

Original article:

Study of quantitative dermatoglyphic markers in idiopathic epilepsy

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ABSTRACT:

Introduction: Idiopathic epilepsy is a tendency to have seizure when there is no structural abnormality in brain. The cause could be genetic and number of genes have been mapped. The objective of this study was to investigate the relation between the dermatoglyphic patterns as an indication of genetic susceptibility in the idiopathic epilepsy.

Methodology: Materials used were 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.

Observations & Results : Mean 'atd' angle is decreased in male and female cases in both hands which is statistically non significant. Mean 'tad' angle is increased in male cases in both hands, but the difference is statistically significant in right hand and statistically non significant in left hand. This angle is increased in female cases in both hands and the difference is statistically non significant.

Conclusion: It was found that patients of idiopathic epilepsy have increase in 'adt' angle in males and females and increase in 'tad' angle in males.

Keywords : Dermatoglyphics, Idiopathic epilepsy, Palm print, a-b ridge count, 'adt' angle'

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 India¹. The term 'Dermatoglyphics' was first introduced in 1926 by the Anatomist, Harold Cummins.² The importance of dermatoglyphics is based upon facts, (Penrose and Ohara³ 1973) like each dermatoglyphic configuration is unique, not same even in monozygotic twins , These remains

unchanged throughout life and survive superficial injury , Recording of ridge pattern can be done rapidly, it does not require expensive equipments and procedure is safe & atraumatic , Can be studied immediately after birth and Useful for screening large population. Ridge differentiation⁴ 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,(Schawman and Alter M)⁵

A] Major chromosomal aberrations

a) Autosomal syndromes (Cummins⁶)

- 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)⁷
- 3) XXYY syndrome (Uchida et al⁸)

B] Inherited non-chromosomal disorders

- 1) Mental retardation (Smith et al⁹)
- 2) Sickle cell anemia (Dejong¹⁰)
- 3) Leukemia (Verbov¹¹)
- 4) Cerebral gigantism (Schaumann and Alter)⁵
- 5) Congenital heart disease (Sanchez¹²)

Dermatoglyphic pattern configuration in normal individuals

The terminologies for dermatoglyphic pattern configuration put forth by Cummins and Midlo¹³(1961) and by Penrose⁴ are widely in use. Variability of patterns is sufficiently great so that no two individuals have identical ridge patterns. Although highly variable, the patterns may be classified into various groups and can be studied qualitatively and quantitatively.

I) Qualitative analysis of Dermatoglyphics

Pattern configuration - Specific group of epidermal ridges embracing any arrangement is called as configuration. Specific configuration which include sharply curved lines of either loop or whorl form is called as patterns.

Fingertip pattern configuration -

Galton¹⁴(1892) divided the ridge patterns on the distal phalanges of the finger tip into three groups.

- 1) Arches
- 2) Loops and
- 3) Whorls.

II) Quantitative analysis of dermatoglyphics

Many dermatoglyphic characteristics can be expressed quantitatively which are useful in normal as well as in medical disorders. The commonly used quantitative measures are as follows :

- 1) Finger-ridge count
- 2) 'a-b' ridge count
- 3) 'atd' angle, 'adt' angle, 'tad' angle

Epilepsy is one of the common neurological disorder affecting people across all nationalities. It presents an etiologic heterogeneity and multifactorial pathogenesis. Genetic factors play an important role in determination of the idiopathic epilepsy⁴. 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 quantitative markers of dermatoglyphics as predictor for idiopathic epilepsy among individuals living in solapur district of maharashtra. With this background in mind the present study was planned to study dermatoglyphic pattern in idiopathic epilepsy.

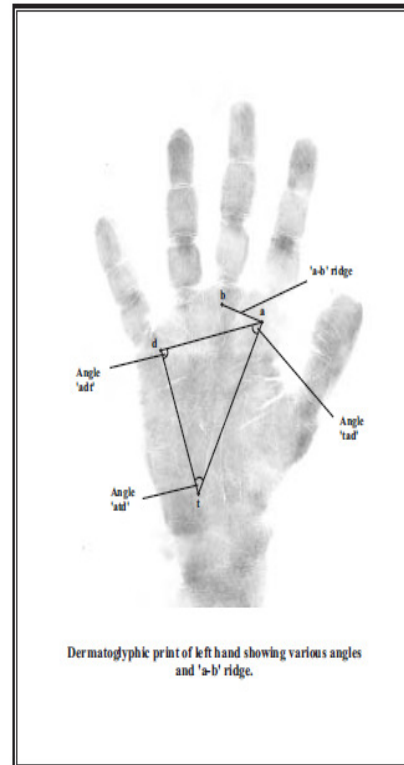
MATERIALS AND METHODS

Materials used were 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.⁵ 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.



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 hollow 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 made⁵. Thus prints of the both hands were obtained and recorded with care.



Dermatoglyphic print of left hand showing various angles and 'a-b' ridge.

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 tertiary care hospital. 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.

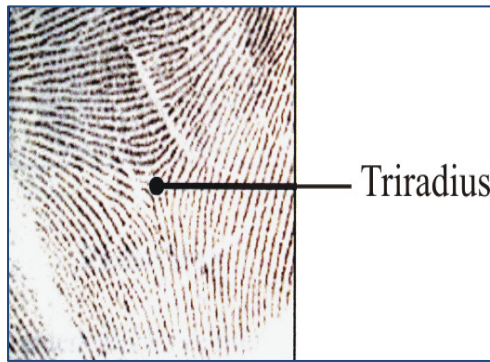
- 2) No history of febrile convulsions.

3) Absence of any other hereditary disorder.

The following parameters were studied,

i) Mean 'a-b' ridge count

Ridges on palms are often counted between two interdigital triradii. The ridge count most frequently obtained is in between triradii 'a' and 'b' which is denoted as 'a-b' ridge count. Then mean of all cases and controls were taken and compared statistically. Triradius is the meeting point of three ridges that forms an angle of 120° with one another.



ii) 'atd' angle - Primarily, 'atd' angle is interpreting the position of 't' triradius. 'atd' angle is formed by lines drawn from the digital triradius 'a' and 'd' to the axial triradius 't'.

iii) 'adt' angle- is formed by lines drawn from the digital triradius 'a' and axial triradius 't' to the digital triradius 'd'

iv) 'tad' angle is formed by lines drawn from the digital triradius 'd' and axial triradius 't' to the digital triradius 'a'

Means of all these angles of cases and controls were taken and compared statistically.

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

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

Z test formula

- \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 No.1 showing quantitative parameters of cases and controls

Parameter			Cases(Mean ± S.D.)	Controls (Mean± S.D.)	Z value	P value	Result
Mean a-b ridge count	Male	Right Hand	40.41±6.27	41.03±5.65	-0.601	P>0.05	Not Significant
		Left Hand	42 ± 5.63	41.5 ± 4.87	-0.543	P>0.05	Not Significant
	Female	Right Hand	40.37 ± 6.69	42.19 ± 4.61	-1.834	P>0.05	Not Significant
		Left Hand	40.37 ± 6.68	42.19 ± 4.51	-1.789	P>0.05	Not Significant
Mean atd angle	Male	Right Hand	42.91 ± 6.51	43.17 ± 6.19	-0.244	P>0.05	Not Significant
		Left Hand	42.52 ± 4.14	43 ± 5.99	-0.529	P>0.05	Not Significant
	Female	Right Hand	41.43 ± 3.74	43.1 ± 6.22	-1.892	P>0.05	Not Significant
		Left Hand	41.71 ± 4.35	42.45±4.46	-1.014	P>0.05	Not Significant

Conti....

Mean adt angle	Male	Right Hand	79.38 ± 4.32	81.52 ± 4.71	-2.749	0.003	Significant
		Left Hand	79.6 ± 4.53	81.53 ± 4.31	-2.54	0.006	Significant
	Female	Right Hand	78.83 ± 3.05	80.55 ± 4.21	-2.724	0.006	Significant
		Left Hand	81.04 ± 5.04	81.16 ± 4.48	-0.142	P>0.05	Not Significant
Mean tad angle	Male	Right Hand	57.72 ± 4.55	55.82 ± 5.22	2.251	0.02	Significant
		Left Hand	57.75 ± 3.95	56.52 ± 4.36	1.713	P>0.05	Not Significant
	Female	Right Hand	58.0 ± 4.09	56.82 ± 4.75	1.543	P>0.05	Not Significant
		Left Hand	56.8 ± 3.64	56.36 ± 4.08	0.658	P>0.05	Not Significant

As per table No 1 in present study, mean a-b ridge count is decreased in male cases in right hand and increased in left hand, but the difference is statistically non significant in both hands. Also mean a-b ridge count is decreased in female cases in both hands. This difference is also statistically non significant.

Mean 'atd' angle is decreased in male and female cases in both hands which is statistically non significant.

Mean 'adt' angle is decreased in male cases in both hands which is statistically significant. Mean 'adt' angle is also decreased in female cases in both hands

but this difference is statistically non significant in left hand and statistically significant in right hand.

Mean 'tad' angle is increased in male cases in both hands, but the difference is statistically significant in right hand and statistically non significant in left hand. This angle is increased in female cases in both hands and the difference is statistically non significant.

The results of this study are compared with previous study by Rangnathan et al. As per their study, they found same results which is shown in table no.2

Table No. 2 Comparison of quantitative parameters of dermatoglyphics in present and previous studies by Rangnath et al¹⁶

Parameter		Previous study by Rangnath et al¹⁶				Present Study			
		Right Hand		Left Hand		Right Hand		Left Hand	
		Cases	Controls	Cases	Controls	Cases	Controls	Cases	Controls
Mean a-b ridge count	Male	39.67 (NS)	37.79	40.96 (NS)	40.6	40.41 (NS)	41.03	42 (NS)	41.5
	Female	38.76 (NS)	37.86	39.6 (NS)	38.5	40.37 (NS)	42.19	40.37 (NS)	42.19
Mean atd angle	Male	43.14 (NS)	41	44.1 (NS)	42.94	42.91 (NS)	43.17	42.52 (NS)	43
	Female	45.02 (NS)	44.26	46.9 (NS)	44.98	41.43 (NS)	43.1	41.71 (NS)	42.45
Mean adt	Male	78.74 (S)	82.67	78.42 (S)	80.69	79.38 (S)	81.52	79.6 (S)	81.53

Conti.....

angle	Female	77.81 (S)	80.1	78.5 (NS)	80.74	78.83 (S)	80.55	81.04 (NS)	81.16
Mean tad angle	Male	58.12 (S)	56.1	57.4	56.38	57.72 (S)	55.82	57.75 (NS)	56.52
	Female	57.17 (NS)	55.64	55.05 (NS)	54.32	58 (NS)	56.82	56.8 (NS)	56.36

CONCLUSIONS

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

1. Increase in 'tad' angle in males.
2. Increase in 'adt' angles in males.
3. Increase in 'adt' angles in females.

The result of this study establishes the fact that there is a random relation between quantitative derma-

toglyphic markers 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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