

PATHOLOGY OF DERMATOGLYPHICS IN INFANTILE AUTISM

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Abstract. The authors present the results of a study on digitopalmary dermatoglyphics of patients diagnosed with infantile autism. 137 subjects (67 boys and 70 girls) with 274 finger and palmar prints, residents in country's eastern territory have been investigated. The dermatoglyphic digito-palmary picture revealed a broad range of anomalies or distortions (associated with severe clinical features) both as the frequency of some of the digital or palmary characteristics and their distribution by sex, laterality and fingers, which differentiate significantly these people from the normal population. Occurring both in boys and girls, on both hands but with priority on the left ones, these distortions contribute to a more complete knowledge of the dermatoglyphic nomogram on the basis of which infantile autism could be diagnosed early. The present study is the first one – at national level – devoted to such aspects.

Key words: dermatoglyphics, infantile autism, anomalies or distortions

Rezumat. Lucrarea cuprinde un studiu al dermatoglifelor digito-palmare prezente la pacienți cu autism infantil (67 băieți și 70 fete) de vârste cuprinse între 2,5 și 18 ani, de la care s-au recoltat 274 amprente. Se constată că, tabloul dermatoglific digito-palmar al pacienților cu autism infantil prezintă o gamă largă de anomalii sau distorsiuni (cu grave implicații clinice), atât sub aspectul frecvenței unora dintre caracteristicile digitale sau palmare cât și al distribuției lor în funcție de sex, lateralitate și degete, prin care afecțiunile se diferențiază semnificativ de populația normală din care provin. Prezente atât la băieți cât și la fete și pe ambele mâini ale afecționaților dar cu precădere pe cea stângă, distorsiunile evidențiate sunt o contribuție la cunoașterea nomogramei dermatoglifice de diagnostic a autismului infantil, având în vedere că studiul de față este primul de acest gen la nivel național.

Cuvinte cheie: dermatoglifice, autism infantil, anomalii sau distorsiuni

INTRODUCTION

Known also as the „**Kanner's Syndrome**”- the name of its discoverer (1943), the infantile autism is defined nowadays as a syndrome characterized by a large spectrum of neuropsychic disorders, manifested by: delayed speaking, incapacity of verbal communication, inability of establishing and developing contacts with the other (close persons being included), the shrink into one's

own hermetic world dominated by unreal images, obsessions and feelings and pronominal reversal, rituals and compulsive phenomena (1-4).

Once lacking its communicative function, *the child's language becomes a soliloquic*, talking to himself stereotypically, producing meaningless sounds and expressions, repeating *ad literam* and evoking ceaselessly past

events, related to nothing, a state named „*echolalia*”.

The syndrome, which is usually installed around the age of 30 months, rarely earlier or later, is in quite various forms, from mild - more or less similar to a normal child - to very severe ones (1,2,4,5). The first category includes the **Asperger Syndrome** (2-4), assuming solely the presence of some autistic elements, such as: anxiety, reduced socialization, utilization of the language exclusively for personal benefits, child's intellect being not affected at all, and the **Ret Syndrome** (1,2), affecting almost exclusively little girls. It is characterized, apart from some bony dystrophies, sight disorders, height and weight hypotrophy, or cortical anthropies, by certain autistic manifestations, such as: slow diction, absence of social communication, repeated stereotype movements. **The severe forms of infantile autism** are associated - in most cases - with severe or moderate mental retardation, with epilepsy, dyslexy, alalia, hearing loss, enuresis or double incontinence, sometimes with the Fragil - X chromosome syndrome or Martin Bell's disease, or with a very rare genetic disease - namely, tuberous sclerosis. Consequently, it is appreciated nowadays that about 75% of autistic persons evidence mental retardation, of which 15%-20% with very severe forms (IQ - below 34); almost 1 of 3 persons are stricken by epileptic crises, while, for about 10% of them (boys, especially) the disease is associated with the Fragil - X

chromosome syndrome and with Tuberous sclerosis (2,6).

Taking into consideration the multiple forms of the manifestations characterizing the disease, credit has come to be given to the idea that **each autistic child's is an unique case**, capable of providing a multitude of symptoms for each psychic function, taken separately (1,2,7).

As to the **etiology of autism**, several hypotheses - including multiple causes of the disease - have been advanced (1,4,7,8). The most widely accepted today one supports **the organic nature of autism**, and assumes certain structural and functional anomalies at the level of the cerebral hemispheres - especially in the parietal zone (responsible for hearing, speaking and language) in the temporal zone (known as regulating the formation of social and emotional habits), as well as at the level of the *Calous Body*, through which the nervous impulses are transmitted from one cerebral hemisphere to another. Actually, by magnetic nuclear resonance (MRI) at brain level (1) a low nervous activity in the above mentioned regions have been detected. Such anomalies present at the level of autistic brain may be inherited (especially in the case of family forms of autism), or they may appear either during prenatal development (more exactly, in the first three months of embryonic life, when epidermal papillary ridges are also forming), being provoked by viral or bacterian infections, metabolic disorders etc., or in perinatal periods.

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As to *autism's substrate and genetic mechanism* research is in progress (2,4,5,9), sustained efforts being made by specialists for discovering the genes responsible for the disease, in view of a possible, future elimination from the genetic code. Until then, however, it is absolutely necessary to establish some methods and techniques for an early identification of children in danger of autism, so that an adequate therapy should be applied prior to the manifestation of any symptoms. As the dermatoglyphic studies, performed on patients suffering from Down syndrome, congenital deafness, or with heart congenital malformations, severe opthalmologic disorders or epilepsy (9-13) put into evidence the importance of dermatoglyphic indicators for an early diagnosis, their application had been considered as beneficial also in infantile autism.

Consequently, a dermatoglyphic study on a group of autistic patients, residents in eastern territory, has been developed.

MATERIAL AND METHODS

137 patients with infantile autism (67 boys and 70 girls) aged between 2.5 and 18 years, all residents in eastern territory of Romania, have been investigated in the Mental Health Laboratory of Iassy.

The medical records of the patients - whose disease began to manifest around the age of 2 years - showed that, in 36.50% of the cases, autism was associated with a severe mental deficiency (IQ below 34), with

anxiety, dislexy, double incontinency. In the most of cases (52.55%) the disease was accompanied by moderate mental deficiency, alalie, enuresis, hypoacusy. Some patients had epilepsy (10.95%). Over 75% of people have been considered with disability of first degree, which assumes an advanced stage of neuropsychic and physiological degeneration, suggestively illustrated - as we shall see in the following - by the broad pathological charge of their dermatoglyphic picture, too.

For all indicators of dermatoglyphic pathology put into evidence, sexual dimorphism and bilateral differences had been also considered, the results being compared with those of controls (normal population) from the same region (a group of 200 subjects: 100 men and 100 women).

The working methods have been those currently employed in studies of pathologic dermatoglyphy (9,11,14).

RESULTS AND DISCUSSION

The analysis and statistic processing of the dermatoglyphic data of the patients with infantile autism have shown that both their finger and palmary picture show an ample and strong pathological charge, suggestively illustrated by a multitude of distortions with deep clinical significance, being an expression of their advanced degree of neuropsychic and physiological degeneration.

At the level of the whole sample, such anomalies are *deviations in the frequency of some of the finger or palmar dermatoglyphic characteristics*

from the values of normal population from which the subjects come, and also upsetting from their classical distribution line, as a function of sex, laterality or fingers. A large part of such distortions had been reported also, for other European groups of autistic patients (6,8,10), as well as in other severe genetic disorders (7,9,10,12) - in different ratios – fact which explains their large clinical implications.

- **Digital dermatoglyphic distortions**
Patients with infantile autism *show a significantly higher frequency for arches (A) and a lower one for loops (L)* on all fingers, comparatively with the control group (table 1). If, for the normal population, the two main patterns are predominant at girls and on the left hand, in these patients they were more frequently at boys and on the right hand (the last one, for loops, exclusively).

The arches, usually present on the second and third finger, and very rarely represented on the others, records *quite high percentages on the fourth and fifth finger, and especially on the first finger of the left hand* (15.7% for girls and 10.45% for boys); many of them had here a radial instead of an ulnar orientation - a peculiarity considered as a strong „*malformative stigmat*” for carriers (9,11).

A last dermatoglyphic anomaly at the digital level refers to *the significant increase of raketoid loops ratio*, through which the patients of the both sexes are considerably differential from the control group ($p < 0.01$); it is a distortion more frequent in girls and

on the right hand of both sexes having its major incidence on fingers IV and V.

- **Palmary dermatoglyphic distortions**

A broad range of distortions, quite severe as to their pathological significance (9,11,12,13); has been provided by palmary picture. The first one, refers to the *modification of the classical sequence of the true patterns' frequency in palm's five compartments*, that is $IV > Hp > III > Th/I > II$ instead of $IV > III > Hp > Th/I > II$ which is the normal case. Such a situation is induced by the *substantial reduction of pattern's percentages in the interdigital space III*, up to 24.09%, comparatively with 36.09% - recorded on the control group, the difference being statistically significant ($p < 0.02$). This anomaly, associated with the other two, equally important as to their malformative effects, consists in the *increase (over two fold) of partial and total supression of C line (Cx and Co, respectively) compared with the controls*. Cx was more frequent in boys, while Co in girls; both prevailed on left palms, the tendencies being similar to those of the control group (table 1).

Significantly higher frequencies have been found also for: *the presence of the loop with ulnar orientation (L^U) and of 2, 3 or 4 triradia in the same palm (tt' , tt'' , etc); the absence of the axial triradius t in the palm (t_{\emptyset}) and finishing of line T's course in fields 11 and 12 instead of 13 (all of them at the level of palm's Hypothenary); for the arrangement*

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of the papillary ridges as a dense and very dense network in the Thenar/I; for reducing the distance between triradia a and b, limiting the interdigital space II, much lower than the normal average value of 21 mm - for women and, of 24 mm - for men, and for the transverse palmary sulcus

or the Simian Line. The differences between the two groups concerning the mentioned distortions are supported statistically by a p value of < 0.05, especially when considering the male and female series, on whole (table 1).

Table 1. Frequencies of digital and palmary distortions in infantile autism group comparatively with normal population

Digital and palmary distortions (%)	Infantile autism (137)			Control (200)			p value		
	Boys	Girls	Boys + Girls	Boys	Girls	Boys + Girls	Boys	Girls	Boys + Girls
A on all fingers	10.60 L>R	10.00 L>R	10.29 L>R	2.50 L>R	6.20 L>R	4.35 L>R	< 0.03	NS	0.03
L on all fingers	61.19 R>L	59.71 R>L	60.44 R>L	67.00 R>L	75.20 L>R	71.10 L>R	NS	< 0.03	0.04
Raketoid type loops	8.65 R>L	9.71 R>L	9.10 R>L	-	-	-	0.01	0.01	< 0.01
L ^U in Hp	11.95 L>R	7.86 L>R	9.85 L>R	3.90 L>R	2.63 L>R	3.26 L>R	0.05	NS	< 0.02
tt', tt''', etc.	27.62 R>L	36.42 R>L	32.11 R>L	15.80 R>L	17.92 R>L	16.86 R>L	NS	< 0.01	0.01
t ₀	2.24 L>R	7.14 L>R	4.75 L>R	-	-	-	NS	< 0.01	< 0.01
T ₁₁ and T ₁₂ instead of T ₁₃	32.09 L>R	28.57 L>R	30.30 L>R	2.80 L>R	3.51 L>R	3.15 L>R	< 0.01	< 0.01	< 0.01
Dense and very dense network in Th/I	29.85 L = R	58.57 L > R	44.52 L > R	10.90 L > R	16.91 L > R	13.95 L > R	0.01	< 0.01	< 0.01
a-b < than 24 mm in M 21 mm in F	58.39 R > L	62.04 R > L	60.22 R > L	9.80 L > R	7.20 L > R	8.50 L > R	< 0.01	< 0.01	< 0.01
Cx	36.56 L > R	30.30 L > R	33.21 L > R	16.90 L > R	14.50 L > R	15.70 L > R	0.01	0.02	0.01
Co	5.22 L > R	10.00 L > R	7.66 L > R	2.10 L > R	3.20 L > R	2.60 L > R	NS	0.05	0.05
Transverse palmary Sulcus	11.94 L = R	6.43 L > R	9.12 L > R	4.10 L > R	2.30 L > R	3.20 L > R	0.05	NS	0.03

Table 1 data show that, out of the 9 palmary distortions occurring in infantile autism, L^U from Hp, T₁₁ and T₁₂, Cx and the **palmar Sulcus** are more frequent to boys, while **tt't''**, etc, t₀, the **dense and very dense**

network from Th/I, Co and the much more **reduced a-b distance** are present to girls - a dimorphic tendency which, apart from some insignificant exceptions, was present in the control group, as well.

Of the two hands, most of the palmary anomalies of patients with autism were more frequent on the left palm (with the exception of tt't', etc., and of the much lower a-b distance), being recognized as carriers of the majority of „malformative stigmata” in other maladies, too (8,9,11,14). With the only one exception (the reduced a-b distance) these bimanual differences agree, with those of the control group, too (table 1).

CONCLUSIONS

1. The dermatoglyphic investigations performed on patients with infantile autism, have put into evidence multiple modifications (either anomalies or distortions) with deep pathological significance, both in the digital and - especially - in the palmary picture (up to eight for each patient) being present - in most cases - on carriers' both hands.
2. On the whole group, for all distortions put into the light, significantly higher ratios have been found comparatively with the control group suggesting that the causal factors involved in the development of autistic manifestations had been active during the first three or four months of intrauterine life, when the epidermal papillary ridges were finished up.
3. The digital anomalies are mostly accompanied by some significant deviations from the classical line of the sexual dimorphism, of the bilateral differences, or distribution on fingers; the palmary ones maintain the tendencies occurring in the normal population.
4. These results could be of use for an early identification of infantile autism in order to establish an adequate therapy.

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