

## Palm flexion creases in medical and anthropological diagnostics

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The palm flexion creases as a part of the total dermatoglyphic status are studied in 816 healthy children (413 boys and 403 girls) and 129 children with inborn and inherited mental insufficiency (66 boys and 63 girls). The flexion creases are studied in reference to their length, width, type and peculiarities of their situation. The scheme of Weninger, Navratil [9], added by the author with new variations is used for definition of the abnormal flexion creases. Considerable differences in characteristics of the palm flexion creases in healthy children and children with mental insufficiency, mainly in the width and running of these creases were established. The frequency of the abnormal creases in children with mental insufficiency is higher, than in healthy ones. It is recommended the investigations of the palm flexion creases to be an inseparable part of the complex dermatoglyphic status, especially about different diseases of the medical and anthropological diagnostics.

*Key words:* palm flexion creases, healthy individuals, children with mental insufficiency.

The palm flexion creases have been studied less than the papillar ridges. Probably, the variety in the finds which characterize the flexion creases, is one of the reasons, those creases to be ignored in the complex dermatoglyphic status. There are rare publications about the palm flexion creases in some diseases [7, 8, 12] and in paternity expertise [3].

It is known that there are three main flexion creases on the palm of the healthy persons which are obligatory: Plica flexoria pollicis (Pfp), Plica flexoria transversa proximalis (Pftp) and Plica flexoria transversa distalis (Pftd). There are also longitudinal creases, which go from the base of the hand to the III, IV and V fingers. These two kinds of creases stay unchangeable during the whole life, while the secondary creases depend on the age and the environment.

There are different classifications for the main flexion creases. Leiber [5] determines three normal types flexion creases and one abnormal, which is due to the duplication of the flexion creases. According to the interlocation of the three flexion creases Viljamovskaja [10] develops six palm types. Alter [1] makes detailed classification of the normal flexion creases, their variations and also the most frequent de-

viations. Modification of his classification is made by Karev [11]. Three-type classification of the palm creases is also offered by Bali, Ramesh [2]. The scheme of Frick et al., modified by Martin, Saller [6] includes characteristic of the three main flexion creases, longitudinal creases and the degree of the furrowness with the secondary creases. New modifications of the palm flexion creases offered by Jain [4].

The aim of the present study is the characterization of the three main flexion creases in healthy children and their deviations in children with mental insufficiency.

## Material and Methods

As a material of the investigation we used the hand prints of 816 healthy children and teenagers from both sexes (413 boys and 403 girls) and 129 children and teenagers with inborn and inherited mental insufficiency (66 boys and 63 girls). We expose the distribution of diagnosis on a Table 1.

As a method of the researches of the flexion creases we accepted the scheme of Frick et al., modified by Martin, Saller [6]. The three main flexion creases are studied in reference to their length, width, type and peculiarities of their situation (Fig. 1). The presence and the characteristics of the four-finger crease, as well as its transitional forms and the longitudinal creases are also studied. At the end the scheme includes the complex pattern of the volar surface of the hand according to the presence and lack of secondary creases and the degree of their presence. In the present study we make our statements only upon the three main flexion creases, the abnormal four finger crease and its transitional forms.

For definition of the abnormal four finger crease we used the scheme of Weninger, Navratil [9]. The scheme shows insufficiency for definition of the flexion crease for our contingent and that is why we add to it new variations (Fig. 2).

Table 1. Children with congenital and inherited mental retardation

Code acc. to ICD	Diagnosis	Boys	Girls	♂+♀
742.1	Microcephaly	13	21	34
742.3	Hydrocephaly	10	2	12
272.7	Tay-Sachs syndrome	1	—	1
271.8	Phenylketonuria	—	1	1
757.3	Ectodermal dysplasia	4	—	4
757.5	Anonychia	1	1	2
759.8	Congenital skeletal anomalies	10	11	21
741.9	Meningocele	2	2	4
318.	Family-hereditary mental retardation	9	7	16
318.	Mental retardation with cataracta congenita	3	—	3
655.3	Congenital rubella embryopathy	—	2	2
655.4	Toxoplasmosis	2	—	2
655.4	Mother intoxication from noninfectious character	4	5	9
646.2	Pregnancy toxicosis	6	6	12
656.1	Hemolytic disease of new born	—	1	1
243.	Congenital hypothyroidism	—	3	3
710.739	Nanismus	1	1	2
Total		66	63	129

Fig. 1. Scheme of the palm basic flexion creases

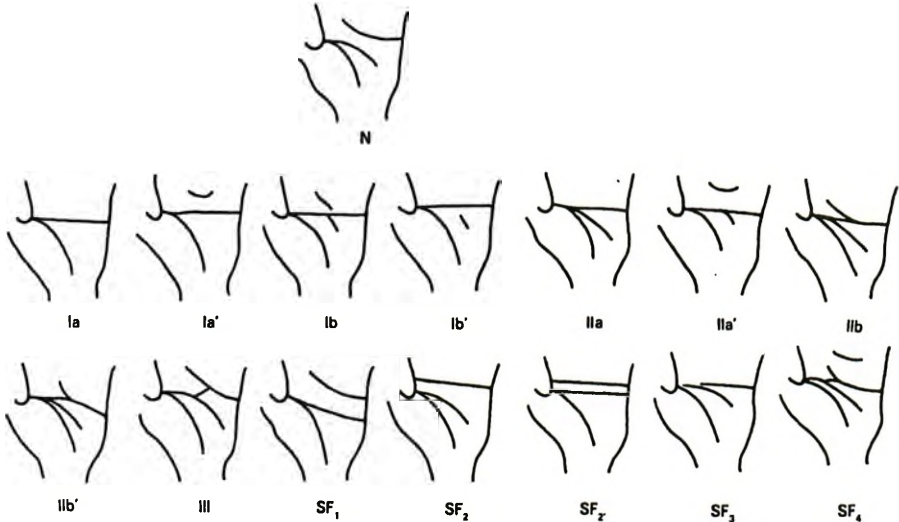
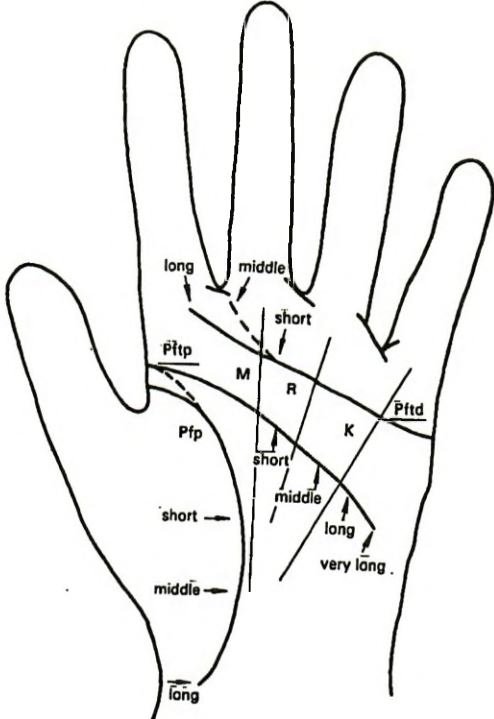


Fig. 2. Scheme of the palm basic flexion creases (by Weninger, Navratil, 1957, added by us)

## Results and discussion

### *Plica flexoria pollicis* (Fig. 3)

Most frequently this crease in healthy children from both sexes is long, narrow, even running and it is connected with Pftp at its beginning of the radial edge of the palm. Significant differences in the characteristic of the crease between the two hands were not established. The intersexual comparison indicates that this crease is more often long and narrow in girls, than in boys. Also, in girls it starts more often independently ( $p < 0.05$ ).

For some of the characteristics of Pfp in children with mental insufficiency, there are significant deviations compared to those in healthy children. For example, the frequency of the long and wide crease is raised. More often there is also uneven running of the crease and this difference is significant in girls ( $p < 0.05$ ).

The frequency of the crease starting with four finger crease is raised (abnormal — boys — 16.78%; girls — 9.12%; healthy — boys — 1.34%; girls — 2.14%).

### *Plica flexoria transversa proximalis* (Fig. 4)

This crease is most often long, with middle width in healthy boys, and narrow in girls, and straight in both sexes. There are no significant bilateral and intersexual differences, except for the narrow crease, which is more often in girls, than in boys.

There is significant difference in relation with Pftp in girls with mental insufficiency, where the frequency of the long crease is reduced, but the frequency of very long and middle is raised. As it is obvious from the diagram, most frequent is the

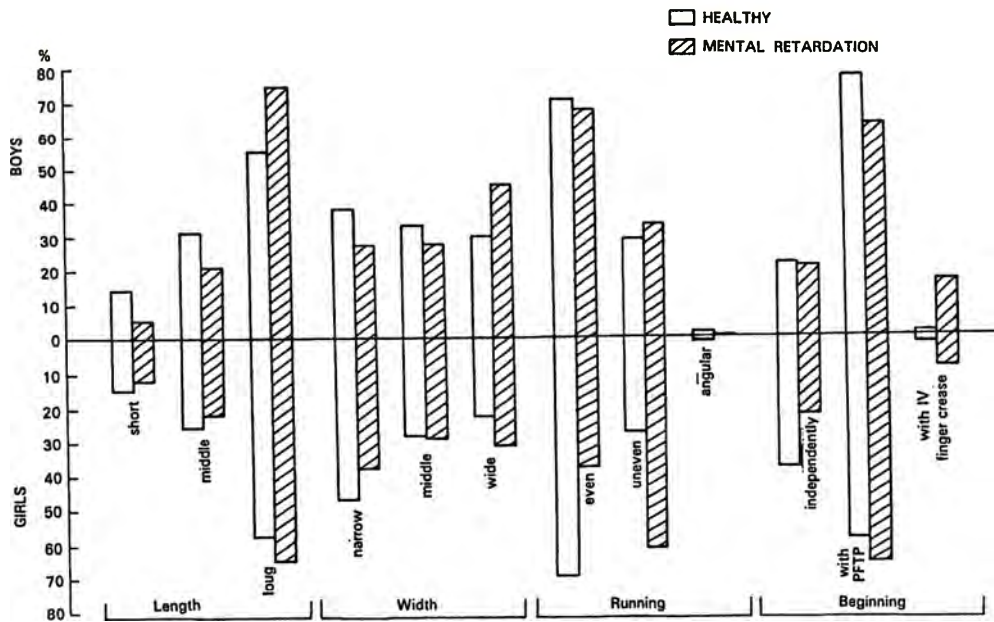


Fig. 3. Characteristics of *Plica flexoria pollicis*

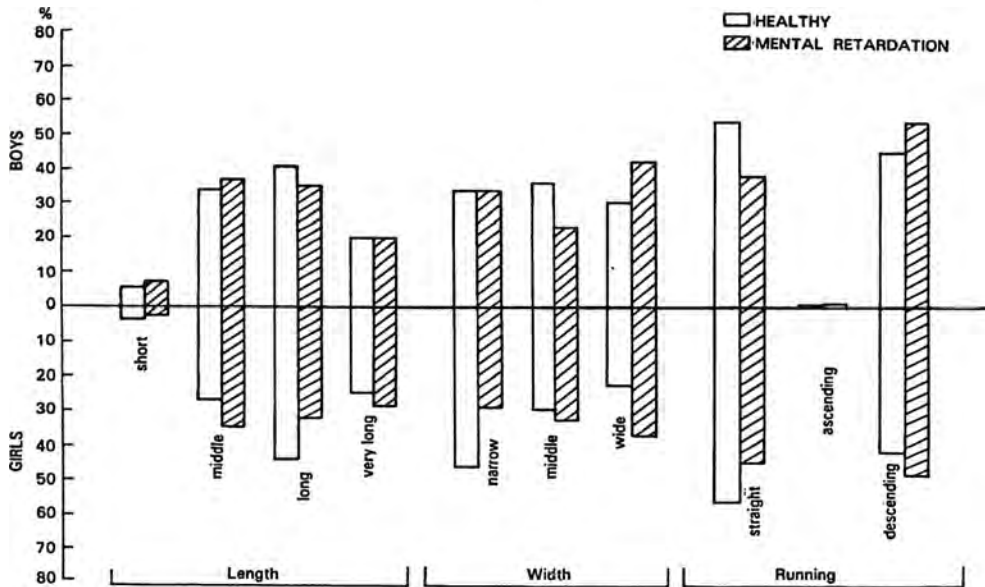


Fig. 4. Characteristics of *Plica flexoria transversa proximalis*

wide crease in children with mental retardation in comparison with the healthy children and these differences are significant for both sexes ( $p < 0.05$ ). In abnormal children most frequent the crease is descending, instead of going straight.

#### ***Plica flexoria transversa distalis* (Fig. 5)**

The data for the third crease Pftd indicate that it is most frequent with middle length (ends at the II interdigital area) in healthy children. Unlike the two other creases Pftd is wide. It is little bit curved in most of the cases. The comparison between the two sexes healthy children indicates that there are no differences in relation to its length, but this crease is more frequent narrow and deeply curved in girls. It is more frequent wide and straight in boys than in girls.

In abnormal children from both sexes the frequency of the short and wide crease is raised. Considerable more frequent is also the straight crease ( $p < 0.05$ ). Probably this is in connection with the more frequent presence of the abnormal crease in these children.

As we mentioned before, we also investigated the frequency of the type flexion creases in healthy children and in children with mental insufficiency with the help of the scheme of Weninger, Navratil [9], added by us. We represent the data on the tables 2 and 3. Most frequent as in healthy boys and in abnormal boys is the normal situation of the main flexion creases. However, this rate is considerably more low in children with mental retardation (with 27%). In healthy boys the abnormal situation of the creases is generally 7.18%, while in boys with mental insufficiency is 34.38%. The distribution of the different type creases shows the raised frequency of type I a, i.e. the classic type of four finger crease ( $p < 0.05$ ). Most considerable is the raising of type SF<sub>1</sub> on both hands in boys with mental insufficiency. The types II a and II b are

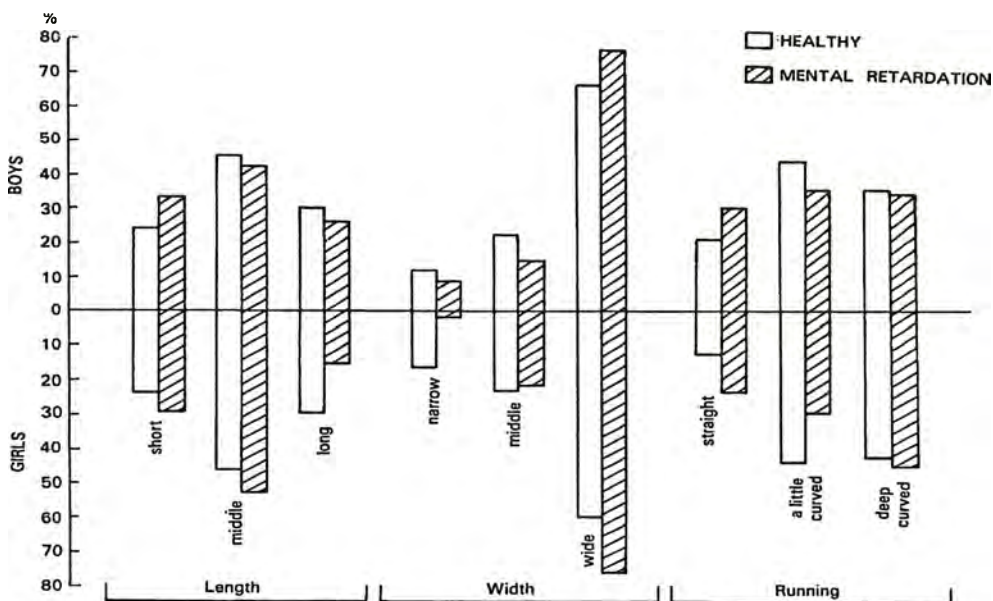


Fig. 5. Characteristics of *Plica flexoria transversa distalis*

also frequent. There are no considerable differences between the two hands, but in healthy boys the frequency of the normal type flexion creases is much higher on the left hand, and in boys with mental insufficiency — on the right hand.

In the girls from both groups, with highest rate is also the normal type, but in girls with mental insufficiency, as in boys with the same disease, it is with significantly lower frequency (with 13% lower). The frequency of abnormal types creases is nearly equal for both hands in healthy girls (5.37%). This frequency is considerably higher in abnormal girls (18.26%). It makes impression that the complex frequency of the abnormal creases is lower in girls with mental insufficiency in comparison with boys. Less frequent in girls with mental insufficiency we found abnormal creases on the right hand, but the difference between the two palms is not considerable. As in boys with mental insufficiency here the raising of type SF<sub>1</sub> is considerable ( $p < 0.05$ ), although its frequency is not so high, as in boys.

In our investigation there are established two basic facts:

1. Considerable differences in the characteristics of the three flexion creases in healthy children and children with mental insufficiency, mainly in the width and run of this creases.

2. The frequency of the abnormal flexion creases in children with mental insufficiency is higher than in healthy children. This can be connected with the more frequent presence of short and stright *Plica flexoria transversa distalis*.

In conclusion, we can say that the investigation of the flexion creases must become an inseparable part of the complex dermatoglyphic status, especially in different diseases. Along with the other dermatoglyphic features, they can help the solution of the problem whether certain disease is inborn or not.

T a b l e 2. Frequency (%) of types of palm flexion creases in boys

Type	Healthy			Mental insufficiency		
	right	left	both hands	right	left	both hands
N	91.46	94.16	92.81	68.74*	62.50*	65.62*
Ia	1.71	0.73	1.22	4.70	6.25	5.48*
Ia'	—	—	—	—	—	—
Ib	0.49	—	0.24	3.12	—	1.56
Ib'	—	0.24	0.12	1.56	1.56	1.56
IIa	1.46	1.22	1.34	3.12	6.25	4.68
IIa'	0.98	0.24	0.61	1.56	—	0.78
IIb	0.73	0.73	0.73	4.70	6.25	5.48*
IIb'	0.49	0.49	0.49	3.12	3.12	3.12
III	1.95	0.98	1.47	1.56	1.56	1.56
SF <sub>1</sub>	—	—	—	6.25*	10.95*	8.60*
SF <sub>2</sub>	0.73	0.24	0.48	—	1.56	0.78
SF <sub>2'</sub>	—	0.24	0.12	—	—	—
SF <sub>3</sub>	—	0.24	0.12	1.56	—	0.78
SF <sub>4</sub>	—	—	—	—	—	—
other	—	0.49	0.24	—	—	—

\*  $P < 0.05$

T a b l e 3. Frequency (%) of types of palm flexion creases in girls

Type	Healthy			Mental insufficiency		
	right	left	both hands	right	left	both hands
N	94.38	94.85	94.63	79.36*	84.12*	81.74*
Ia	0.24	0.24	0.24	—	—	—
Ia'	—	0.98	0.49	1.59	1.59	1.59
Ib	0.73	—	0.36	1.59	3.17	2.38
Ib'	0.24	0.49	0.36	—	—	—
IIa	0.73	0.49	0.61	3.17	1.59	2.38
IIa'	—	0.73	0.36	—	—	—
IIb	1.97	1.25	1.61	1.59	1.59	1.59
IIb'	0.73	—	0.36	—	1.59	0.80
III	—	—	—	1.59	1.59	1.59
SF <sub>1</sub>	—	—	—	4.76*	3.17*	3.96*
SF <sub>2</sub>	0.73	0.49	0.61	1.59	—	0.80
SF <sub>2'</sub>	—	—	—	1.59	—	0.80
SF <sub>3</sub>	—	0.24	0.12	—	—	—
SF <sub>4</sub>	—	0.24	0.12	—	—	—
other	0.24	—	0.12	3.17	1.59	2.38

\* $P < 0.05$

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