

## CONTRIBUTIONS TO THE DERMATOGLYPHIC DIAGNOSIS OF EPILEPSY

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**Abstract.** Palmary dermatoglyphics, of a group of 102 epilepsy-stricken children and teenagers (51 boys and 51 girls), with ages between 2 and 17 years, have been analyzed. Some significant distortions, inducing deep clinical implications, which differentiate the patients from the apparently normal population, have been found. Some of the palmary dermatoglyphic anomalies, occurring in high ratios with both boys and - especially - girls, predominantly on the left palms of the subjects (equally boys and girls), have also been observed at other European groups of epileptics. The papillary ridges' disposition as a dense and very dense network at the Thenar/I level, and the finalization of line T's direction in palm's field 11 and 12 - instead of 13 -, as we found, contribute to enriching the indicators of epilepsy's dermatoglyphic diagnosis - at least for the patients met in Moldavia, for which reference data had been provided.

**Key words:** epilepsy, dermatoglyphic diagnosis, children, teenagers

**Rezumat.** Lucrarea cuprinde un studiu al dermatoglifelor palmare asupra unui lot de 102 copii și adolescenți cu epilepsie (51 băieți și 51 fete) de vârstă cuprinsă între 2 și 17 ani, provenind din Moldova. Au fost evidențiate unele distorsiuni cu adânci implicații clinice care diferențiază pacienții de populația aparent normală. Prezente în proporții ridicate atât la băieți cât mai ales la fete și cu precădere pe palmele stângi ale subiecților de ambele sexe unele dintre anomalile dermatoglifice palmare evidențiate au fost raportate și pentru alte grupări europene de epileptici. Dispunerea creștelor papilare din Thenar/I în rețea densă și foarte densă și finalizarea traseului liniei T în câmpurile 11 și 12 ale palmei în loc de 13 găsite de noi, contribuie la îmbogățirea diagnozei dermatoglifice a epilepsiei, cel puțin pentru pacienții ce provin din Moldova, pentru care am dispus de date de referință.

**Cuvinte cheie:** epilepsie, diagnostic dermatoglic, copii, adolescenți

### INTRODUCTION

Epilepsy is one of the most frequent neurological diseases (1,2,3), occurring on a certain type of nervous structure and which, once installed, may induce disorders that facilitates the subsequent recurrence of crises. According to World Health Organization (WHO), and the International League for Struggle against

Epilepsy (ILSE), epilepsy has been defined as a “recurrent paroxysmal disorder of cerebral function characterized by sudden brief attacks of altered consciousness, motor activity, sensory phenomena, or inappropriate behaviour caused by abnormal excessive discharge of cerebral neurons” (3).

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The hereditary forms of epilepsy are predominantly benign, having either a recessive autosomal (beginning at the age of 10-15 years and showing a progressive evolution around the age of 20) or a dominant autosomal transmission (beginning at 10-25 years, and evolving progressively around 45). Besides these forms there also exist numerous other types of epilepsy (1,2,3) as determined by various causal factors that may intervene either in the first 3-5 months of intrauterin life (a period in which the epidermal papillary ridges are forming), or along postnatal life. In the last case, these factors are usually related to developmental defects, birth injuries, or metabolic disease affecting the brain (hypo-glycemia, phenylketonuria, hypoparathyroidism), or as a result of some infections, (meningitis, encephalitis, brain abscess, rabies, tetanus, toxoplasmosis etc) or are secondary to cerebral trauma, tumors or other organic brain diseases (3). Focal brain diseases can cause seizures at any age. In the last cases, the generally accepted idea was that an essential role in their occurrence would be played by the genetic predisposition. Skin, with all its annexes, is being formed from the same embryonic foil (the ectoblast) as the central and peripheral nervous system. Any modification or disorder produced at the level of the encephalus in the first 3-5 months of intrauterin life will have repercussions, too, on the epidermal papillary ridges, subjected to significant deviations from their normal arrangement

and orientation-the so-called dermatoglyphic distortions or anomalies (1,2,4).

At a population or group level, such anomalies are nothing else than deviations of some of the dermatoglyphic characteristics from the values recorded in the normal populations from which these affected people came from. The large spreading of epilepsy drew the interest of dermatoglyphicians who, as a result of some extended investigations succeeded, indeed, in putting into evidence, important malformative stigmata or graphical signals with deep clinical significance.

Either independently, or by associating the results with those obtained by clinicians and neurologists, these might be employed as indicators in the diagnosis of this disease. Out of the multiple tests used in such a diagnosis, it is the dermatoglyphic examination which - apart from being less expensive - has also the advantage of its possible accomplishment - as a result of dermatoglyphics' immutable character over one's whole life-as early as any of the postnatal life stages. Therefore the dermatoglyphic test may be also utilized in epilepsy's screening at a population level.

Until now, the epilepsy has never been investigated in Romania, from a dermatoglyphic perspective. Developed on a group of epileptic children from Moldavia region this study is a first attempt.

### MATERIAL AND METHODS

102 epileptic children and teenagers (51 boys and 51 girls) from North-Eastern region of Romania

(Moldavia), with ages between 2 and 17 years, have been investigated from a dermatoglyphic point of view.

The working methods employed fully agree with those utilized in studies of pathological dermatoglyphy (1,4,5,6,7). The medical records of the affected subjects, including the results of the clinical investigations, and an inquiry among parents, about the occurrence, or not, of the disease with at least another one member of the family (its ascendance on the line of both parents also included), led to the following results: **36** of the epilepsy - stricken subjects (21 boys and 15 girls) manifested *idiopathic seizures* (with unknown causes); in **34** of them (17 boys and 17 girls), *epilepsy* was *associated with a variety of cerebral or systemic disorders* such as: chronic infantile encephalopathy, severe mental deficiency, spastic or flaccid paraplegy or tetraplegy, cardiac, ocular, or other diseases; **26** of the subjects (8 boys and 18 girls) had *hereditary (familial) epilepsy* and, finally, **6** patients (5 boys and 1 girl) manifested *post-traumatic or post-meningeal seizures*. The same inquiry pointed out the fact that, in 96 cases (94.1%), the crises started at ages between 2 and 6 months, as repeated attacks, amplified in time, and taking the form of tonico-clonic generalized seizures which, even under treatment, appeared once or twice a week. At the last 6 epileptics considered in the study, the crises occurred in the prepuberty period, directly in their generalized form or grand mal seizures.

The frequencies of different palmary characteristics have been calculated for the whole group of subjects, due to the small number of individuals in each subgroup.

The analysis of results considered sexual dimorphism and bimanual differences, comparatively with those of the control group living in the same residence area.

## RESULTS AND DISCUSSION

Analysis of the palmary dermatoglyphic characteristics of epileptic children put into evidence the important distortions (anomalies) that differentiate them considerably from the normal population (table 1). Some of these malformative marks have been described in the literature for other European groups of epileptics, too (1,4).

*A first and very important deviation, at the level of the affected people's palm is a very strong reduction of the model's frequency in the interdigital spaces IV and III*, up to 29.90% and 29.41%, versus 53.84% and 41.61% respectively, values recorded in the control group from Moldavia,  $p = 0.005$ . Under such circumstances, the frequency of models in the two palmary compartments becomes almost equal to that of the Hypothenar area (i.e., 28.92%), so that the classical succession of models' distribution in the five compartments of the palm becomes  $IV = III \approx Hp > Th/I > II$  instead of  $IV > III > Hp > Th/I > II$ , as occurring in normal populations. Out of the numerous genetic or teratologic diseases studied, such a striking

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diminution of models' frequency in spaces IV and III has never been reported-up to now - excepting the epilepsy (1,2), which at least until some new investigations, seems specific for this severe syndrome.

Most of subjects - especially girls had ***in the Th/I compartment the papillary ridges, arranged as a dense and very dense network instead of having a slightly bended direction.*** This is an aspects quite rarely met in the control sample (table 1), although mentioned by us for blind and in other severe eye diseases (women 58.50%; men 23.50%), in congenital heart malformations and other severe cardiovascular diseases (women 47.70%; men 31.20%), at parents of multiple malformed children (women 43.50%; men 25.50%) and mentally-handicapped children (girls 45.80%; boys 20.70%) (6,7,8). Special mention should be made of the fact that, in all cases, the dense and very dense network in Th/I appears primarily for the feminine series as well as for epileptics, which might lead to the assumption that the gene responsible for this anomaly is situated on chromosome X.

Another curious observation concerning the epileptics was that, with most of the carriers - of both sexes -, this anomaly occurs on both palms (girls 81.82%; boys 73.68%), probably by double malformative effect.

***In the interdigital space II*** of many of the epileptics under study, ***a surprising decrease of the distance between triradia "a" and "b" - marking the limits of this compartment - much under the***

***average values recorded for the Romanian population*** (i.e., of 21 mm at women and 24 at men). In some cases the decrease up to 11 mm was noticed. Such a severe distortion, also observed for other European groups of epileptics (1,2), as well as in other severe diseases (6,7,8), anomalies of the sexual chromosomes included (1) is much more frequent in epileptic boys and on the right palms of the affected ones. The percentage recorded for this distortion get quite close to those observed by us in mentally-handicapped children (82.90% for boys and 49.40% for girls), in deaf-and-dumb (60.20% for boys; 30.00% for girls), or with subjects suffering from severe cardiovascular diseases (56.20% for boys; 32.70% for girls). Most of the epileptics are carriers of this anomaly on both palms (63.36% boys and 58.62% girls), followed, in about 31%, by situations when it appears exclusively on the right palms (boys 31.82% and girls 31.03%). The last position is occupied by the cases where the anomaly was found exclusively on the left palms (girls 10.34% and boys 4.54%).

***Changing of line T's classical direction, which starts from the „t" basal triradius, in palm's fields 11 and 12 instead of 13*** - as occurring in over 95% normal people - represents another malformative sketch of the epileptics' palm, more frequently met with the feminine series and on the left hand (table 1). So, this tendency of deviating line T's direction was found in 47.06% of girls and 31.37% of

boys, most of these carriers having it only on the left palm (50.00% for girls and 43.75% for boys), being followed by the bilateral arrangement (33.33% for girls and 37.50% for boys). In few cases this had been found exclusively on the subjects' right palms (16.66% for girls and 18.75% for boys).

Among the last distortions inducing deeply clinical implications - as we have found - must be underlined *the tendency of partial or total suppression of the C line's direction (Cx and respectively Co), which starts from triradius c, positioned at the basis of finger IV*. Rare ridge formations, Cx and Co are frequently

used in population and human pathology studies (9,10), because of their high incidence in several genetic or terathologic diseases (1) - epilepsy included (2) and lower incidence in normal groups (Cx = 15%, Co = 2 - 3%), where Cx is mainly to be found at men while Co - on the contrary - is more frequent in women. In our epilepsy patients, both types of suppression were more frequent in the female series, prevailing on the left palms of the subjects. They record significantly higher percentage comparatively with control group (table 1).

**Table 1. Palmary distortions on left (L) and right (R) hands of both sexes (%)**

Palmary distortions	Sex	Epileptics (102)			Controls (200)			.p		
		L	R	L+R	L	R	L+R	L	R	L+R
Dense and very dense network in Thenar/I	M	29.41	37.25	33.33	9.80	11.60	10.90	<0.001	<0.001	<0.001
	F	58.82	58.82	58.82	15.20	18.62	16.91	<0.001	<0.001	<0.001
a-b much below 21mm with girls and 24 mm with boys	M	58.82	82.31	70.58	26.30	41.50	33.95	<0.001	<0.001	<0.001
	F	39.21	50.98	45.10	19.50	25.60	22.50	0.007	0.001	0.004
Line T's finalization in fields 11 and 12 instead of 13	M	25.49	17.64	21.56	3.50	2.10	2.80	<0.001	<0.001	<0.001
	F	39.21	23.53	31.37	5.60	1.45	3.55	<0.001	<0.001	<0.001
Cx	M	41.17	25.49	33.33	23.97	9.93	16.95	<0.05	<0.05	<0.05
	F	45.10	37.25	41.17	20.75	12.58	16.66	<0.001	<0.001	<0.001
Co	M	7.84	9.80	8.82	2.50	1.85	2.15	NS	<0.05	0.05
	F	17.65	9.80	13.72	3.85	2.60	3.22	<0.05	0.05	<0.05

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39 (76.47%) out of the 51 epileptic girls were Cx - and Co - carriers, as follows: in 43.59% of them, such formations are present on both palms, in 38.46% - exclusively on the left palms and in only 17.95% of the carriers - in their right palms. For boys, 31 of the 51 epileptics were Cx - and Co - carriers, which represents a percentage of 60.78%. Unlike the girls, most of the Cx - and Co-carrying boys (41.93%) have these distortions on the left palms only, while 38.71% of them concomitantly on both palms, and 19.35% - exclusively on the right ones.

As in the case of the other previously analyzed distortions, the bilateral arrangement of Cx and Co suppressions with the carriers records a quite high percentage, for both sexes, fact that express, in a suggestive manner, the ample pathological charge at the level of epileptics' palm.

As the group of epileptics taken into study includes, too, cases in which, besides epilepsy, the affected persons suffer from other serious diseases, one might believe that some of the distortions described are correlated with the latter ones. Nevertheless, the individual analysis of the dermatoglyphic files of the affected subjects evidenced that; the number of carriers for each of the anomalies is much higher (even double with the girl's series) comparatively with the number of epileptics affected by other diseases, too. If considering, however, that the present study is the first one of this type in our country, with a view to assuring more safety to the results

obtained, it is the authors' opinion that the investigations should be extended on each of the four types of epilepsy mentioned in the present study. This might support the already accredited idea according to which, regardless of the type of epilepsy and of the causal factors involved, the occurrence of crises is based on a genetic predisposition and consequently, no differences should be recorded in dermatoglyphics' pathology for various types of epilepsy.

### CONCLUSIONS

The present study put into evidence that the degree of affection of the investigated epileptics is correlated with the presence in the palm's dermatoglyphics of the significant distortions (anomalies) like: the spectacular diminution of model's frequency in the interdigital spaces **IV** and **III**; the strong decrease of distance "a"-**"b"** much below the average value recorded in Romanian population; the increase, over the maximum threshold of normality of partial and total suppression of **C Line** (**Cx** and respectively **Co**); a higher frequency of the cases in which the papillary ridges from Thenar/I are arranged as a dense or very dense network, as well as of those in which **T's Line** finish in palm's field 11 and 12 - instead of 13. The last two distortions, which until now have never been observed in other European groups of epileptics, represent a contribution to enriching the indicators of epilepsy's dermatoglyphic diagnosis.

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