Dermatoglyphic Study in Bipolar Disorder

Mahima Shrivastava[1], Rajendra Kumar Mathur[2], Vineet Dhaneria[3,*], Samata Goyal[4]

[1]Professor, [2]Professor & Head, [3]Senior Demonstrator, [4]1st Yr Resident, Jawahar Lal Nehru Medical College, Ajmer, Rajasthan

***Corresponding Author:**
Vineet Dhaneria
Senior Demonstrator, Jawahar Lal Nehru Medical College, Ajmer, Rajasthan
Email: drvineet51083@gmail.com

Abstract

Background: The word dermatoglyphics means writing on the skin. This includes ridge patterns on skin of palms, digits and soles. Finger patterns are definitely constitutional in nature. Both finger and palm prints give clue to various pathological conditions in human being.

Material and methods: The present dermatoglyphic study was conducted on fifty males and fifty females in the age group of 18-60 years, diagnosed as bipolar disorder cases, who attended the psychiatric outdoor or were admitted in the wards of psychiatric department, Jawahar Lal Nehru Hospital, Ajmer, Rajasthan.

Results: The Total Finger Ridge Count (TFRC) and a-b ridge counts were found to be decreased in the bipolar diseased group. The mean 'atd' angle on both the hands considered together is found to be greater in the bipolar cases compared to the normal i.e. 90.22º in males and 92.46º in females bipolar cases compared to the control with mean angle 80.46º and 82.46º respectively in males and females (in males p= 0.0001, in females p= 0.0002). The frequency of whorls were increased in patients compared to the controls (p<0.001).

Conclusion: Dermatoglyphics, a non-invasive method, could serve as a screening indicator for the follow up of individuals in threatened families. The study was aimed at establishing a correlation between occurance of bipolar affective disorder and the dermatoglyphics of hand which depends on genetic factors. On the basis of probability, one can correlate the dermatoglyphic pattern to bipolar disorder.

Keywords: Dermatoglyphics, Bipolar Disorder, TFRC, a-b ridge count, atd angle

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Introduction

Herschel (1916) proposed the word dermatoglyphics.[1] The word dermatoglyphics means writing on the skin. This includes ridge patterns on skin of palms, digits and soles.[2]

The dermatoglyphic patterns in some genetic disorders are characteristic and to some extent they also help in determining twin zygosity. Behavioural abnormalities reflected in dermatoglyphics. The ridges patterns on hands and feet start developing around the thirteenth week of gestation and are completed by about the sixteenth week.

Cummins in 1961 introduced the term "Dermatoglyphics" (derma-skin, glyphae-carving). Both finger and palm prints give clue to various pathological conditions in human being. Bipolar disorder consists of one excited [manic/hypomanic] episodes and one or more depressive episodes.[3]

Material and Methods

The subjects were 100 patients suffering from the bipolar disorder who attended the psychiatric outdoor or were admitted in the wards of psychiatric department, Jawahar Lal Nehru Hospital, Ajmer. All of them belonged to the Rajasthan state. Both male and female patients were included & came in the age group of 18-60 years of age. They were diagnosed as bipolar diseased patient according to the criteria of DSM IV.[4] The patients were not related to one another. The diagnostic groups were comparable with regard to age, sex, caste, religion, socio-economic status and ethnic origin. Almost identical number of subjects were included in the control group. They were mostly the staff & students of the medical college, all adults & belonging to the Rajasthan state.

Exclusion criteria: Patients suffering from schizophreniform disorders, any other psychiatric disorders and those with associated genetic abnormalities were excluded in this study.

Camel duplicating ink was used for taking the prints of fingers and palm. Prints were studied with the help of a magnifying lens. The three basic pattern types as distinguished by Galton (1892) are the whorl, loop and arch. Penrose LS (1965) described the method for ridge counting.[5]

Fingertip Pattern: Fingertip patterns were studied on individual digits. Numbering of digit was done from thumb to little finger.

Fingertip patterns were classified as arches, loop and whorls (Fig. 1).

a. **Arch:** In this pattern ridges enter from one side, traverse a pattern area, from a curve and leave from other side.
b. **Loop:** In a loop, ridges enter on one side of the digit, recurve abruptly and leave the pattern area on the same side. If the ridges enter and leave from ulnar side it is called ulnar loop. If ridges enter and leave from radial side it is called radial loop.
c. **Whorl:** It is complex pattern. It is defined as any ridge configuration with two or more triradii one as ulnar other as radial.

The 'atd' angle is formed by line drawn from triradius a to t and from t to d (Fig. 2).

Unpaired t-test of difference in proportion were done in order to find out any significant alternations in the dermatoglyphic characteristics in subjects with bipolar mood disorder from those of the normal individuals.

Results

In the present dermatoglyphic study, fifty male and fifty female bipolar cases were compared with the same number of normal adults devoid of any mental disease. Members from the same family were excluded. The study was aimed at establishing a correlation between occurance of bipolar affective disorder and the dermatoglyphics of hand which depends on genetic factors. The TFRC and a-b ridge counts were found to be decreased in the bipolar diseased group. The mean 'atd' angle on both the hands considered together is found to be greater in the bipolar cases compared to the normal i.e. 90.22º in males and 92.46º in females bipolar cases compared to the control with mean angle 80.46º and 82.46º respectively in males and females (in males p= 0.0001, in females p= 0.0002). The frequency of whorls were increased in patients compared to the controls (p<0.001).

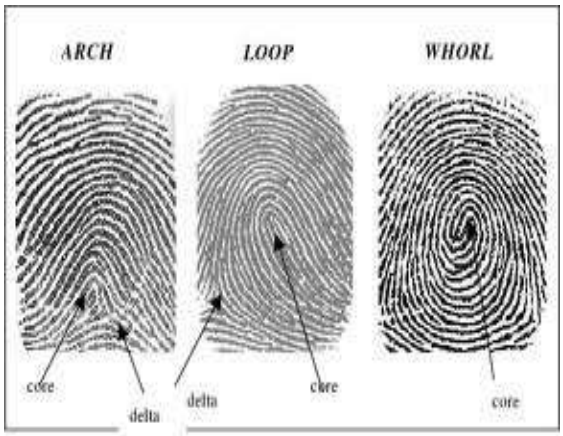

Fig. 1: Different Fingertip patterns

Fig. 2: Showing atd angle

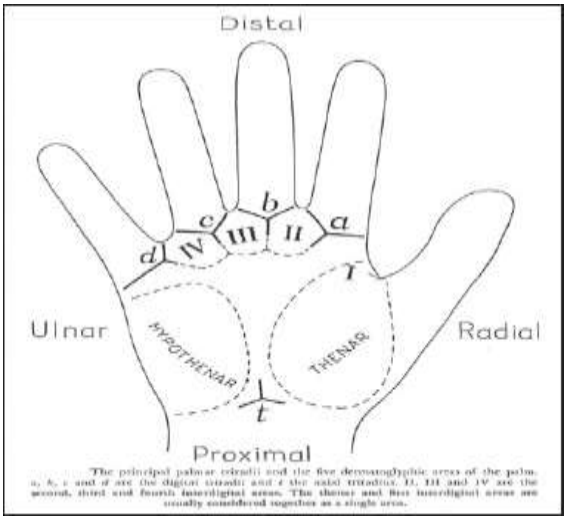

Fig. 3: Map of the dermatoglyphic areas of the palm

Table 1: Mean Distribution of a-b Ridge Count in Bipolar & Control (Males)

		Number of Palms	Mean	SD	p-value
	R	50	37.46	12.70	
Control					
	L	50	38.46	12.73	
					n.s.
	R	50	34.46	12	
Bipolar					
	L	50	36.46	12.73	

n.s. not significant

Table 2: Mean Distribution of a-b Ridge Count in Bipolar & Control (Females)

		Number of Palms	Mean	SD	p-value
	R	50	36.46	12.70	
Control					
	L	50	34.46	12.73	
					n.s.
	R	50	34.46	12.73	
Bipolar					
	L	50	36.46	12.70	

n.s. not significant

Table 3: Mean Distribution of 'Total Finger Ridge Count (TFRC)' in Bipolar & Control (Males)

		Number of Palms	Mean	SD	p-value
	R	50	147.46	11.70	
Control					
	L	50	142.31	11.64	
					0.0001
	R	50	130.20	12.73	
Bipolar					
	L	50	132.20	11.60	

Table 4: Mean Distribution of 'Total Finger Ridge Count (TFRC)' in Bipolar & Control (Females)

		Number of Palms	Mean	SD	p-value
	R	50	130.46	11.70	
Control					
	L	50	127.46	12.73	
					n.s.
	R	50	127.42	12.73	
Bipolar					
	L	50	126.50	14.43	

n.s. not significant

Table 5: Mean Distribution of 'atd' angle in Bipolar & Control (Males)

	Number of Palms	Mean	SD	p-value
Bipolar	50	90.22	11.62	0.0001
Control	50	80.46	12.73	

Table 6: Mean Distribution of 'atd' angle in Bipolar & Control (Females)

	Number of Palms	Mean	SD	p-value
Bipolar	50	92.46	12.73	0.0002
Control	50	82.46	12.78	

Table 7: Finger Pattern Frequencies in both hands in Bipolar & Control (Both sexes)

	Whorl		Ulnar loop		Radial loop		Arches	
	No.	%	No.	%	No.	%	No.	%
Bipolar	466*	46.88	441	44.37	41	4.12	46	4.63
Control	301	29.95	595	59.20	54	5.37	55	5.47
*p< 0.001								

Discussion

Fang (1949) established a hypothesis that there is a steady increase in the mean a-b bridge count with intelligence and significant low-ridge count in mental deficiency.[6]

Dutta P.K. (1978) studied the utility of 'atd' angle in dermatoglyphics for satisfactory universal ethnic comparison and genetic investigation.[7]

R.S. Balgir (1980) found that bipolar cases show a slightly decreased mean a-b ridge count only when compared with the control. He compared the 'atd' angle in manic depressive psychotics and schizophrenics.[8]

Balgir et al. (1980) analyzed qualitative and quantitative dermatoglyphic features in schizophrenia and manic-depressive psychosis.[9]

Gutiérrez B et al. (1998) conducted a study on two metric dermatoglyphic traits i.e. total a-b ridge count and total finger ridge count in a sample of 118 patients with chronic DSM-III-R bipolar illness and 216 healthy controls. No differences were found for these two traits.[10]

While Jelovac N (1999) found the palmar ridge counts to be markedly low in bipolar affective disorder as compared to controls.[11]

Some studies have concluded that the total finger ridge counts in patients with schizophrenia are decreased compared with normal controls, whereas other studies have demonstrated no significant differences between schizophrenic patients and controls.[12] Many research groups have reported that there is a significantly reduced a-b ridge count in patients with schizophrenia compared with controls; however, not all studies have confirmed this finding.[13]

In present study, the total finger ridge count (means of ten digit counts) and a-b ridge counts were found to be decreased in the bipolar cases when compared to normal. The frequency of whorls were increased in patients compared to the controls ($p<0.001$). The mean 'atd' angle on both the hands considered together was found to be greater in the bipolar cases compared to the normal i.e. 90.22º in male and 92.46º in female bipolar cases compared to the control with mean angle 80.46º and 82.46º respectively in males and females (in males $p= 0.0001$, in females $p= 0.0002$).

Previous studies have shown higher angles in both males and females.[14]

Conclusion

Dermatoglyphics, a non-invasive method, could serve as a screening indicator for the follow up of individuals in threatened families.

On the basis of probability, one can correlate the dermatoglyphic pattern to bipolar disorder.

Although no definite and confidently positive opinion can be given as to the diagnostic value of dermatoglyphics in bipolar disorder, it is a probable tool which should be explored and investigated further by large scale and long duration studies.

Abbreviations

L- Left
R- Right
SD- Standard Deviation
TFRC- Total Finger Ridge Count

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