

# ANALYSIS OF THE QUALITATIVE AND QUANTITATIVE DERMATOGLYPHIC TRAITS IN SCHIZOPHRENIA PATIENTS

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## ABSTRACT

In a psychiatric diagnosis, Schizophrenia [schizein ("to split") and phren- ("mind")] is a mental illness. The neurodevelopment theory of the etiology of schizophrenia, suggest either genetically or epigenetically controlled faulty embryonic development of structures of ectoderm origin like brain and skin. This may disturb neurodevelopment that in turn may cause these subjects to be at increased risk for the development of schizophrenia and related disorders. Dermatoglyphics is used as a diagnostic aid in a number of diseases that have a strong hereditary basis. In the present work, we studied the frequencies of various types of skin ridges found on the digits, palms in schizophrenic patients. The present study aimed to evaluate the association of dermatoglyphic patterns with different blood groups and also to evaluate the role of dermatoglyphics in early detection of prone individuals and genetic predisposition of disease. Studies were conducted in 100 patients of schizophrenia and various dermatoglyphics parameters such as finger print pattern and exits of main lines were calculated. These parameters of study group were compared to controls. Qualitative analysis has shown statistically significant difference among two groups. It was observed that in blood group A the Arche pattern in both hands were pre-dominant when compared those of controls and the difference was highly significant ( $P < 0.05$ ) while loop ulnar pattern was highly significant ( $P < 0.001$ ). Loop ulnar pattern was highly significant ( $P < 0.001$ ) in left hand of blood group AB. The main line index in the study group when compared to controls observed the difference.

**KEYWORDS:** - Dermatoglyphic palmar patterns, main line index, Blood group, schizophrenic patients.

## INTRODUCTION:

Dermatoglyphics<sup>1</sup> are configuration of epidermal ridges in the volar aspect of palms and soles. Purkinje classified finger ridge patterns into 9 separate groups in 1823, during this century the dermatoglyphics used in criminology, anthropology, comparative zoology and human genetics by Galton.

Dermatoglyphics, the study of fingerprints are constant and individualistic. Specific dermatoglyphic patterns are embryologically dependent on the development of volar pads which emerge between week 6 and week 8, just after the hand loses its webbed appearance. These volar pads appear on each finger tip, on the distal palm between each pair of fingers and on the hypothenar area of the palm. Between week 10 and week 12, the volar pads start to regress and dermatoglyphic patterns are formed. Epidermal ridges are fully formed by the 24th week. Dermatoglyphic characteristics are substantially

genetically determined but are also significantly affected by early second trimester insult. Dermatoglyphy is considered as a classical model of polygenic inheritance, means the several genes are involved in the inheritance of the dermal traits.

Dermatoglyphic traits are formed under genetic control early in development but may be affected by environmental factors during first trimester of pregnancy. They however do not change significantly thereafter, thus maintaining stability not greatly affected by age. These patterns may represent the genetic make up of an individual and therefore his/her predisposition to certain diseases.

Schizophrenia is a psychiatric diagnosis that describes a mental illness characterized by impairments in the perception or expression of reality, most commonly manifesting as auditory hallucination, paranoid or bizarre delusions or disorganized speech and thinking in the context of significant social or occupational dysfunction.

Dermatoglyphic alterations may be the result of early prenatal disturbances thought to be implicated in the aetiology of psychiatric illness. Both the skin and the brain develop from the same ectoderm and it is thought, therefore, that dermatoglyphics are informative

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for early disturbances in brain development in schizophrenia. Dermatoglyphic abnormalities are also associated with developmental disorders<sup>3</sup>. Dysmorphic signs originate during fetal development, primarily during the second trimester<sup>3,4</sup>.

**MATERIAL AND METHOD**

In the present study One hundred probands with definite clinical evidence of schizophrenia were collected from the department of psychiatric, P.B.M. Hospital & Groups, Bikaner. Diagnoses of the patients were based on their detailed history, clinical examination. They were matched with One hundred healthy subjects, those who are residing in the same locality and having no family history of schizophrenia or any other inheritable disease. Rolled impressions of the fingers and plain impressions of the palm and sole were obtained on smooth white papers by the standard ink and roller method of modified Cotterman's technique. The various palmar, plantar and digital patterns of arches, loops and whorls were counted and classified with the aid of a hand lens using Loesch and Skrinjaric's method<sup>2</sup>. The palm and

finger prints were studied for the parameters of both qualitative and quantitative analysis. The findings were analyzed, tabulated and their statistical significance was noted.

**OBSERVATIONS:**

In (Table -1) as comparison of right hand between blood groups of control and Schizophrenic patients, show significant importance. In blood group A, arches were found to occur in 0.6% controls while their presence in patients was 4%. The parameter showed significant value (p=<0.05). In blood group AB, whorl and loop ulnar patterns parameter showed significant value (p=<0.001). Whorls were found to occur in 62% controls while their presence in patients was 17% and in loop ulnar were found to occur in 32% controls while their presence in patients was 48%. No significant values were observed in different dermatoglyphic patterns of right hand of blood group B & O.

In (Table -2) as comparison of left hand between blood groups of control and Schizophrenic patients, show significant importance. In blood

Finger Pattern	Blood Groups											
	A			B			AB			O		
	M	S	p	M	S	p	M	S	p	M	S	p
Whorl %	52	16	0.1	181	8	0.1	31	6	<0.001	85	29	0.1
	33	24		35	53		62	17	***	40	48	
Loop ulnar %	95	42	0.5	264	6	0.3	16	29	<0.001	106	-	-
	61	64		51	40		32	48	***	49	-	-
Loop radial %	4	-	-	9	-	-	1	-	-	1	-	-
	2	-		1	-		2	-		0.4	-	
Arches %	1	3	<0.05	9	-	-	-	-	-	4	-	-
	0.6	4	*	1	-		-	-		1	-	
Tented arch %	3	4	0.1	47	1	0.7	2	-	-	19	-	-
	1	6		9	6		4	-		8	-	

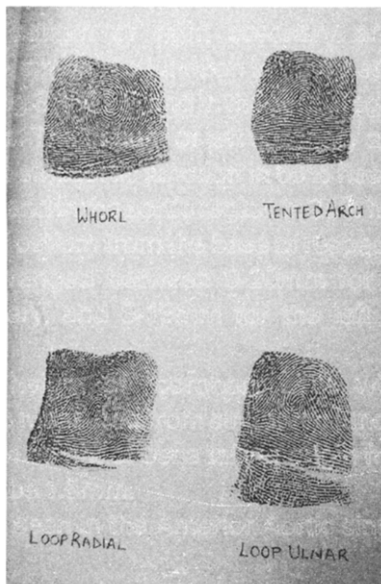
**Table No 1:** Comparison of finger print patterns of right hand in non-disease male and schizophrenia with respect to their blood groups A, B, AB, O (M-Male, S-Schizophrenia, \* = significant value)

Finger Pattern	Blood Groups											
	A			B			AB			O		
	M	S	p	M	S	p	M	S	p	M	S	p
Whorl %	41	8	<0.05	142	8	<0.05	31	4	<0.001	74	5	0.8
	26	12	*	27	53	*	62	12	***	34	38	
Loop ulnar %	101	47	<0.001	298	5	<0.05	17	31	<0.001	119	5	0.2
	65	72	***	58	33	*	34	88	***	55	38	
Loop radial %	6	-	-	13	-	-	-	-	-	3	-	-
	3	-		2	-		-	-		1	-	
Arches %	2	6	<0.001	10	1	0.1	-	-	-	5	-	-
	1	9	***	1	6		-	-		2	-	
Tented arch %	5	4	0.31	46	1	0.7	2	2	0.7	14	-	-
	3	6		9	6		4	5		6	-	

**Table No. 2** -Comparison of finger print patterns of left hand in non-disease male and schizophrenia with respect to their blood groups A, B, AB, O (M-Male, S-Schizophrenia, \* = significant value)

Palmar & Plantar Main lines	Exit Areas Of Main Lines In Blood Groups of Control & Schizophrenic							
	A		B		AB		O	
	C	Sc	C	Sc	C	Sc	C	Sc
a	5	5	5	5	4	4	5	5
b	5'	5'	5'	5'	5'	5'	5'	5'
c	7	9	7	7	7	9	9	9
d	11	9	11	9	11	9	9	9
PTC	4	4	4	4	4	4	4	4
DCT	11	11	11	11	11	11	11	11
VC	2	2	2	2	2	2	2	2
A	15	15	15	15	15	15	15	15
B	15	7	7	7	15	15	15	15
C	9	15'	9	15'	15'	15'	15'	15'
D	15'	15'	15'	15'	15'	15'	15'	15'

**Table No. 3** -Comparison of termination of main lines of palm and sole in non-disease male and schizophrenia with respect to their blood groups A, B, AB, O (C-Control , Sc-Schizophrenia)



group A of left hand whorl, loop ulnar and arches patterns found statistically significant. Whorl was found to occur in 26% controls while their presence in patients was 12% in blood group A. The parameter showed significant value ( $p < 0.05$ ). Loop ulnar pattern were found to occur in 65% controls while their presence in patients was 72% in blood group A. The parameter showed significant value ( $p < 0.001$ ). arches were found 9% in control and 1% in disease group that was statistically significant ( $p < 0.001$ ) in left hand of blood group A. In blood group B, whorl and loop ulnar patterns parameter showed significant value ( $p < 0.05$ ). Whorl were observed in 27% controls and in patients it was 53% and in loop ulnar were found to occur in 58% controls while their presence in patients was 33%. Dermatoglyphic patterns of left hand of blood group AB showed significant value ( $p < 0.001$ ). In whorl pattern were observed 62% in control and 12% in patients. In loop ulnar pattern found in left hand of

control was 34% while 88% in patients. No significant values were observed in different dermatoglyphic patterns of left hand of blood group O.

The main line terminations in schizophrenic cases significantly differed from the controls in different blood groups (Table -3). The differences are apparently the result of low frequency of c-line terminating at 7th and high frequency at 9th positions in blood groups A and AB and high frequency of d-lines terminating at 9th and low frequency at 11th position in blood groups A, B and AB on palms of the patients when compared to controls of blood groups. The low frequency of C-line terminating at 9th and

**DISCUSSION:**

Whorl is significantly greater in both hands of controls than patients with A blood group ( $p = < 0.05$ ;  $p = < 0.01$ ). Loop ulnar patterns are significantly greater in both hands of patients than controls in A blood group ( $p = < 0.01$ ). Loop ulnar is significantly greater in right hand of controls than patients with AB blood group ( $p = < 0.001$ ). Loop ulnar pattern is significantly greater in left hand of patients than controls with AB blood group ( $p = < 0.001$ ). Whorl is significantly greater in left hand of controls than patients with AB blood group ( $p = < 0.001$ ).

Varma SL, Singh S<sup>5</sup> were worked on dermatoglyphic traits and schizophrenics. The frequency of arches in the patient and control groups was similar. The frequency of loops in the control group was higher than in the patient group, and the trend was consistent in all the digits. The whorls in the patient group showed an increase over the control group.

Palmar main lines 'a', 'b', 'c', 'd', PTC, DTC, VC from area 5, 5', 9, 9, 4, 11 & 2 and Plantar main lines 'A', 'B', 'C', 'D' from area 15, 7, 15' & 15' in diseased group.

After the discovery of ABO blood groups by Landsteiner, the geneticists were looking for the significance of the occurrence of different blood groups by studying the association of certain blood groups in diseases. Oxford Press paper focuses on studies on the association of blood groups with schizophrenia disease in man<sup>6</sup>. Most of the diseases in man is influenced by genetic characteristics of man. 1973, Elston and Kringlen<sup>7</sup> analyzed possible genetic linkages between schizophrenia and specific blood groups.

The dermatoglyphic anomalies found in schizophrenia, along with the high densities of secondary palmar creases also reported in the illness<sup>8</sup> (Cannon et al, 1994), support the existence and aetiological significance of an unidentified prenatal insult. This probably occurs in the second trimester of pregnancy, which significantly affects the ectodermal development of persons who go on to develop schizophrenia<sup>9</sup> (Bracha et al, 1991; Bracha et al, 1992). Kaur N, Sharma P K, Tiwari SC, Tiwari N<sup>10</sup> (2003) were worked on the effect of a positive family history of schizophrenia on fingerprint patterns. A significant increase in whorls and a decrease in loops was observed in the male schizophrenics. Arches were significantly increased in the schizophrenic population with a positive family history of the disease.

It is observed in present study that prevalence of schizophrenia disease shows following order of association with blood groups- A > AB > B.

D. Irvine and H. Miyashita (1965)<sup>11</sup> concluded that incidence of blood group was higher in schizophrenics than in non schizophrenics. The incidence of blood group A & AB combined was higher in schizophrenics than in non schizophrenics.

On the basis, it has been opened that any epidermal ridge alterations in individuals have a distinctive dermatoglyphic feature, which remain unchanged throughout life. So the association of blood group and different diseases with dermatoglyphics has been used as a scientific tool for early prediction and thus prevention of the development of different diseases.

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