

Dermatoglyphic Analysis in Indian Subjects with Manic Depressive Psychosis: A Prospective Study

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Abstract

Introduction: Dermatoglyphics is the study of the epidermal ridges of the skin covering the digits, palms of the hands, and soles of the feet. Dermatoglyphic patterns may be viewed as “fossils” of late first and second trimester fetal development. Any disturbances in hereditary or environmental factors at the time of ridge formation may alter the dermatoglyphic pattern. It is well known that bipolar mood disorder has some genetic predisposition. **Material & Methods:** The material for the study was clinically diagnosed cases of manic depressive psychosis (100) as per DSM-IV criteria in the age group of 15 - 70 years. Patients were those attending out patient and in patient department of psychiatry at B.M. Patil Medical College, Hospital and Research Centre, Bijapur. Finger and palm prints of 100 normal people for control of same age group were obtained from Medical students. **Results:** Increased incidence of whorls, decreased incidence of arches, ulnar loops and radial loops in MDP patients as compared with controls. Mean AFRC in MDP was lower & difference was statistically not significant. Mean TFRC in MDP was lower, difference was statistically significant ($p=0.04$). Mean ab-RC on right hand in MDP was lower & difference was statistically highly significant ($p=0.000$). The Mean ab-RC on left hand in MDP was lower & difference was statistically highly significant ($p=0.000$). Mean atd angle on right hand in MDP was higher, difference was statistically highly significant ($p=0.00$). Mean atd angle on left hand in MDP was higher & difference was statistically highly significant ($p=0.000$). **Conclusions:** In the present study the observed changes suggest significant difference in dermatoglyphic patterns in bipolar mood disorder and control. Our findings match with most of the previous studies in bipolar mood disorder. Dermatoglyphics, a non-invasive method, could serve as a screening indicator for the follow up of individuals in threatened families.

Keywords: Dermatoglyphics; Manic Depressive Psychosis; Finger and Palm Prints; The Quantitative Study Includes Total Finger Ridge Count (TFRC); Absolute Finger Ridge Count (AFRC); ‘ATD’ Angle.

Introduction

Cummins in 1926 for the first time coined the term dermatoglyphics to this field of science. It has been accepted and adopted internationally. Etymologically this term is harmonious blend of two words Derma, Skin; Glyphe, Carve. It gives the impression that something has been carved out of the skin [1].

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Dermatoglyphics is the study of the epidermal ridges of the skin covering the digits, palms of the hands, and soles of the feet. Epidermal ridges are formed between the 11th and 24th weeks of gestation; after this time, the epidermal ridges do not change and hence have been considered as markers of prenatal brain injury [2].

Dermatoglyphic patterns may be viewed as “fossils” of late first and second trimester fetal development. Any disturbances in hereditary or environmental factors at the time of ridge formation may alter the dermatoglyphic pattern. It is well known that bipolar mood disorder has some genetic predisposition [3]. There has been reports of associations between dermatoglyphic patterns and bipolar mood disorders [4,5].

Hence, this study was undertaken to explore the differences between bipolar and normal individuals on the basis of dermatoglyphic parameters.

Material and Methods

Finger Prints

The distal phalanges of person's right hand were inked over the tile by firm pressure on the dorsum, starting from little finger. The distal phalanges of left hand were similarly inked.

White crystal bond paper, applied firmly over a wooden pad, was used for recording the inked epidermal ridge patterns. Rolled finger prints were recorded after applying uniform pressure on white bond paper as following order [ulnar to radial side].

Palm Print

Palm prints of both hands were obtained after inking them with help of rubber roller. A white crystal bond paper was wrapped around a wooden pad placed on the table.

The prints obtained were immediately examined with hand-lens and care was taken to include all essential details.

Source of Data

The material for the study was clinically diagnosed cases of manic depressive psychosis (100) as per DSM-IV criteria in the age group of 15 - 70 years. Patients were those attending out patient and in patient department of psychiatry at. B. M. Patil Medical College, Hospital and Research Centre, Bijapur. Finger and palm prints of 100 normal people for control of same age group were obtained from Medical students of BLDEU'S Shri B.M. PATIL Medical college, Hospital and Research Centre, Bijapur.

All the data was analyzed qualitatively and quantitatively. Findings of each case were recorded in separate forms.

Study period: Study was carried out for a period of 1.5 years from Nov 2010 to April 2012.

Inclusion Criteria

Manic Depressive Psychosis as per criteria lay down by Diagnostic and Statistical Manual of Mental Disorders, published by American Psychiatric Association (DSM-IV criteria) [6].

Exclusion Criteria

Infected hand. Deep burns of fingers and palms leading to scars. Any deformities of fingers and palm.

Type of Study

The qualitative study includes finger print patterns (whorls, radial loops, ulnar loops and arches) and palmar pattern (ab ridge count, interdigital patterns).

The quantitative study includes total finger ridge count (TFRC), absolute finger ridge count (AFRC), and mean 'atd' angle.

Statistical analysis for quantitative analysis, the arithmetic mean and standard deviation were calculated. For qualitative analysis, the 'Chi' square test was applied wherever necessary [7].

To analyze finger pattern frequency, the fingertip pattern configurations were classified as arches (A), loops (L), whorls (W). The arches were further recorded as simple (A), or tented (A^t) arches depending upon the presence or absence of a triradius. For statistical purpose, both were grouped together as arches only. Loops (L) were recorded as ulnar or radial depending upon the side on which it opened. p' value is probability rate at 0.05 level of significance for the corresponding degree of freedom. p<0.05 is significant. p>0.05 is not-significant.

Results

The described table 1 shows- increased incidence of whorls (39.1% vs. 37.6%), ulnar loops (56.1% vs. 55.8%), arches (4.2% vs. 5%) and radial loops (0.5% vs. 1.6%) in MDP males as compared with control males. The difference was statistically non-significant (p= 0.31).

The table 2 shows- increased incidence of whorls (37.7% vs. 32.6%), decreased incidence of arches (4.9% vs. 7%), ulnar loops (56.3% vs. 58.8%) and radial loops (1.2% vs. 1.6%) in MDP females (Right & left hand combined) as compared with control females. The difference was statistically non-significant (p= 0.26).

The table 3 reveals - increased incidence of whorls (38.5% vs. 35.1%), decreased incidence of arches (4.5% vs. 6%), ulnar loops (56.2% vs. 57.3%) and radial loops (0.8% vs. 1.6%) in MDP patients as compared with controls. It can also be appreciated that the difference was statistically non significant (p= 0.09).

The described table 4 shows that the Mean AFRC in MDP was lower (142.9) with S.D. of 51.8 as compared to control group & difference was statistically not Significant. (p=0.174).

Table 1: Comparison of Fingerprint Patterns in Male MDP Patients & Controls

Male-Right + Left	W		LU		LR		A		Statistics
	No	%	No	%	No	%	No	%	
MDP	223	39.1	320	56.1	3	0.5	24	4.2	X ² = 3.516 D.F= 3 P= 0.319
Controls	188	37.6	279	55.8	8	1.6	25	5	

Table 2: Comparison of Fingerprint Patterns in Female MDP Patients & Controls

Female-Right + Left	W		LU		LR		A		Statistics
	No	%	No	%	No	%	No	%	
MDP	162	37.7	242	56.3	5	1.2	21	4.9	X ² = 3.994 D.F= 3 P= 0.262
Controls	163	32.6	294	58.8	8	1.6	35	7	

Table 3: Comparison of Fingerprint Patterns of MDP Patients & Controls

Patterns	MDP (Male+Female)	Controls (Male+Female)	χ ²	P
W	385 (38.5 %)	351 (35.1 %)	6.49,d(f)=3	P= 0.09
L U	562 (56.2 %)	573 (57.3%)		
L R	8 (0.8%)	16 (1.6%)		
A	45 (4.5 %)	60 (6 %)		

Table 4: Comparison of Quantitative Dermatoglyphic Features Of MDP & Controls

Features	Group (N=100)	Mean	Std. Deviation	t- value	Sig. (2-tailed)
AFRC	MDP	142.92	51.890	-1.365	.174
	Controls	154.75	69.381		
TFRC	MDP	108.15	23.614	-2.070	.040
	Controls	117.18	35.692		
R-abRC	MDP	26.27	4.178	-12.572	.000
	Controls	35.72	6.249		
L-abRC	MDP	26.38	3.481	-13.771	.000
	Controls	35.94	5.976		
R-atd	MDP	42.08	5.237	4.065	.000
	Controls	39.11	5.095		
L-atd	MDP	42.62	5.5	4.102	.000
	Controls	39.50	5.252		

Mean TFRC in MDP was lower (108.15) with S.D. of 23.6 as compared to control group, difference was statistically significant. (p=0.04). Mean ab-RC on right hand in MDP was lower (26.2) with S.D. of 4.1 as compared to control group & difference was statistically highly significant. (p=0.000). The Mean ab-RC on left hand in MDP was lower (26.38) with S.D. of 3.4 as compared to control group & difference was statistically highly significant. (p=0.000).

Mean atd angle on right hand in MDP was higher (42.08) with S.D. of 5.2 as compared to control

group, difference was statistically highly significant. (p=0.000). Mean atd angle on left hand in MDP was higher (42.62) with S.D. of 5.5 as compared to control group & difference was statistically highly significant. (p=0.000).

The described Table 5 shows frequency of interdigital patterns in MDP and controls, it can be noted that in MDP highest number of patterns were seen I4 and I3 areas (39% & 31%) and in controls also same that was I4 & I3 (37% & 33%). Statistically significant difference was found in I2 area (p=0.002) and I4 area (p=0.049).

Table 5: Comparison of Frequency of Patterns in Interdigital Areas, Hypothenar Areas in MDP Patients and Controls

Interdigital Pattern	MDP NO (%)	Controls NO (%)	X ²	Degree of Freedom	P value
TH /I1	0 (0)	1 (0.5)	1.005	1	.316
I2	9 (4.5)	0 (0)	9.424	1	.002
I3	63 (31.5)	74 (37)	2.804	1	.094
I4	78 (39)	66 (33)	3.571	1	.049
HYT	20 (10)	17 (8.7)	.298	1	.585

Discussion

Balgir et al. [8] studied dermatoglyphics in MDP and according to the study - in fingerprint patterns of MDP patients there were more loops (50.3%), whorls next in frequency (47.3) and least was arches (2.3%), when compared with control group (loops- 51.3%, whorls-45.4% and arches 3%). These findings are similar to findings in our study (Table 3). In the same study [8] Regarding interdigital area pattern, there was no significant difference in the occurrence of patterns in I3 and I4 interdigital areas in both the MDP male (I3=59% & I4=57%) and MDP female (I3=72% & I4=64.4%) patients as compared with controls (I3=47% & I4=52%). The data was statistically not significant. This study is similar to observations in present study except in present study the data is statistically significant I2 & I4 areas (Table 5).

Balgir RS et al. [9] studied dermatoglyphics in MDP, in his study the frequencies of fingerprint patterns was as follows- in male MDP patients – loops-50.3%, whorls-47.3%, and Arches-2.3%, in female MDP patients – loops- 56.8%, whorls-39.6%, and Arches-3.5%. This pattern is similar to our findings in the present study (Table 1 & 2). With respect to patterns in interdigital areas in MDP cases- Thenar/ I1=15%, I2=14%, I3=76.6%, I4=66.6%, and Hypothenar=38.3% as compared with male control group- Thenar/ I1=3%, I2=6%, I3= 36.6%, I4= 45.8%, and Hypothenar- 21.6%. Data was statistically significant at all interdigital areas. The results of this study are nearly similar to results of present study (Table-5). Mean TFRC of MDP was 141.6 (s,d=42.3), as compared with control group of 141.3 (s,d=40.78). This comparison was statistically non-significant. This finding was also similar to present study (Table-4), except that the result of present study was statistically significant. Mean atd angle of MDP was low, as compared with control. This comparison was statistically significant ($p < 0.001$). This observation is similar to present study (Table 4).

Yousefi-Nooraie R et al. [10] in his research found that- mean TFRC of MDP was (87.6) and control (74.9). The data was statistically not significant ($P=0.09$). Contrary to this study, in present study the mean TFRC in MDP group is lower than in controls (Table 4), but this difference was statistically significant. In the same study [62] the mean Right ab-ridge count in MDP (40.3) and control (40.1). The data was statistically not significant ($p=0.6$). Similar to this study in present study the mean Right ab-ridge count in MDP group was lower as compared control to and the difference was statistically highly significant (Table 4).

In the same above mentioned study [10] the mean of right atd angle in Bipolar sample, and Control sample was- 44 (s.d=8.3) and 42.9 (s.d=7.5) respectively. The data was statistically not significant ($p=0.3$). In present study the mean Right atd-angle in MDP group was higher than control (Table 4), and this difference statistically significant. Mean left atd angle in Bipolar sample, and Control sample was- 43.8 (s.d=7.6) and 42.7 (s.d=8.2) respectively. The data was statistically not significant ($p=0.1$). similar to this in present study the mean left atd-angle in MDP group was higher than control (Table 4), difference being statistically significant.

Chakraborty D et al. [5] studied Dermatoglyphic in Malay Subjects with Bipolar Mood Disorder, according to his study when Finger Print Frequencies in Both Hands of male MDP patients are compared with controls - in male MDP whorls were 41.22%, ulnar loops were 50.40%, radial loops were 7.5% and arches were 0.8% as compared with control group -whorls 43.33%, ulnar loops were 53.66, radial loops were 2.5% and arches were 0.5%. The difference was statistically not significant. Findings in the above described study are consistent with observations in the present study (Table 1) except for arches which were found to be increased in present study.

Chakraborty D et al. [5] also studied Finger Print Frequencies in Both Hands of Malays Both Sexes combined, according to his study- in MDP group the percentage of whorls was- 42%, ulnar loops were -49.6%, radial loops were 7.46% and arches- 0.93% as compared with controls (whorls 41.17%, ulnar loops- 55.88%, radial loops 2.45% and arches-0.49%). Results of the above described study are consistent with observations in the present study (Table 3) except for arches which were found to be increased in present study. In his study atd angle was found to be increased in MDP patients as compared with controls (81.15 vs 79.27). The difference was statistically not significant. This finding is also consistent with present study (Table 4).

Jelovac N et al. [11] studied dermatoglyphics in MDP and control groups and according to his study- mean TFRC in MDP was lower than control groups (116.86 & 141.03). The difference was statistically significant. This finding is similar to finding in present study (Table 4). Mean Right ab-RC in MDP and control groups was - 35.3 and 41.8 respectively. The difference was statistically significant ($p=0.001$). Mean left ab-RC in MDP, and control groups was - 37.04 and 43.5 respectively. The difference was statistically significant ($p=0.001$). These two observations go hand in hand with

observations in present study (Table 4). Mean atd angle in right hand of MDP and control groups was - 42.06 and 47.42 respectively. The difference was statistically significant ($p=0.001$). Mean atd angle in left hand of MDP and control groups was - 41.61 and 47.86 respectively. The difference was statistically significant ($p=0.001$). This finding was also similar to finding in present study (Table 4).

Conclusions

In the present study the observed changes suggest significant difference in dermatoglyphic patterns in bipolar mood disorder and control. Our findings match with most of the previous studies in bipolar mood disorder. Dermatoglyphics, a non-invasive method, could serve as a screening indicator for the follow up of individuals in threatened families.

Prominent Conclusions from Present Study Include

In fingerprint pattern of MDP as compared with control - there were more loops, whorls next in frequency and least was arches. Frequency of occurrence of pattern in interdigital areas, there were more patterns seen in I3 & I4 areas, but data was statistically significant only at I2 and I4 areas. Mean atd angle in MDP was high, this was statistically significant. Mean TFRC in MDP group was low, difference statistically significant. Mean Right & Left ab-ridge count in MDP group was lower; this difference was statistically highly significant. Mean Right & left atd-angle in MDP group was higher, and difference was statistically significant. Mean right and left ab-RC in MDP was high and difference was statistically significant.

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