Original Article

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Study of Fingertip Patterns in Idiopathic Epilepsy

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Abstract

Idiopathic epilepsy is a tendancy to have seizure when there is no structural abnormality in brain. The cause could be genetic and number of genes have been mapped. These genetic factors are reflected as changes in dermatoglyphis pattern in patients of idiopathic epilepsy. Sophisticated investigations may not possible in all cases. The objective of this study is to investigate the relation between the dermatoglyphic patterns as an indication of genetic susceptibility in the idiopathic epilepsy. Dermatoglyphics has been well established as a diagnostic aid in a number of diseases having hereditary basis. Genetics plays an important role in idiopathis epilepsy, so a study was done on 135 cases of both sexes to find out variations in dermatoglyphysics of these patients. It was found that patients of idiopathic epilepsy have increase in radial loops & decrease in whorls. These genetic factors are reflected as changes in dermatoglyphic pattern in patients of idiopathic epilepsy.

Keywords: Dermatoglyphics; Idiopathic epilepsy; Palm print; Loops; Arches; Whorls.

Introduction

The fine ridge patterns of the fingers, palms and soles have attracted man since primitive times. There is evidence that finger prints were used for identification for more than 2000 years ago. Palmistry, an ancient art of fortune telling by studying the hand and predicting the future, has its origin in India.[1] Dermatoglyphics is the scientific study of epidermal ridges and their configurations on volar aspect of fingers, palms, toes and soles. The term 'Dermatoglyphics' was first introduced in 1926 by the Anatomist, Harold Cummins.[2] The biologic, embryologic, anthropologic, forensic, clinical and genetic implications of friction ridges have been folded into one scientific discipline called 'Dermatoglyphics'.

The importance of dermatoglyphics is based upon facts, (Penrose and Ohara[3] 1973)

1) Each dermatoglyphic configuration is unique, not same even in monozygotic twins.
2) These remains unchanged throughout life and survive superficial injury.
3) Recording of ridge pattern can be done rapidly, it does not require expensive equipments and procedure is safe and atraumatic.
4) Can be studied immediately after birth.
5) Useful for screening large population.

Ridge differentiation[4] takes place early in fetal life which is genetically determined and influenced by environmental factors. Once they formed, do not change throughout life. Genetically related medical disorders may be, studied with the help of dermatoglyphics.

Some clinical disorders in which dermatoglyphic studies have been carried out on a large scale are as follows,

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Major chromosomal aberrations

a) Autosomal syndromes (Cummins[5])
   1) Mongolism (Trisomy 21)
   2) Cri-du-Chat syndrome
   3) Trisomy E
   4) Trisomy D
b) Sex chromosome syndromes
   1) Klinefelter's syndrome (47 XXY)
   2) Turner's syndrome (45 X0)[6]
   3) XXYY syndrome (Uchida et al[7])

Inherited non-chromosomal disorders

1) Mental retardation (Smith et al[8])
2) Sickle cell anemia (Dejong[9])
3) Leukemia (Verbov[9])
4) Cerebral gigantism (Schaumann and Alter[8]
5) Congenital heart disease (Sanchez[10])

Epilepsy is one of the common neurological disorder affecting people across all nationalities. It presents an etiologic heterogenity and multifactorial pathogenesis. Genetic factors play an important role in determination of the idiopathic epilepsy, both partial and generalized.[11] Idiopathic epilepsy is a tendency to have seizure when there is no structural abnormality in the brain. The cause could be genetic and number of genes have been mapped. These genetic factors are reflected as changes in dermatoglyphic pattern in patients of idiopathic epilepsy. Sophisticated investigations may not be possible in all cases. Dermatoglyphics may be used as a screening test to select few cases showing abnormalities, expecting abnormal karyotype. In the present study a preliminary observation was made of the usefulness of finger tip patterns in serving as predictor for idiopathic epilepsy among individuals living in solapur district of Maharashtra.

Aims and Objectives

1) To study fingertip patterns in idiopathic epilepsy.
2) To compare the fingertip patterns in normal and patients with idiopathic epilepsy.
3) To study correlation between fingertip pattern in normal and idiopathic epilepsy patients.
4) To evaluate the significance of the above correlation by applying statistical methods.
5) To compare the result of the present study with that of previous study.

Materials and Methods

Materials used are wooden table of suitable height, porcelain tile, kores duplicating ink, sponge rubber pad, a rubber roller, white bond paper, spirit, soap, water and towel, magnifying lens.

The method used to collect the data for the present study was Standard ink method.[12] Patient was asked to wash hands with soap and water to remove oil, sweat and dirt from the skin. The porcelain tile was kept on table. A small amount of ink was placed on the slab and spread with roller into a thin, even film. The area to be printed was pressed against the slab, taking care that, the whole area to be printed was covered with ink.

Photograph of hand print

Palm Prints: A firm surface was used under the sheet of paper on which inked finger is pressed. Pressure is applied on interphalangeal joints, head of metacarpals and dorsum of hand. With the help of fingers or blunt end of the pencil little pressure is applied on the web space between the fingers. Complete palm impression including hallow of space was obtained over the paper. To ensure complete print and also to print the hollow of the palm, a sponge rubber pad was kept under the paper on which prints are made.[13] Thus prints of the both hands were obtained and recorded with care.

Fingertip Prints[14]: The distal phalanges of person's right hand were inked over the tile by firm pressure starting from thumb (ulnar to radial side). White bond paper was kept on the edge of the table for recording the fingerprint pattern. Rolled finger prints were obtained starting from the thumb to little finger. The same procedure was followed for recording the finger prints of the left hand. Thus rolled finger prints of the both hands were obtained and recorded with care.

Collection of data

With the help of standard ink method, prints of 135 diagnosed idiopathic epilepsy patients were obtained from Dept. of Medicine and Dept. of Pediatrics of Civil hospital, Solapur. Patients age was between 5-35 years and diagnosis of epilepsy was confirmed clinically and by investigations. Following criteria taken into consideration.

1) History of recurrent seizures.
2) No history of head trauma.
3) No history of infectious diseases.
4) No history of metabolic disorders.
5) Absence of any other genetic disorders.

The controls were having age group of 5 to 35 years. Criteria taken into consideration for controls:

1) No family history of epilepsy.
2) No history of febrile convulsions.
3) Absence of any other hereditary disorder.

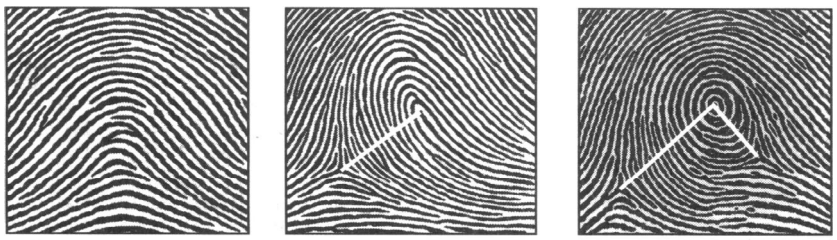
The following parameters were studied,

Finger tip patterns: The ridge patterns on the distal phalanges of the finger tip are divided into following types

1) *Arch:* It is formed by succession of more or less parallel ridges which traverse the pattern area and form a curve which is concave proximally. (As shown in Photograph No 1)
2) *Loop:* It is a series of ridges enter the pattern area on one side of the digit, recurves and leave the pattern area on the same side. If the ridge opens on the ulnar margin, the resulting loop is termed as ulnar loop. If the ridge opens towards the radial margin the resulting loop is termed as radial loop. (As shown in Photograph No 1)
3) *Whorl* - In this ridges are commonly arranged as a succession of concentric rings. (As shown in Photograph No 1)

The obtained data is tabulated separately for cases and controls and for males and females. The data is analyzed and compared statistically by applying 'z' test and then 'p'value is

Figure 1: Showing different finger tip patterns & TFRC



Arch (no triradius) Loop (one triradius) Whorl (two triradii)

calculated. If 'p' value is less than 0.05, then results are considered significant.

Z test formula

$$Z = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}}$$

$\bar{X}_1$ = Mean (Cases)
$\bar{X}_2$ = Mean (Control)
σ_1 = S.D.Cases
σ_2 = S.D. Control
n_1 = Number of cases
n_2 = Number of Controls

Results and discussion

Table 1: Showing finger tip patterns in cases and controls

Finger tip pattern	Male				Female			
	Cases	controls	Z value	P value	Cases	controls	Z value	P value
Ulnar loop	376 (55.29%)	360 (53.73%)	0.576	**>0.05, not significant**	420 (62.68%)	411 (60.64%)	2.12	**>0.05, not significant**
Radial loop	45 (6.62%)	27 (4.02%)	2.115	<0.05, significant	7 (1.04%)	11 (1.62%)	0.917	>0.05, not significant
Whorls	230 (33.83%)	264 (39.41%)	-2.127	**<0.05, significant**	220 (32.84%)	224 (32.94%)	-0.041	**>0.05, not significant**
Arches	29 (4.26%)	19 (2.84%)	1.417	>0.05, not significant	123 (3.44%)	34 (5%)	-1.431	>0.05, not significant

Finger tip pattern

As per table No 1 in male cases, frequency of ulnar loops is 55.29% in idiopathic epilepsy cases and 53.73% in controls, radial loops is 6.62% in idiopathic epilepsy cases and 4.02% in controls, whorls is 33.83% in idiopathic epilepsy cases and 39.41% in controls, arches is 4.26% in idiopathic epilepsy cases and 2.84% in controls. So in male cases percentage of ulnar loops, radial loops and arches are increased, while whorls are seen decreased. In this result increased incidence of radial loops and decreased incidence of whorls are statistically significant.

In females, frequency of ulnar loops is 62.68% in idiopathic epilepsy cases and 60.64% in controls , radial loops is 1.04% in idiopathic epilepsy cases and 1.62% in controls , whorls is 32.84% in idiopathic epilepsy cases and 32.94% in controls , arches is 3.44% in idiopathic epilepsy cases and 5% in controls. Also in female cases percentage of ulnar loops are increased while radial loops, whorls and arches are seen decreased. In this increased incidence of ulnar loops and decreased incidence of radial loops, whorls and arches are statistically not significant.

The results of this study are compared with previous study by Blanka Schaumann and Assa Mayersdorf. As per their study, they found percentage of ulnar loops and radial loops increased and percentage of whorls and arches decreased in male.

Conclusions

Hence we conclude that the following parameters can be used as dermatoglyphic markers in case of idiopathic epilepsy.

Comparison of finger tip patterns in present and previous studies

Pattern	Previous study by Blanka Schaumann and Assa Mayersdorf[13]				Present study			
	Male		Female		Male		Female	
	Cases (%)	Controls (%)	Cases (%)	Controls (%)	Cases (%)	Controls (%)	Cases (%)	Controls (%)
Ulnar loops	63	59.9	63	59.9	55.29	53.73 (Not Significant)	62.68	60.44 (Not Significant)
Radial loops	6.6	5	6.6	5	6.62	4.02 (Significant)	1.04	1.62 (Not Significant)
Whorls	25.6	28.4	25.6	28.4	33.83	39.41 (Significant)	32.84	32.94 (Not Significant)
Arches	4.8	6.7	4.8	6.7	4.26	2.84 (Not Significant)	3.44	5 (Not Significant)

1. Increase in radial loops in males.
2. Decrease in whorls in males.

Ulnar loops and arches cannot be taken as dermatoglyphic markers in case of idiopathic epilepsy as they are not significant in our study. The result of this study establishes the fact that there is a random relation between fingertip pattern and incidence of idiopathic epilepsy. We recommend for further quantitative study to confirm the findings of present study.

Presence of above dermatoglyphic features will help us to predict the chances of development of idiopathic epilepsy, so that the individual can take precautions measures and early treatment to prevent complications.

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