± 0,19	3,18	
Palms								
M.L.I.	279	7,8 ± 0,11	1,84	9,3 ± 0,12	1,94	17,1 ± 0,17	2,80	
a-b RC	276	42,6 ± 0,30	5,00	41,4 ± 0,33	5,5	84,0 ± 0,60	9,9	
atd angle (degrees)	$\left\{ \begin{array}{l} < 6y \\ 6-14y \\ adult \end{array} \right.$	107	47,7 ± 0,63	6,51	46,5 ± 0,88	9,08	94,2 ± 1,16	12,09
		50	41,9 ± 0,89	6,27	42,4 ± 0,97	6,80	84,6 ± 2,72	12,19
		121	40,5 ± 0,56	6,21	41,3 ± 0,84	9,29	81,8 ± 1,37	15,07
FEMALES								
Fingers								
TFRC	263	62,2 ± 1,34	21,8	65,7 ± 1,46	23,6	127,7 ± 2,87	46,5	
P.I.	273	6,0 ± 0,1	1,66	6,0 ± 0,10	1,68	12,0 ± 0,19	3,19	
Palms								
M.L.I.	281	7,7 ± 0,13	2,24	8,8 ± 0,13	2,12	16,5 ± 0,22	3,76	
a-b RC	279	42,6 ± 0,34	5,6	41,1 ± 0,31	5,2	83,7 ± 0,59	9,9	
atd angle (degrees)	$\left\{ \begin{array}{l} < 6y \\ 6-14y \\ adult \end{array} \right.$	118	50,2 ± 0,94	10,28	48,0 ± 0,88	9,56	99,7 ± 1,31	14,28
		43	46,0 ± 1,70	11,15	45,8 ± 1,47	9,65	91,7 ± 3,23	21,20
		114	41,6 ± 0,94	9,91	41,9 ± 0,79	8,34	83,5 ± 1,31	14,02

TABLE 2

Mean finger ridge-count, standard error and standard deviation for each finger and each hand.

	270 MALES		263 FEMALES	
	\bar{x}	s	\bar{x}	s
Left hand				
I	15,90 ± 0,34	5,62	14,53 ± 0,36	5,87
II	10,24 ± 0,42	6,88	10,39 ± 0,43	6,99
III	11,46 ± 0,40	6,40	10,71 ± 0,37	6,07
IV	14,93 ± 0,37	6,03	14,31 ± 0,38	6,17
V	13,09 ± 0,30	4,87	12,33 ± 0,32	5,25
Total	65,59 ± 1,47	24,20	62,19 ± 1,34	21,80
Right hand				
I	18,39 ± 0,36	5,84	16,76 ± 0,36	5,79
II	10,34 ± 0,44	7,20	10,69 ± 0,44	7,18
III	10,82 ± 0,41	6,75	11,10 ± 0,37	5,99
IV	15,30 ± 0,37	6,07	14,76 ± 0,37	5,94
V	13,26 ± 0,31	5,15	12,39 ± 0,32	5,15
Total	68,19 ± 1,44	23,60	65,70 ± 1,46	23,60

TABLE 3
Digital pattern type and direction (frequency % and standard error).

		Left hand	Right hand	Both hands
Patterns		270 MALES		
Arches		5,1 ± 0,60	4,9 ± 0,59	5,0 ± 0,42
Loops	radial	5,3 ± 0,61	7,1 ± 0,70	6,2 ± 0,46
	ulnar	67,5 ± 1,27	59,0 ± 1,34	63,1 ± 0,93
	total	72,8 ± 1,21	66,1 ± 1,29	69,4 ± 0,89
Whorls	symm.	0,8 ± 0,06	1,4 ± 0,32	1,1 ± 0,04
	radial	5,9 ± 0,64	7,3 ± 0,71	6,6 ± 0,48
	ulnar	15,4 ± 0,98	20,4 ± 0,32	17,9 ± 0,23
	total	22,1 ± 1,20	29,1 ± 1,24	25,6 ± 0,84
Patterns	radial	9,9 ± 0,81	14,4 ± 0,95	12,8 ± 0,64
	ulnar	83,9 ± 1,00	79,9 ± 1,09	81,1 ± 0,75
	symm.	6,2 ± 0,66	6,2 ± 0,65	6,1 ± 0,46
		275 FEMALES		
Arches		6,6 ± 0,67	5,2 ± 0,60	5,9 ± 0,45
Loops	radial	5,3 ± 0,60	4,3 ± 0,55	4,7 ± 0,40
	ulnar	63,8 ± 1,30	64,6 ± 1,29	64,1 ± 0,91
	total	69,1 ± 1,25	68,9 ± 1,25	68,8 ± 0,88
Whorls	symm.	1,5 ± 0,33	1,3 ± 0,31	1,4 ± 0,22
	radial	7,1 ± 0,69	6,2 ± 0,65	6,7 ± 0,47
	ulnar	15,9 ± 0,99	18,3 ± 1,04	17,1 ± 0,72
	total	24,4 ± 1,16	25,8 ± 1,18	25,2 ± 0,83
Patterns	radial	12,3 ± 0,89	10,6 ± 0,83	11,4 ± 0,61
	ulnar	79,5 ± 1,09	82,8 ± 1,02	81,2 ± 0,75
	symm.	8,2 ± 0,74	6,6 ± 0,67	7,3 ± 0,50

TABLE 4
Pattern frequency on fingers.

		V	IV	Left			Right			V	
				III	II	I	I	II	III	IV	
270 MALES											
Arches		1,4	2,5	10	9,0	2,5	2,1	11,8	7,9	1,4	1,1
Loops	radial	0	0,7	2,5	23,7	0,4	0,7	29,4	3,9	1,4	0
	ulnar	88,9	68,6	72,0	39,2	68,6	56,4	30,5	69,2	53,0	85,7
	total	88,9	69,2	74,5	62,9	68,9	57,0	59,8	73,1	54,4	85,7
Whorls	sym.	0	0,7	1,1	0,7	1,5	1,2	1,0	1,6	2,2	0,7
	radial	0	2,2	5,5	17,3	4,4	5,1	18,5	7,7	4,8	0,4
	ulnar	9,6	25,2	9,3	10,1	22,7	34,4	8,3	9,7	37,1	12,2
	total	9,6	28,2	16,1	28,1	28,6	40,7	28,3	19,0	44,1	13,3
Patterns	sym.	1,4	3,2	11,5	9,8	4,0	3,3	13,2	9,4	3,6	1,8
	radial	0	2,9	7,6	41,0	4,7	5,8	47,9	11,6	6,2	0,4
	ulnar	98,6	94,0	81,0	49,2	91,3	91,0	38,9	79,0	90,2	97,8
275 FEMALES											
Arches		1,4	4,0	10,8	12,3	4,3	2,2	12,5	7,2	2,5	1,8
Loops	radial	0	0,7	1,8	23,9	0	0	18,6	1,1	1,8	0
	ulnar	88,5	64,1	71,2	34,4	60,2	57,7	37,6	77,8	60,9	89,2
	total	88,5	64,7	73,1	58,2	60,2	57,7	56,2	78,9	62,6	89,2
Whorls	sym.	0,4	0,8	1,9	1,7	2,7	1,1	25,0	0,9	1,9	0,4
	radial	1,1	3,8	4,4	19,6	6,9	5,5	18,5	3,3	4,0	0
	ulnar	8,7	26,6	9,9	8,0	25,9	33,5	10,2	9,8	28,9	8,6
	total	10,0	31,2	16,2	29,3	35,5	40,1	31,2	14,0	34,8	9,0
Patterns	sym.	1,8	4,8	12,7	14,0	7,0	3,3	15,0	8,1	4,4	2,2
	radial	1,1	4,5	6,2	43,5	7,0	5,5	37,1	4,4	5,8	0
	ulnar	97,1	90,7	81,1	42,5	86,0	91,2	47,9	87,5	89,9	97,8

TABLE 5
Frequency (%) of palmar traits in males and females.

PALMAR PATT.	MALES			FEMALES		
	Left N = 279	Right N = 278	L + R	Left N = 281	Right N = 281	L + R
Hypothenar						
RL	15,05	17,98	16,52	20,99	23,48	22,24
UL	7,53	8,99	8,26	8,19	5,34	6,77
CL	0,72	1,80	1,26	0,71	4,27	2,49
Whorls	1,79	4,32	3,05	4,63	5,34	4,99
Total	25,09	33,09	29,08	34,52	38,43	36,48
Thenar - I						
IInd	11,83	3,96	7,90	5,34	3,56	4,45
IIIrd	2,51	5,40	3,95	0	0,71	0,36
IVth	31,90	62,23	47,04	34,52	50,89	42,71
	50,53	30,58	40,58	57,65	48,04	52,85
AXIAL TRIRADIUS						
t	80,71	76,79	78,75	76,51	75,09	75,80
t'	8,21	8,21	8,21	9,61	6,04	7,83
t''	2,85	2,85	2,85	3,56	5,34	4,45
tt'	5,36	6,79	6,07	2,49	4,27	3,38
tt''	2,50	4,28	3,39	7,12	4,98	6,05
tt't''	0,36	0,36	0,36	—	—	—
t absent	—	0,71	0,36	0,71	4,27	2,49
A-D COMBINATIONS						
1- 7	9,0	0,7		9,3	1,8	
1-11	1,8	1,1		5,0	2,1	
3- 7	39,1	17,3		33,8	22,1	
3-11	14,3	14,4		12,5	13,5	
5- 7	16,5	14,7		17,1	20,3	
5-11	16,8	44,6		19,9	32,7	
11- 7	1,1	2,2		1,8	2,1	
11-11	1,1	2,9		0	1,1	
13- 7	0	1,1		0,4	1,8	
13-11	0	0,4		0	2,5	
others	0,4	0,7		0,4	0	
	Left	N = 280		Left	N = 281	
		Right	Bilat.		Right	Bilat.
Abortive and absent C-line	11,82	6,12	2,86	14,26	8,90	4,98
Simian crease	2,50	1,07	0,71	2,14	0,71	0,36

TABLE 6

Concordance in pattern type between corresponding fingers and in main line terminations between left and right hand in males and females (%).

	I	II	III	IV	V
MALES	72,9	51,9	74,5	71,8	90,0
FEMALES	78,0	54,6	75,8	70,3	90,6
	line A	line B	line C	line D	
MALES	47,1	60,4	44,6	49,6	
FEMALES	48,0	68,0	56,6	57,3	

TABLE 7

Correlations between left and right hand of the same individual.

	N	Males	N	Females
P.I.	276	0,873	273	0,84
T.F.R.C.	270	0,833	263	0,942
M.L.I.	279	0,335	281	0,484
a-b R.C.	276	0,834	279	0,864

TABLE 8

Paired t-test for difference between left and right hand for some quantitative characters.

	N	MALES t	P	N	FEMALES t	P
T.F.R.C.	270	3,099	< 0,002	263	7,12	< 0,001
P.I.	277	7,937	< 0,001	273	1,414	n.s.
M.L.I.	279	11,29	< 0,001	281	8,329	< 0,001
a-b R.C.	276	6,53	< 0,001	279	8,723	< 0,001

TABLE 9

t-test for difference between left and right hand
for several digital and palmar characteristics.

	MALES			FEMALES		
	N	t	P	N	t	P
FINGER PATTERNS						
Arches	270	0,238	n.s.	275	1,558	n.s.
Loops	270	3,777	< 0,001	275	0,113	n.s.
Whorls	270	4,167	< 0,001	275	0,845	n.s.
Patterns ulnar	270	3,110	< 0,001	275	2,215	< 0,02
radial	270	3,499	< 0,001	275	1,403	n.s.
PALMAR PATTERNS						
Hypothenar	278	2,077	< 0,02	281	0,963	n.s.
Thenar - I	278	3,44	< 0,001	281	1,023	n.s.
IIInd	278	1,749	n.s.	281	1,405	n.s.
IIIth	278	7,164	< 0,001	281	3,923	< 0,001
IVth	278	4,79	< 0,001	281	2,282	< 0,02
Abortive - absent C-line	280	2,36	< 0,01	281	1,986	< 0,03
Simian crease	280	1,278	n.s.	281	1,430	n.s.
Absent t	280	1,403	n.s.	281	2,708	< 0,01
A-D COMBINATIONS						
1- 7	279	4,560	< 0,001	281	3,886	< 0,001
3- 7	279	5,683	< 0,001	281	3,090	< 0,01
3-11	279	0,034	n.s.	281	0,352	n.s.
5- 7	279	0,484	n.s.	281	0,973	n.s.
5-11	279	7,119	< 0,001	281	3,446	< 0,001

TABLE 10

t-test for difference between males and females
for some quantitative characteristics.

	N		Left hand		Right hand		Both hands	
	Males	Females	t	P	t	P	t	P
T.F.R.C.	270	263	1,709	n.s.	1,223	n.s.	1,474	n.s.
P.I.	277	273	0,424	n.s.	1,838	n.s.	0,744	n.s.
M.L.I.	278	281	0,587	n.s.	2,826	< 0,001	2,158	< 0,02
a-b R.C.	276	279	0	n.s.	0,663	n.s.	0,357	n.s.

TABLE 11
t-test for differences between males and females
for digital pattern type and direction, and for some palmar characteristics.

	N		Left hand		Right hand		Both hands	
	Males	Females	t	P	t	P	t	P
DIGITAL PATTERNS								
Arches	270	275	1,667	n.s.	0,358	n.s.	1,463	n.s.
Loops	270	275	2,127	< 0,02	1,560	n.s.	0,479	n.s.
Whorls	270	275	1,421	n.s.	1,930	n.s.	0,339	n.s.
Patterns ulnar	270	275	2,969	< 0,01	1,944	n.s.	0,094	n.s.
radial	270	275	1,993	< 0,05	3,000	< 0,01	1,622	n.s.
PALMAR PATTERNS								
Hypothenar	278	281	2,438	< 0,01	1,317	n.s.		
Thenar - I	278	281	2,740	< 0,01	0,249	n.s.		
IIInd	278	281	2,67	< 0,01	3,230	< 0,001		
IIIrd	278	281	0,658	n.s.	2,705	< 0,01		
IVth	278	281	1,689	n.s.	4,225	< 0,001		
Abortive - absent C-line	280	281	0,847	n.s.	1,233	n.s.		
Simian crease	280	281	0,279	n.s.	0,448	n.s.		
Absent t	280	281	1,392	n.s.	2,671	< 0,01		
A-D COMBINATIONS								
3- 7	279	281	1,303	n.s.	1,428	n.s.		
3-11	279	281	0,625	n.s.	0,307	n.s.		
5- 7	279	281	0,190	n.s.	1,743	n.s.		
5-11	279	281	0,947	n.s.	2,892	< 0,01		

TABLE 12

Means and standard deviations for total finger ridge-count and a-b ridge-count (sum of both hands) in samples from European populations.

Population	Authors	MALES			FEMALES		
		N	\bar{x}	s	N	\bar{x}	s
Total finger ridge-count							
Belgian	present study	270	133,8	49,0	263	127,7	46,5
	VRYDAGH 1970	80	136,43	47,50	72	119,68	54,47
	VRYDAGH 1971	122	140,07	47,44	93	122,75	47,86
	DESTRIJKER <i>et al.</i> 1977	65	128,33	47,15	50	112,32	46,41
British	HOLT 1955	825	145,18	50,49	825	126,97	52,33
French	LAMY <i>et al.</i> 1957	351	132,36	45,28	360	121,36	46,48
Swedish	BÖÖK 1957	204	139,70	49,47	188	120,67	52,81
Italian	GIOVANNUCI & BARTOLOZZI 1968	500	135,00	47,04	500	127,38	44,90
a-b ridge-count							
Belgian	present study	276	84,0	9,90	279	83,70	9,90
	VRYDAGH 1971	177	85,84	9,82	166	86,04	9,69
	DESTRIJKER <i>et al.</i> 1977	86	83,17	—	65	83,65	—
Spanish	PONS 1964	200	82,59	11,17	200	84,04	10,32
British	FANG 1949	424	83,04	10,28	435	83,01	9,72
	HOLT 1968b	250	85,49	10,46	250	84,88	10,24

TABLE 13

Frequency of pattern types in different Caucasian population samples.

Population	Authors	N	Whorls	Loops	Arches
MALES					
Belgian	present study	270	25,6	69,4	5,0
	VAN DEN BERGHE 1966	201	26,94	70,00	2,93
	VRYDAGH 1971	196	28,21	67,76	4,03
	DESTRIJKER <i>et al.</i> 1977	133	31,97	62,12	5,91
FEMALES					
Belgian	present study	275	25,2	68,8	5,9
	VAN DEN BERGHE 1966	301	25,40	68,49	5,79
	VRYDAGH 1971	194	29,18	65,16	5,66
	DESTRIJKER <i>et al.</i> 1977	136	26,92	66,08	7,05
MALES + FEMALES					
Belgian	present study	545	25,4	69,1	5,45
	VAN DEN BERGHE 1966	502	26,02	69,09	4,64
	VRYDAGH 1971	390	28,69	66,46	4,85
	DESTRIJKER <i>et al.</i> 1977	269	29,45	64,10	6,48
Swedish	BECKMAN <i>et al.</i> 1962	200	21,4	71,9	6,7
British	HOLT 1964	1000	26,1	68,9	5,0
Italian	GIOVANNUCCI & BARTOLUZZI 1968	1000	33,1	60,7	6,2

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