



Indices and Main Line Terminations in Epilepsy – A Dermatoglyphic Study

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Abstract

Introduction: Genetic etiology has been proposed for both idiopathic epilepsy and dermatoglyphics. Hence, the present study has been undertaken to find out the existence of any correlation between dermatoglyphics and Idiopathic Generalized Epilepsy.

Materials and Methods: The study was conducted in the Department of Anatomy and Department of Neurology, Himalayan Institute of Medical Sciences, Swami Ram Nagar, Dehradun. Main Line Index (MLI), Furuhata's Index, Dankmeijer's Index and Main line (A, B, C, D) terminations were analyzed by utilizing finger and palmar prints.

Aims and Objectives: To find out an association, if any, between dermatoglyphic patterns of hands in Idiopathic Generalized Epilepsy of both sexes.

Results: The present study showed a non-significant increase of MLI in right hand and non-significant decrease of MLI in left hand of cases when compared with respective hands of controls. There was an increase in Dankmeijer's Index and a decrease in Furuhata's Index in

case group when compared with control group. Main line D was mostly confined to sectors 11, 9 and 7 in both sexes among the cases and controls. Main line C terminated quite often in sectors 9 & 7 in males and females of the case series. Main line B terminated most frequently in sectors 5" & 7 in control and case groups. Main line A terminated most frequently in sector 5' in males and females.

Conclusion: Therefore, we can conclude and hypothesize merely by observing increase in Dankmeijer's Index and a decrease in Furuhata's Index in the fingerprints (as observed in the present study) that persons with high risk of Idiopathic Generalized Epilepsy can be identified early and preventive measures can be taken against serious complications.

Keywords: Dermatoglyphics, Idiopathic Generalized Epilepsy, MLI, Furuhata's Index, Dankmeijer's Index, Main line (A, B, C, D) terminations.

Introduction

The term Dermatoglyphics is derived from the ancient Greek words 'derma' means skin and 'glyph' meaning

carving. Dermatoglyphics is the scientific study of patterns of epidermal ridges present on fingers, palms, toes and soles (1). Although Cummins and Midlo coined the term dermatoglyphics, it started as a scientific discipline with the publication of Purkinje's thesis and Galton's classic book "Fingerprints" (2). Dermatoglyphic patterns are constant and individualistic. Abnormalities in the epidermal ridges may result from genetic alterations occurring around the first trimester, during the period of organogenesis, between 13th to 60th days after fertilization (3).

The term Epilepsy is derived from the Ancient Greek word *epilēpsía* which means seizure. Epilepsy is a common chronic neurological disorder characterized by seizures. These seizures are transient signs and/or symptoms of abnormal, excessive or hypersynchronous neuronal activity in the brain (4).

Owing to the similar source of ectodermal development of both the nervous system and the epidermal papillary ridges of the skin, the present study was carried out to identify an association, if any, between Idiopathic Generalized Epilepsy and the dermatoglyphic patterns present in such type of Patients (5).

Materials and Methods:

The present study was conducted in the Department of Anatomy, Himalayan Institute of Medical Sciences, Swami Ram Nagar, Dehradun. 50 confirmed cases of Idiopathic Generalized Epilepsy were taken as cases who reported to the Neuromedicine OPD at Himalayan Institute Hospital, Swami Ram Nagar, Dehradun. Prior approval of Institutional Ethical Committee was obtained. Descriptive (observational and cross-sectional) study was performed on 500 subjects (Control Group, n=250 and Study Group, n=250) in age groups between 15-50 years of either sex.

Selection of subjects for the Control Group consisted of patients selected from individuals attending the

Neuromedicine OPD. Patients with H/O epilepsy, convulsions or seizures in the past were excluded from the Control Group.

Selection of Study Group consisted of patients clinically confirmed as cases of Idiopathic Generalized Epilepsy attending the OPD. Patients with H/O epilepsy in the past associated with a variety of cerebral or systemic disorders in the form of chronic infantile encephalopathy, severe mental deficiency, spastic or flaccid paraplegia or tetraplegia, cardiac, ocular or other diseases were excluded from study group. Epileptic patients with H/O previous trauma over the head or meningeal infections were also excluded.

Case Recording Forms were used to generate the data. Before taking the finger and palmar prints of the patients and controls, a written informed consent was taken from all the patients as well as controls.

The materials used for the study were Quick drying duplicating ink, Rubber roller, Inking Slab- Thick glass sheet, White paper with a glazed surface on one side of A3 size, Pressure pad made up of foam, Diluent and Hand Lens. Printing of the Digits and Palm were obtained using the Ink Method. Parameters analyzed by utilizing finger and palmar prints were Main Line Index (MLI), Furuhashi's Index, Dankmeijer's Index and Main line (A, B, C, D) terminations.

The data were analyzed by using statistical software SPSS-22. The collected data were represented in the form of mean and standard deviation. The significance of differences between cases and controls was assessed by the Student's t-test at 5% level of significance.

Results:

The study was performed on 250 normal individuals (126 males and 124 females) as controls and 250 patients taken as cases (132 males and 118 females). Thus 1250 fingers & 250 hands of controls and cases each were analyzed in both right and left hands separately. The observations

obtained were compiled and tabulated in following manner (Table 1 & Table 2).

Table 1: Comparison of MLI between Control and Case Groups.

Patterns	Controls (n=250)		Cases (n=250)	
	Rt Hand	Lt Hand	Rt Hand	Lt Hand
Mean	9.86	8.44	10.02 (p=0.65)	8.12 (p=0.48)
SD	1.807	2.224	1.755	2.309
SEM	0.250	0.314	0.248	0.327

Table 2: Comparison of Indices between Controls and Cases

Index	Control group	Case group
Dankmeijer's Index	11.30	30.82
Furuhata's Index	61.25	49.16

The table 1 showed that a there was non-significant increase of MLI in right hand and non-significant decrease of MLI in left hand of cases when compared with respective hands of controls.

The table 2 showed there was an increase in Dankmeijer's Index and a decrease in Furuhata's Index in case group when compared with control group.

Termination of main line D was mostly confined to sectors 11, 9 and 7 in both males and females of the cases and controls. The percentage frequency of occurrence being in the order of 11, 9 & 7 in right hands of controls and cases (Fig. 1).

Main line C terminated quite often in sectors 9 & 7 in males and females of the case series. The same trend was seen in control males and females (Fig. 2).



Fig. 7a: Palmar Print of Left hand of Female Control showing main line termination 'A' at 5' and main line termination 'D' at 11.



Fig. 7b: Palmar Print of Left Hand of Female Case showing main line termination 'A' at 5' and main line termination 'D' at 11.

Main line B terminated most frequently in sectors 5' & 7 in control and case groups. In female cases the termination in sector 5'', being 39% on right palms and 44% on left palms. In male cases this termination at sector 7 was 56% on right palms and 28% on left palms (Fig. 2). However, this line terminated at sector 9 in 11% and 0% of male and female controls respectively in right palms.

Main line A terminated most frequently in sector 5' in males and females in both control and cases (Fig.1).

Discussion

In the present study there was a non-significant increase of mean values of MLI in right hand (10.02±1.76) and

decrease in left hand (8.12 ± 2.31) of cases in the present study when compared with their respective controls i.e. (9.86 ± 1.81) and (8.44 ± 2.22) respectively (Table 1).

Ranganath P et al (5) observed a significant increase in the main line index of right (8.21 ± 0.9) and left (8.02 ± 0.78) hands of female patients. MLI was not found to be significantly different in the male patients and male controls. Schaumann B et al (6) observed significant increase in the main line index on the right palm ($p < 0.01$). Shawky et al (7) found significantly increased MLI in the epileptic children (11.5 in males, and 10.6 in females), as compared to the control (8.6 in males, and 9.4 in females). Goshi RC (8) observed significantly increased MLI in female epileptics (left 8.02 and right 8.2). Rivera C (9) did not observe any difference.

In the present study there was an increase in Dankmeijer's Index (30.82) and decrease in Furuhat's Index (49.16) in case groups when compared with their respective controls i.e. 11.30 and 61.25 respectively (table 2).

Brown M and Paskind HA (10) observed reduced indices in epileptic patients. Rivera C (9) did not find any difference in such indices of cases when compared with their controls.

In the present study, termination of Main Line D was mostly confined to sectors 11, 9 and 7 in both sexes among the cases and controls. This order of frequency remained the same in right hand of both control and case groups (Fig. 1). Filho et al (11) referenced Denny in his study, who found a higher incidence of termination of main line D at position 9.

Main line C terminated quite often in sectors 9 & 7 in males and females of the case series. The same trend was seen in control males and females (Fig. 2). Bansal IJS et al (12) found similar observations. Filho et al (11) referenced Lopez R in his study, who found a higher incidence of termination of main line C at position 9.

Main line B terminated most frequently in sectors 5' & 7' in control and case groups. In female cases the termination in sector 5'', being 39% on right palms and 44% on left palms (Fig. 2). In male cases this termination at sector 7' was 56% on right palms and 28% on left palms. Bansal IJS et al (11) observed that main line B terminated more frequently at position 7.

Main line A terminated most frequently in sector 5' in males and females. In right palms of male and female controls termination of main line A at sector 5' was 50% and 63% respectively while in cases it was 44% and 72% respectively (Fig. 1). Bansal IJS et al (12) noted that Main Line A was found to terminate most frequently at position 3 in males (34.84%) and females (47.05%) followed by position 5' where it was 22.72% in males and 20.58% in females in the patient series.

Therefore, these parameters of significantly decreased whorls and increased arches may be of immense help not only in identifying pre-epileptics but can be helpful in preventing serious complications of epilepsy, which is a leading problem of the world.

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Declarations:

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