International Journal Dental and Medical Sciences Research
Volume 3, Issue 4, July-Aug 2021 pp 206-211 www.ijdmsrjournal.com ISSN: 2582-6018

Quantitative Analysis of Total Finger Ridge Count in Schizophrenia Patients and Controls in a Tertiary Care Hospital in West Bengal.

Dr. Sagarika Ray[1],MD (Psychiatry).
Dr. Amit Kumar Pal[2], MD (Anatomy).
[1]*Senior Resident, Institute of Psychiatry-Centre of Excellence, IPGME&R, Kolkata.*
[2]*Senior Resident , Department of Anatomy, Midnapore Medical College and Hospital, West Bengal.*
Corresponding Author: Dr. Sagarika Ray,

Submitted: 10-07-2021 Revised: 20-07-2021 Accepted: 23-07-2021

ABSTRACT:
BACKGROUND: Schizophrenia is a psychiatric illness with numerous etiological factors. The relationship between dermatoglyphic characteristics and schizophrenia has been noticed and documented. The aim of this study was to compare Total Finger Ridge Count in schizophrenia patients with healthy controls, and also between male and female patients in a tertiary care hospital in West Bengal, India.
CONTEXT AND PURPOSE OF STUDY: The study was undertaken to determine whether Total Finger Ridge Count could serve as a reliable marker for early diagnosis of schizophrenia. This in turn, will facilitate intervention at an early stage and help schizophrenic patients on their road to recovery.
METHODS: Total Finger Ridge Count (TFRC) of 50 schizophrenia patients, comprising 25 males and 25 females, were compared to 50 age and gender matched healthy controls (including 25 males and 25 females).
RESULTS: Statistically significant differences was found when TFRC values were compared between cases and controls and between male and female cases.
CONCLUSIONS: TFRC value can be utilized as a predictive tool for Schizophrenia.
KEYWORDS: Schizophrenia, dermatoglyphics, epidermal ridge, Total Finger Ridge Count (TFRC).

I. INTRODUCTION:

Dermatoglyphics is the scientific study of the epidermal ridge arrangement of the palm, finger, and sole.[1] The term Dermatoglyphics is derived from the Greek words 'Derma,' which means "skin," and 'Glyphics," which means "carvings."[2] Cummins and Midlo are credited with the coining of the phrase "Dermatoglyphics".[3] During the 11th week of pregnancy, epidermal ridges begin to form and differentiate during the third and fourth months.[4] Significant brain growth also occurs during this time.[5] Schizophrenia is characterized by basic and distinctive abnormalities in the areas of thinking, perception and affect, and its etiology is complex.[6] Prenatal stress to the developing fetus, whether genetic, environmental, or both, is a significant risk factor for the genesis of schizophrenia, according to the neuro-developmental theory.[7] Because the brain and skin are both ectodermal progeny, injury to the developing brain has been related to changes in a variety of dermatoglyphic characteristics.[8],[9] During the late first and second trimesters of intrauterine life, the epidermal ridges of the finger, palm, and sole emerge and differentiate. They stay consistent throughout life once generated. Dermatoglyphic malformations can be caused by a number of physiological assaults that occur during fetal development, such as exposure to environmental pollutants, viral infections, or genetic abnormalities.[10] The second trimester is also an important time for fetal brain development. As a result, the crucial phase of development of the fetal brain overlaps with that of the epidermis.[11] Thus, any insult or disturbance, both genetic and environmental, will possibly affect both the brain and the epidermis throughout this interval. Dermatoglyphic characteristics are genetically influenced, according to research.[12]Dermatoglyphics deformity may occur before the end of the fifth month of intrauterine life due to genetic or other causes acting alone or in combination.[13] Evidence from adoption, familial, and twin research revealed schizophrenia's hereditary foundation. As a result, dermatoglyphic changes can be used as a possible investigative tool. Because both the brain and the skin experience considerable growth and development throughout the intrauterine life of an individual, this study was performed to see whether dermatoglyphics might give a valuable insight regarding future risk of developing schizophrenia.

The dermatoglyphic parameter TFRC was evaluated in this study. It was evaluated if there is a

International Journal Dental and Medical Sciences Research
Volume 3, Issue 4, July-Aug 2021 pp 206-211 www.ijdmsrjournal.com ISSN: 2582-6018

substantial difference in TFRC between schizophrenia patients and healthy controls and also between male and female patients.

II. MATERIALS AND METHODS:

A cross-sectional research was carried out, with non-probability, purposive sampling.

Cases: The study collected finger and palm prints from clients visiting the outpatient department at Midnapore Medical College and Hospital in West Bengal, India.

The study included 50 people who were diagnosed with schizophrenia using DSM 5 criteria, with 25 males and 25 females taking part. Patients with other mental illnesses, such as schizophreniform disorder, bipolar affective disorder, obsessive compulsive disorder, cognitive problems, or substance use disorders, as well as those with related genetic abnormalities, or suffering from other comorbid illnesses were excluded from the research.

After screening with the General Health Questionnaire 12 item version, age and gender matched healthy controls were recruited from the community. A total of 50 controls were chosen, including 25 males and 25 females. It was ascertained that these individuals did not have any psychological problems or a family history of the same.

The purpose and procedure of the study was clearly described to the research participants in details in their native language, and only those who voluntarily consented were included in the study. After receiving ethical approval, the study was carried out over a period of six months. The research was self-funded.

Study participants were asked to clean their hands with soap and water to remove dirt. Palmar prints were taken by standard ink method. A glass slab was placed on the table. A small amount of Kores duplicating ink was spread over it with a roller to produce a thin, uniform film of ink which was applied to palmar aspect of both hands starting from wrist creases to fingertips. The hand was extended at wrist joint and was kept on paper. Pressure was applied on the head of metacarpals, dorsum of hand and web space between fingers. Complete palm impression including the hollow of the palm was obtained on paper and then individual fingertip print was taken by rolling it on the paper.

Ridge arrangement on fingers: In the simplest classification (Galton 1892) finger print patterns are divided into three main classes which are arches, loops and whorls. A simple arch has no triradius (junction of three regions each containing systems of ridges which are approximately parallel in small fields of this region). A loop has one triradus. In a whorl, typically there are two triradii. Loops are of two kinds- one is ulnar loop and other is radial loop according to the direction they face. Ulnar loop opens towards the ulnar margin of the hand and has triradius on the radial side and vice versa in case of radial loop.

TOTAL FINGER RIDGE COUNT – In a simple arch as there is no triradius, therefore ridge count score is 0. A loop with one triradius has one line of count. In case of whorls there are typically two lines of counts. In a symmetrical whorl one line is taken from each triradius to the centre. In the double loop type of whorl, one line is taken from each triradius to the corresponding core. In our study only the higher count (corresponding to the longer line) has been used in case of whorl. The sum of the single counts on all the ten fingers of an individual is the total finger ridge count (TFRC).

Figure 1. Roller used for spreading ink.

International Journal Dental and Medical Sciences Research
Volume 3, Issue 4, July-Aug 2021 pp 206-211 www.ijdmsrjournal.com ISSN: 2582-6018

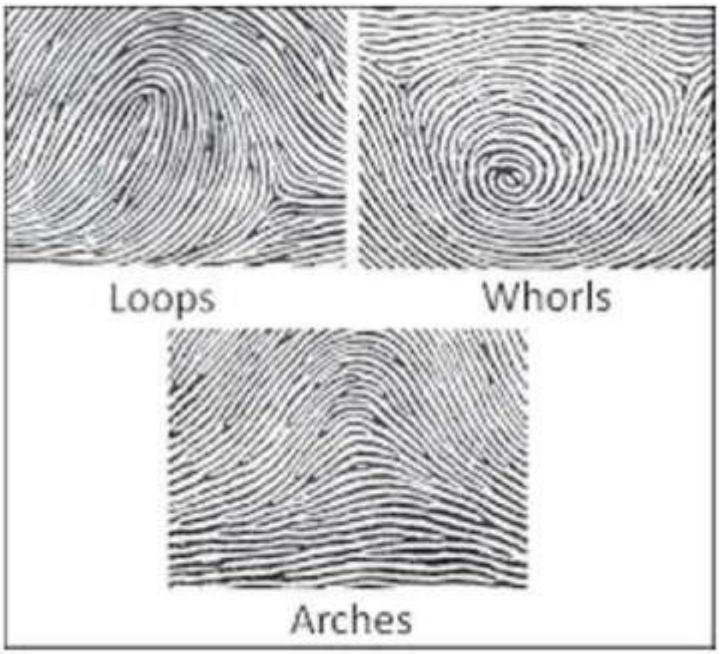

Figure 2. Finger print types.

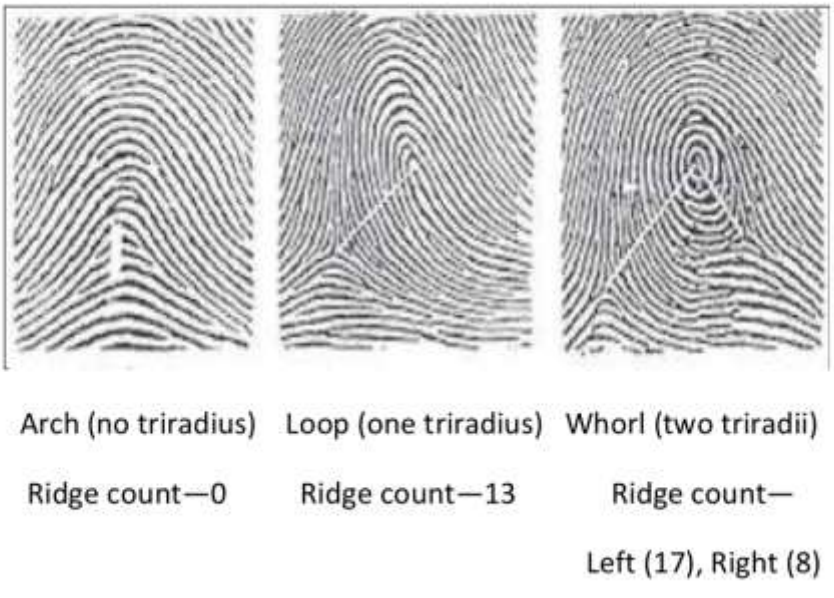

Figure 3. Finger prints showing digital triradii

III. RESULTS AND DISCUSSIONS:

The obtained data was entered into a Microsoft Excel spreadsheet, which was then utilized to create the data chart and graphical representation. The results were analyzed using appropriate statistical techniques. To compare the means of the case and control groups,and that of male versus female cases and controls, two-tailed unpaired t-test was employed.

International Journal Dental and Medical Sciences Research
Volume 3, Issue 4, July-Aug 2021 pp 206-211 www.ijdmsrjournal.com ISSN: 2582-6018

Statistical significance was interpreted by a p value of less than 0.05, with 95 percent confidence intervals.

TFRC was shown to be substantially lower in schizophrenia patients compared to controls in our present investigation. This has been summarized in Table 1, which shows the mean TFRC in cases as 103.18 (±17.94) as compared to 137.36 (±8.45) in controls. Figures in brackets indicate Standard Deviation. This has been graphically represented in Figure 4.

On comparing between genders, TFRC was found to be significantly reduced in male schizophrenic patients as compared to their female counterparts. Table 2 shows the mean TFRC in male cases to be 88.36 (±8.2), while that in female cases was recorded as 118 (±11.51). In order to rule out the possibility that this is a general pattern observed between genders, comparison of TFRC was made between the genders even in the healthy control group. However, it showed that there was no statistically significant difference in TFRC between males and females in the control group. This has been demonstrated in Table 3, which shows the mean TFRC in males to be 137.68 (±8.77), whereas it was 137.04 (±8.29) in case of females. This data has been graphically portrayed in Figure 5.

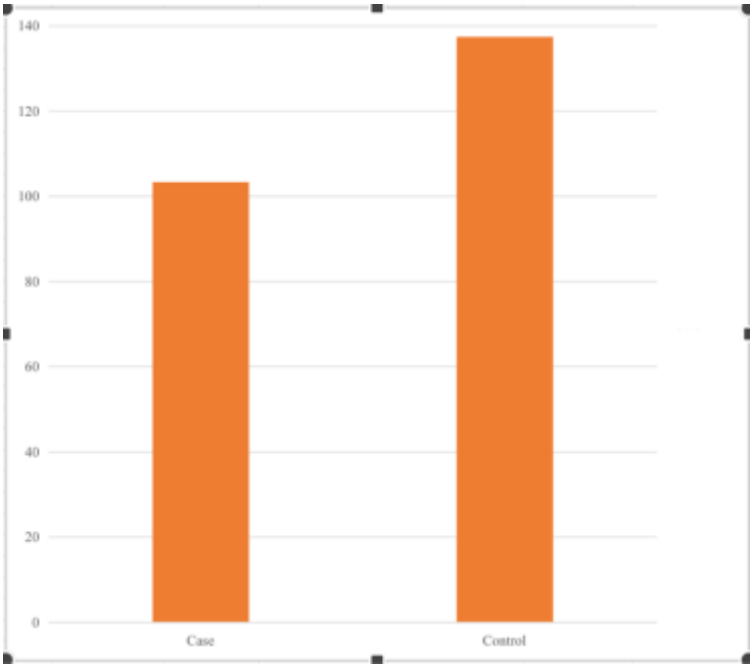

Figure 4. Comparison of mean TFRC between cases and controls.

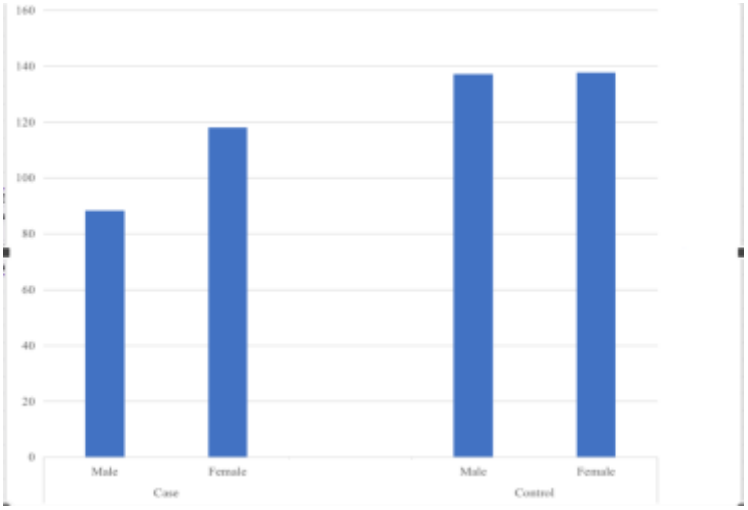

Figure 5. Comparison of mean TFRC between male and female in both cases and controls.

International Journal Dental and Medical Sciences Research
Volume 3, Issue 4, July-Aug 2021 pp 206-211 www.ijdmsrjournal.com ISSN: 2582-6018

Table 1. Comparison of mean TFRC between cases and controls.

Subjects	Mean	Minimum	Maximum	Standard Deviation	p-value
Case (n=50)	103.18	75	142	17.94	<0.0001
Control (n=50)	137.36	121	150	8.45	

Table 2. Comparison of mean TFRC between male and female cases.

Cases	Mean	Minimum	Maximum	Standard Deviation	p-value
Male (n=25)	88.36	75	102	8.2	<0.0001
Female (n=25)	118	100	142	11.51	

Table 3. Comparison of mean TFRC between male and female controls.

Controls	Mean	Minimum	Maximum	Standard Deviation	p-value
Male (n=25)	137.68	121	150	8.77	0.7920
Female (n=25)	137.04	121	150	8.29	

Similar studies have been done earlier. Mellor et al discovered a significant decrease in TFRC in male patients as compared to controls but no change in female patients. [14]Fananas et al discovered no statistically significant change in TFRC between patients and controls. [15] Srinivas Murthy et al observed a decrease in TFRC in both men and women. [16] The study by Jhingan et al. discovered an increase in the mean TFRC of female patients when compared to controls. [17] Sivkov et al demonstrated a significant rise in TFRC in males compared to controls.[18]

IV. CONCLUSION:

According to the current study, the Total Finger Ridge Count, may be used as an accurate indicator of the probability of a person developing schizophrenia in his lifetime. Further research in a larger demographic cohort will add more credence to the study's results. Early identification of potential schizophrenic patients using dermatoglyphic indicators may give a future avenue for the primordial prevention of schizophrenia, or at the very least, allow for the early implementation of intervention in such individuals, therefore improving treatment outcomes.

LIST OF ABBREVIATIONS:

TFRC: Total Finger Ridge Count

DSM: Diagnostic and Statistical Manual of Mental Disorders

CONFLICT OF INTEREST:

There are no conflicts of interest pertaining to this study.

ACKNOWLEDGEMENT:

We are forever indebted to our respective Head of the Departments, Prof. Dr. P K Saha and Prof. Dr. S Biswas, without whose kind support and guidance, we could never have accomplished this study.

REFERENCE:

[1]. Venkatesh E, Anjana B. Palmar dermatoglyphics in oral leukoplakia and oral squamous cell carcinoma patients. J Indian Acad Oral Med Radiol 2008;20:94-9.

[2]. Kiran K, Kavitha R, Amitha HM. Dermatoglyphics as a non-invasive diagnostic tool in predicting mental retardation. J Int Oral Health 2010;2:95-100.

[3]. Cummins H, Midlo C. Methods of printing: Ink method. In: Cummins H, Midlo C, eds. Finger Prints of Palms and Soles: an Introduction to Dermatoglyphics. 1st ed. Philadelphia, PA: Blakiston Company; 1943:45.

[4]. Debnath M, Venkatasubramanian G, Berk M. Fetal programming of schizophrenia: Select mechanisms. NeurosciBiobehav Rev. 2015 Feb;49:90–104.

[5]. Dell'Osso B, Spagnolin G, Suardi NE, Altamura AC. Neurodevelopment Alterations,

Neurodegeneration, and Immunoinflammatory Patterns in the Pathophysiology of Schizophrenia. In: Galimberti D, Scarpini E, editors. Neurodegenerative Diseases [Internet]. Springer London; 2014 [cited 2014 Dec 27].p.215–25. Available from: http://link.springer.com/chapter/10.1007/978-1-4471-6380-0_13

[6]. Lavretsky H. History of Schizophrenia as a Psychiatric Disorder. In: Mueser KT, Jeste DV, editors. Clinical Handbook of Schizophrenia. New York, New York: Guilford Press; 2008. pp. 3–12. [Google Scholar]

[7]. Murray M, Lewis SW. Is schizophrenia a neurodevelopmental disorder? British Medical Journal (Clinical Research Ed.). 1987;295(6600):681.

[8]. Van Os, J, Woodruff PW, Fañanas L, Ahmad F, Shuriquie N. Howard R, Murray RM. Association between cerebral structural abnormalities and dermatoglyphic ridge counts in schizophrenia. Comprehensive psychiatry. 2000;41(5):380-4.

[9]. Fearon, P, Lane A, Airie M, Scannell J. McGowan, A, Byrne M, et al Is reduced dermatoglyphic a-b ridge count a reliable marker of developmental impairment in schizophrenia?. Schizophrenia research. 2001;50(3):151-7.

[10]. Waterworth DM, Bassett AS, Brzustowicz LM. Recent advances in the genetics of schizophrenia. Cell Mol Life Sci CMLS. 2002 Feb;59(2):331–48.

[11]. Mednick, SA, Machon RA, Huttunen MO, Bonett, D. (Adult schizophrenia following prenatal exposure to an influenza epidemic. Archives of general psychiatry.1988;45(2):189-92.

[12]. Fatjó-Vilas M, Gourion D, Campanera S, Mouaffak F, Levy-Rueff M, Navarro ME, et al. New evidences of gene and environment interactions affecting prenatal neurodevelopment in schizophrenia-spectrum disorders: a family dermatoglyphic study. Schizophr Res. 2008 Aug;103(1-3):209–17. |

[13]. Waterworth DM, Bassett AS, Brzustowicz LM. Recent advances in the genetics of schizophrenia. Cell Mol Life Sci CMLS. 2002 Feb;59(2):331–48. |

[14]. Mellor CS. Dermatoglyphic evidence of fluctuating asymmetry in schizophrenia. Br J Psychiatry. 1992 Apr 1;160(4):467–72.

[15]. Fañanás L , Moral P, Bertranpetit J. Quantitative Dermatoglyphics in Schizophrenia: Study of Family History Subgroups. Hum Biol [Internet]. 2014 Sep 12;62(3). Available from: http://digitalcommons.wayne.edu/humbiol/vol62/iss3/8

[16]. Murthy RS, Wig NN. Dermatoglyphics in schizophrenia: the relevance of positive family history. Br J Psychiatry. 1977 Jan 1;130(1):56–8

[17]. Jhingan H, Munjal G. Dermatoglyphics In Female Catatonic Schizophrenics. Indian J Psychiatry. 1989 Oct 1;31(4):329

[18]. Sivkov, Stefan T; Akabaliev, Valentin H; Kaleva, NartsisN.FoliaMedica**;** Plovdiv Vol. 51, Iss. 3, (Jul-Sep 2009): 25-30.