

## Research Article

# Qualitative palmar dermatoglyphic patterns in cases of idiopathic generalized epilepsy

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## ABSTRACT

**Background:** 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. Objective of current study was to find out an association, if any, between dermatoglyphic patterns of hands in idiopathic generalized epilepsy of both sexes.

**Methods:** The study was conducted in the department of anatomy and department of neurology, Himalayan institute of medical sciences, Swami Ram Nagar, Dehradun. Fingertip patterns (whorls, loops, arches) and Main line (A, B, C, D) terminations were analysed by utilizing finger and palmar prints.

**Results:** The present study showed a significant decrease in whorls and an increase in arches in both the hands of male and female IGE patients. Loops were increased in both hands of female patients. 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 decrease in the whorl and increase in the arch patterns 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, Whorls, Loops, Arches

## 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.<sup>1</sup> 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".<sup>2</sup> 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 13<sup>th</sup> to 60<sup>th</sup> days after fertilization.<sup>3</sup>

The term Epilepsy is derived from the Ancient Greek word epilēpsia 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.<sup>4</sup>

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.<sup>5</sup>

**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 100 subjects (Control group, n=50 and study group, n=50) 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 from 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 fingertip patterns ( whorls , loops, arches ) and Main line terminations (A, B, C, D).

The data were analyzed by using statistical software SPSS-22. The collected data were represented in the form of frequency and percentage. The chi square test (when expected frequency count is more than 5) and Fischer exact test (when expected frequency count is less than 5) were used to check the proportion of fingertip patterns between control and cases at 5% level of significance.

**RESULTS**

The study was performed on 50 normal individuals (26 males and 24 females) as controls and 50 patients taken as cases (32 males and 18 females). Thus, 130 fingers of male controls and 160 fingers of male cases, while 120 fingers of female controls and 90 fingers of female cases were analyzed. The observations obtained were compiled and tabulated in following manner (Table 1 & Table 2).

**Table 1: Distribution of fingertip patterns in right hands of control and case groups.**

Patterns	Males		P value	Females		P value
	Controls (n=130)	Cases (n=160)		Controls (n=120)	Cases (n=90)	
	Frequency (percentage)	Frequency (percentage)		Frequency (percentage)	Frequency (percentage)	
Whorls	60 (46)	64 (40)	0.04	29 (24)	14 (16)	0.02
Loops	68 (52)	83 (52)	1.00	80 (67)	65 (72)	0.04
• Ulnar loops	66 (50)	82 (51)	1.00	78 (65)	64 (71)	0.03
• Radial loops	2 (2)	1 (1)	0.50	2 (2)	1 (1)	0.50
Arches	1 (1)	11 (6)	0.03	7 (6)	9 (10)	0.03
Composite	1 (1)	2 (2)	0.50	4 (3)	2 (2)	0.30

The Table 1 showed a significant decrease in the percentage of whorl patterns and an increase in arch patterns in both male and female cases (P <0.05) in right hands when compared with their respective control groups. Moreover, a significant increase in the loop and ulnar loop patterns were observed in female cases only (P <0.05) in right hands when compared with their respective control groups.

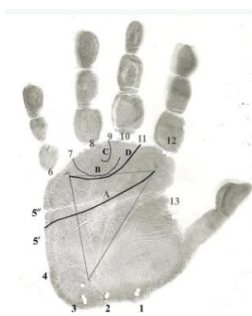
The Table 2 showed a significant decrease in the percentage of whorl patterns and an increase in arch patterns in both male and female cases (P <0.05) in left hands when compared with their respective control groups. Moreover, a significant increase in the loop and ulnar loop patterns while decrease in radial loop patterns were observed in female cases only (P <0.05) in right

hands when compared with their respective control groups.

**Table 2: Distribution of fingertip patterns in left hands of control and case groups.**

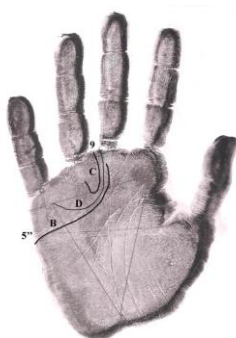
Patterns	Males		P value	Females		P value
	Controls (n=130)	Cases (n=160)		Controls (n=120)	Cases (n=90)	
	Frequency (percentage)	Frequency (percentage)		Frequency (percentage)	Frequency (percentage)	
Whorls	54 (42)	56 (35)	0.03	34 (29)	12 (13)	0.010
Loops	69 (53)	86 (54)	0.57	72 (60)	63 (70)	0.014
• Ulnar loops	67 (52)	84 (53)	0.67	66 (55)	62 (69)	0.012
• Radial loops	2 (2)	2 (2)	1.00	6 (5)	1 (1)	0.04
Arches	2 (2)	13 (8)	0.01	10 (8)	12 (14)	0.02
Composite	5 (4)	5 (3)	0.95	4 (3)	3 (3)	1.00

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 (Figure 1).



**Figure 1: Palmar print of left hand of female case showing main line termination 'A' at 5' and main line termination 'D' at 11.**

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 (Figure 2).



**Figure 2: Palmar print of left hand of female case showing main line termination 'B' at 5'' and main line termination 'C' at 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. 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 (Figure 1).

**DISCUSSION**

In the present study there was a significant decrease in the percentage of whorl patterns among female cases (16%) and among male cases (40%) in the right hands when compared with their respective control groups who had whorl patterns of 24% and 46% respectively in the pulps of their fingertips (P <0.05) ( Table 1).

Similar observations were found by Mattos-Fiore MAB and Saldanha PH.<sup>6</sup> A study conducted by Brown M and Paskind HA<sup>7</sup> stated decreased whorl patterns in both the hands of male and female epileptic patients. Separate studies conducted by Goshi RC et al.<sup>8</sup> concluded that whorl patterns were decreased in male epileptic patients but increased in female epileptics.

However, contradictory findings in the form of increased whorl patterns in both the hands of male and female epileptic patients were observed by Tay JS,<sup>9</sup> Lal N & Sureka RK,<sup>10</sup> Tarca A<sup>11</sup> and Nair RR.<sup>12</sup> Filho et al.<sup>13</sup> found no significant differences in their research.

In the present study, there was an increase in the percentage of loop patterns (72%) among female cases in the right hands when compared with their respective control groups who had loops (67%) in the pulps of their fingertips (Table 1).

There was an increase in the percentage of loop patterns (70%) among female cases in the left hands when compared with their respective control groups (60%) (Table 2).

Similar observations were found by many other authors. Filho et al.<sup>13</sup> and Brown M & Paskind HA<sup>7</sup> found decreased radial loops in epileptics in separate studies. Mondal PR<sup>14</sup> observed similar increase in the loop patterns in female cases but decrease in the same parameter in male cases of IGE.

In the present study there was a significant increase in the percentage of arch patterns among female (10%) and male (6%) cases in the right hands when compared with their respective control groups who had arch patterns of 6% and 1% respectively in the pulps of their fingertips ( $P < 0.05$ ) (Table 1). The same parameter when studied in the left hand, a significant increase in the percentage of arches among female (14%) and male (8%) cases were observed when compared with their respective control groups i.e. 8% and 2% respectively ( $P < 0.05$ ) (Table 2).

Similar observations were found by Ranganath P et al.,<sup>3</sup> Goshi RC et al.<sup>8</sup> and Brown M & Paskind HA<sup>7</sup> who observed an increased arch pattern in both the hands of epileptics.

In the present study there was a non-significant decrease in the composite patterns. Past literature based on (composite pattern findings in patients of epilepsy) was meager and hardly any data could be recovered.

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 (Figure 1). Filho et al.<sup>13</sup> 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 (Figure 2). Bansal IJS et al.<sup>15</sup> found similar observations. Filho et al.<sup>13</sup> 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 (Figure 2). In male cases this termination at sector 7 was 56% on right palms and 28% on left palms. Bansal IJS et al.<sup>15</sup> 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 (Figure 1). Bansal IJS et al.<sup>15</sup> 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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