COMPARATIVE STUDY OF PALMAR DERMATOGLYPHICS IN PATIENTS WITH SCHIZOPHRENIA, MANIC DEPRESSIVE PSYCHOSIS AND NON PSYCHIATRIC CONTROLS IN AGE GROUP BETWEEN 15-70 YEARS

By

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Dissertation submitted to the

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In partial fulfillment of the requirements for the degree of

DOCTOR OF MEDICINE

In

ANATOMY

Under the guidance of

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LIST OF ABBREVIATIONS USED

A	:	Arch
a-b RC	:	a-b Ridge Count
AFRC	:	Absolute Finger Ridge Count
BPAD	:	Bipolar Affective Disorder
Hy	:	Hypothenar
I2	:	Interdigital area 2
I3	:	Interdigital area 3
I4	:	Interdigital area 4
LU	:	Ulnar Loop
LR	:	Radial Loop
L1	:	Left Thumb
L2	:	Left Index Finger
L3	:	Left Middle Finger
L4	:	Left Ring Finger
L5	:	Left Little Finger
MDP	:	Manic Depressive Psychosis
R1	:	Right Thumb
R2	:	Right Index Finger
R3	:	Right Middle Finger
R4	:	Right Ring Finger
R5	:	Right Little Finger
TFRC	:	Total Finger Ridge Count

Th/I_1 : Thenar & 1^{st} Interdigital Area

W : Whorls

ABSTRACT

Background and objectives:

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. The dermatoglyphic patterns may be viewed as "fossils" of late first and second trimester fetal development.

Materials and Methods:

Consecutive 100 patients of schizophrenia, manic depressive psychosis diagnosed clinically in the age group of 15- 70 yrs in both sexes & 100 non psychiatric people of same age group in both sexes as controls. Quantitative and qualitative dermatoglyphics were studied in all the three groups and compared using appropriate statistical tests.

Results and Interpretation:

The frequency of whorls and radial loops were increased in schizophrenics in comparison with controls. Percentage of total loops was increased particularly on the middle finger (R3 & L3) of schizophrenics. There is decrease in total finger ridge count in schizophrenics (117.01) as compared to controls, statistically non-significant. Mean a-b ridge count in the right hand and in the left hand of schizophrenics was decreased when compared to controls, which was statistically significant. The atd angle is decreased in schizophrenic patients when compared to controls, statistically not significant. Frequency of occurrence of pattern in interdigital areas in schizophrenia was compared with control group- more patterns were seen in I3 & I4 areas, but data was statistically significant only at I2. In fingerprint pattern of MDP patients there were more loops, whorls next in

frequency and least were arches when compared with control group. Frequency of occurrence of pattern in interdigital areas in MDP was compared with control group-more patterns seen in I3 & I4 areas, but data was statistically significant only at I2 and I4 areas. Mean atd angle of MDP was low, as compared with schizophrenics, this was statistically significant. Mean TFRC in BPAD group is lower than in schizophrenics and higher controls, this difference was statistically significant. Mean Right & Left ab-ridge count in schizophrenics was higher than BPAD group; this difference was statistically highly significant. Mean Right atd-angle in schizophrenics was lower than BPAD group and higher than control (Table no-31), and this difference was statistically significant (P=0.001). Difference in the mean right and left ab-RC in Schizophrenia, BPAD and control groups was statistically significant. Difference in the Mean right and left atd angle of Schizophrenia, BPAD and control groups was statistically significant

Conclusion:

The observed changes suggest significant difference in dermatoglyphic patterns in bipolar mood disorder, schizophrenia and control. Our findings match with most of the previous studies of dermatoglyphics in schizophrenia and bipolar mood disorder. Dermatoglyphics, a non-invasive method, could serve as a screening indicator to detect of individuals at risk in families**.**

Keywords: Dermatoglyphics, Schizophrenia, Manic Depressive Psychosis.

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INTRODUCTION

Skin happens to be the largest and most important organ of the body. It performs many important functions in the life of an individual, viz. it protects and safe guards the body from the vagaries of the weather, maintains the body temperature and saves the internal organs of the body from the injuries. However, the skin on the ventral side of the hands and the plantar side of the feet is exclusively designed and is corrugated with the ridges and configurations which are functionally useful as they help in the grasping without which the objects would easily slip away from the hands.[1]

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.[2]

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.[3] The dermatoglyphic patterns may be viewed as "fossils" of late first and second trimester fetal development. [4]

In the recent past a number of investigators have focused their attention in finding out an association of morphological and genetical characters with a number of human pathological conditions. Dermatoglyphics, determined by polygenic inheritance, are one of such tools frequently used in scientific studies. It has been demonstrated by many that dermatoglyphic analyses are of aid in the diagnosis,

nosology and understanding the genetics of many human pathogenic abnormalities. Since Galton's (1892) pioneering work on fingerprints, a number of researchers have studied the dermatoglyphic correlates of mental and behavioral traits.[5]

Moreover, critical growth of the brain is also occurring during this period. Since the skin and the brain develop from the same ectoderm, dermatoglyphic variations are informative for early developmental brain disturbances.[6] Dermatoglyphics may be affected by both genetic and environmental factors. A relationship exists between embryonic stress and distortion of dermatoglyphic patterns.[7]

The morphology of the epidermal ridges is genetically determined but can also be influenced by environmental factors such as a viral infection, radiation, or alcohol and drug abuse that can disturb brain development.[8,9] The rationale behind this hypothesis is that epidermal ridges share ectodermal origins with the central nervous system. However, once they are formed the epidermal ridges remain unchanged. Since both the ridges and the brain are derived from the ectoderm, it seems reasonable to use unusual dermatoglyphics patterns to characterize disturbances to brain development.[10]

The use of dermatoglyphics as a genetic marker in Schizophrenia has attracted the attention of many investigators throughout the world, i.e., Europe, America, Africa, Asia and Australia. Many studies have tried to establish the direct link between epidermal ridges and schizophrenia using different features to characterize the configuration of epidermal ridges.[11]

The earliest studies of dermatoglyphics of schizophrenia were that of Poll (1935), Moller (1935) and Duis (1937), who found that the normal sex difference was

reduced in their schizophrenic sample. Poll (1935) was the first investigator to study comprehensively the finger patterns of patients with schizophrenia.[5]

It is also well known that bipolar mood disorders have some genetic predisposition and there have been reports of associations between dermatoglyphic patterns and bipolar disorders.[12]

Therefore schizophrenia and bipolar disorder are similar in some epidemiological and developmental features.[13] In contrast, the two disorders show differences in neuro-imaging findings, such as reduced volume of the brain in schizophrenia[14] and more severe ventricular enlargement in schizophrenic than bipolar patients[15].The aberration of their development is associated with the deviation of brain development.[16] These morphologic traits have been used in detecting the biologic and genetic background in schizophrenia. Subtle dermatoglyphics alterations have been found in severe bipolar patients and there may be a relationship between early prenatal insults and later onset of bipolar disorder.[17]

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

OBJECTIVES OF STUDY

1. To study and compare the Dermatoglyphic pattern in Schizophrenic Patients, Manic Depressive Psychosis and control group.

REVIEW OF LITERATURE

"Man can change, his behaviour can alter, thought can diversify but the dermatoglyphic patterns will remain the same forever". The term dermatoglyphics has its origin from Greek work 'derma' means skin and 'glyphics' means carved. Dermatoglyphics is defined as the scientific study of epidermal ridges and their configuration on the volar aspect of the palmar and plantar regions.[18]

Epidermal ridges are formed between the 11th and 24th weeks of gestation; after this time, the epidermal ridges do not change. Moreover, critical growth of the brain is also occurring during this period. Since the skin and the brain develop from the same ectoderm, dermatoglyphic variations are informative for early developmental brain disturbances. It has been suggested that an insult causing damage to one of these systems would damage the other.[19]

HISTORY OF DERMATOGLYPHICS

The first description of epidermal ridges which make characteristic patterns when prints are taken of fingertips was learnt in 1684 by ingenious physician Nehemiah Grew. In 1685, Grew's paper was followed by the publication in Amsterdam of a brief account in Bidloo's 1685 Anatomica Humani Corporis. In 1686, a comparable description was given by Malphigi in De Eterno Tactus Organo. In 1823, John Evangelist Purkinji described nine types of patterns on the fingers [20]

In 1890, Francis Galton systematically studied the whole subject and published his book 'Fingerprints' in 1892. He showed his interest for personal identification for the prints which persist throughout life. He coined a number of new terms in the field, described the first practical method of finger print identification, responsible for basic nomenclature (arch, loop, and whorl). He also explored studies

of the hereditary aspects of fingerprints, investigating comparisons of siblings, twins and genetically unrelated individuals and was the first to report concordance of papillary ridge patterns among relatives. This opened the field as a useful tool in anthropology.[21]

Harold Cummins studied all aspects of fingerprint analysis from anthropology to genetics and even embryology perspectives. In 1943 he published book titled 'Fingerprints, palms and soles', a bible in the field of dermatoglyphics. In 1968, Sarah Holt, published 'The Genetics Dermal Ridges'. She summarizes her research in dermatoglyphic patterns of both fingers and palms, in both normal and congenitally afflicted.[22]

In 1976, Schaumann Alter's published 'Dermatoglyphics in Medical Disorders'. Significant investigations have also been carried out into dermatoglyphic indicators of CHD, Leukemia, Cancer, Coeliac disease, Intestinal disorders, Alzemier's disease, Rubella, Schizophrenia, and mental illness. In 1985, Dr. Chen Yi Mou of Harvard university, applied dermatoglyphics to educational fields and brain physiology. In 2000, Dr.Stowens, chief of pathology at St Luke's Hospital in New York, claimed to be able to diagnose Schizophrenia and Leukemia with up to 90% accuracy using dermatoglyphics. In 2004, in International behavioral and medical Biometrics Society over 7000 reports and thesis were published. Many countries such as U.S.A. Japan, China, Taiwan apply dermatoglyphics for various educational fields.[23]

EMBRYOGENESIS

Embryological research has shown that the development of epidermal ridges is preceded by the formation of volar pads. Swelling of the mesenchymal tissue appears

as elevation on the palm around 6.5 weeks post fertilization. Volar pads exhibit rapid growth between 6.5 and 10.5 weeks, initially they appear evenly rounded. However by 9 weeks, the pads begin to take position and shape. In 1929 Harold Cummins described that the various configurations are not determined by self-limited mechanisms of the skin. The skin possesses the capacity to form ridges but alignments of these ridges are responsive to stress in growth as are the alignment to sweeping by wind or wave. [24]

The initial regression of volar pads around 10-11 weeks correspond to the initial formation of epidermal ridges, which first appear as localized cell proliferation in the basal layer of the epidermis during 10 weeks post fertilization. The primary ridges that are formed develop at the epidermis-dermis interface and not on the skin surface. Due to general growth of the hand the number of primary ridges increase along with increase in the width and penetrate deeper into the underlying dermis. Around 14 weeks, the sweat glands appear at uniform intervals along the ridges. This association has resulted in the term Glandular fold, corresponds to the surface ridge that we can see. At 15 weeks secondary ridges lacking sweat gland appear. Secondary ridges/furrow fold correspond to the furrow of secondary ridge. Primary ridges cease proliferation. So at 17weeks, epidermal ridges become visible on the volar surface as finger prints. From 17-24 weeks, secondary ridges continue to proliferate until they are in a one to one correspondence with primary ridges. At 24 weeks the epidermal ridge system has an adult morphology. At 24 weeks bridging and anastomoses between primary and secondary ridges begin to appear. The dermis between anastomotic epidermal bridges, progressively form peg like structures “the dermal papillae” characteristic of definite dermal ridge. [24]

HEREDITY AND DERMATOGLYPHICS

Heredity plays an important role in the formation of dermatoglyphic patterns. The inheritance of dermatoglyphic traits was initially studied by Galton in 1892, Wilder in 1902, Penrose in 1954 and Holt in 1968. Studies of inheritance of pattern sizes, direction and shape often give contradictory conclusions. Individual dermatoglyphic traits have been claimed to be inherited as dominant, recessive, and as a single gene or polygenic with complete or in-complete penetrance and variable expression of genes.[25]

Holt studied total ridge count of fingers and inheritance. She stated that this trait was determined almost entirely by one or more additive or co-dominant genes.[26] There are also normal variations which represent hereditary differences between ethnic groups and even within the same family.[27]

At present, there is wide agreement that the heredity of most dermatoglyphic features confirm to polygenic system. Modern cytogenetic methods allow precise identification of chromosomes and thus help in studying the correlation between individual chromosome observations and dermatoglyphic features. [25]

On the basis of current knowledge it can be said that the total ridge has greater clarity in terms of heritability, followed by 'atd' angle and the patterns on the fingers and the palms in that order.[28] The 'atd' angle can be marked with lead pencil and measured by using transparent protractor of the variety which is contracted of a semicircle of plastic material.[29]

GENERAL FEATURES OF RIDGE ARRANGEMENT ON PALMS

On examining a palm print, it can be seen that the ridges form nearly parallel rows. Their course is never straight, except in a very small area of skin. On both palms and soles, the ridges run in different directions in the various areas. At the junction of three ridge systems, three ridges meet to form a triradiate pattern, generally termed the triradius (Fig.1). In the distal palm there are usually four triradii, one above each finger, except the thumb. These are the digital triradii, called a, b, c, d (Fig.2). 'a' is situated proximal to the index finger b, c, and d are located proximal to the middle, ring and little fingers, respectively. Normally there is another triradius, the axial triradius (t), situated at the proximal end of the palm. Not infrequently, a number of triradii other than the mentioned four, are found in the distal palm. Two triradii may be fused into a single triradius, or there may be an additional (accessory) triradius or triradii in some of the interdigital areas. A special case of a missing triradius is an interdigital triradius, which may subtend two or more digits. Such a triradius, lying in the centre of an interdigital area is labeled in relation to the triradii it replaces, e.g., bc for a triradius in the third inter-digital area, between the normally formed triradii b and c. Occasionally one of the triradius may be absent. In certain areas the ridges may be arranged to form patterns, and triradii may be associated with these designs. By marking the ridges running from each triradius, a picture of the chief features of ridge arrangement is obtained.[13]

Patterns can be traced from the triradii and these provide skeletons of the patterns. An accessory triradius can be observed in an inter-digital area and these are referred to as a1, b1, c1 and d1. In definite areas, the sites of the fetal volar pads, the ridges may be arranged to form patterns. There are five of these areas on the palm (Fig.2); the thenar area under the thumb, with which is usually included the first

inter-digital area; the second, third, and fourth inter-digital areas; and the hypothenar area on the ulnar side of the palm. [13]

FINGER PATTERNS

Patterns on the finger-tips were classified by Galton into three main types depending on the number of triradii present. The simplest pattern to be found on the fingertips is an arch. It has no triradius. It is subdivided into two types, the simple arch (Fig 3.a) and tented arch (Fig.3.b). The most common pattern on the fingertip is a loop. It has one triradius. It is of two types. If the ridge opens on the ulnar side the resulting loop is termed an ulnar loop (Fig.4) whereas if it opens towards the radial margin it is called a radial loop (Fig.4). 'A' in Galton's classification is any ridge configuration with two or more triradii. There are different types of whorls – concentric whorl, spiral whorl, central pocket whorl, double loop pattern and accidental whorl (Fig 5). A person may have the same pattern on all ten fingers, but various patterns often occur on different digits.[13]

PALMAR PATTERNS

Patterns on palms (Fig 6) are similar to those found on fingers, but usually larger and sometimes more complex. Thus in the hypothenar area the principal patterns are loops of various types, including S-shaped patterns made up of double loops, and whorls, often with three triradii. Thenar patterns are frequently distinctive, incorporating loops, with some ridges running at right angles to the general ridge direction in the area. Inter-digital patterns are almost invariably loops which open into the nearest inter-digital space. Rarely very small whorls are found in this part of

the palm. Pattern frequencies in all areas differ in the two sexes. For e.g. on fingers, females have more arches and fewer whorls than males.[13]

The characteristics of dermatoglyphics can be described quantitatively i.e. by counting the number of ridges within a pattern and measuring angles or distance between specified points of triradii.

The total finger ridge count (TFRC) represents the sum of the ridge counts of all ten fingers. Larger count is used on those digits with more than one ridge count. In a loop there is one triradius, so one ridge count; in a whorl with two triradii, there are two counts and the higher is used. For an arch the score is zero. In a double loop whorl, the counting is done from the triradii to the core that is nearer the triradius. Thus two counts – a radial and an ulnar are obtained. [13]

Weninger proposed improvement of ridge counting in bicentric patterns by adding the ridge numbers between the two cores to the conventional count. Absolute Finger ridge count (AFRC) is the sum of the ridge counts of all the fingers. The TFRC and the AFRC are the same if no whorls are present. The TFRC expresses the size of pattern and the AFRC reflects the pattern size as well as its intensity. [13]

Holt in 1961 illustrated that the mean ridge count of loop may be considerably lower than that of whorls in both males and females. A ridge count of 'zero' implies the presence of a simple or tented arch in the finger. Pattern intensity refers to the complexity of ridge configurations. It can be expressed by widely used method to interpret the position of axial triradius in the palm is the atd angle (Fig.11). This angle is formed by lines drawn from the digital triradius 'a' to axial triradius and to digital triradius 'd'. The symbol 't' is reserved for axial triradii found in the proximal region of the palm, near the wrist crease. A triradius situated near the center of the palm is termed 'tll' the symbol 'tl' represents the intermediate position of the

triradius. An extremely distally placed triradius (distal to proximal transverse crease) is termed as 'tlll'. The more distal the position of the axial triradius, the larger the atd angle. The axial triradius shifted toward the radial side is called 'tr' and that shifted to the ulnar side is called 'tu'. Palms with pattern in hypothenar area may have more than one axial triradius. In such cases it is customary to record the widest atd angle i.e., the angle from the distal 't'. [13]

There are several disadvantages in using the atd angle as a dermatoglyphic parameter. a) The most important one is that the atd angle tends to decrease with age because the palm grows more in length than in breadth.

b) The size of the angle is also affected by the amount of spreading of the fingers when the patterns are printed.

c) The pressure exerted while the palm is printed also can affect the atd angle.

The numerical values of the atd angles have been employed in determining the axial triradius position, i.e. to distinguish between t and tl and tll. Penrose suggested that, an angle less than 45^0 be designated as t, angles between 45^0 and 56^0 as tl, and any larger angles as tll. Cripel considered 61^0 as tll. Cascos considered 71^0 as tll and Preus and Fraser considered 63^0 as tll.[13]

FLEXION CREASES – PALM AND FINGERS

These creases represent the location of the firmer attachment of the skin to underlying structures. The first to appear is the radial longitudinal crease that borders the thenar eminence. This is followed by the proximal transverse crease and distal transverse crease. Sometimes the proximal and distal transverse creases are replaced by or joined into one single crease that traverses the whole palm. This single transverse flexion crease is usually referred to as a Simian crease or line (Fig 7).

Variants of single palmar crease have been noted .They are transitional type 1 (proximal and distal creases connected by a bridging crease) and transitional type 2 (fusion of the transverse creases with branching proximal and distal segments, incomplete single palmar crease). A variation in appearance of Proximal Transverse crease is the Sydney Line (Fig.8) named after the city in Australia where it was observed first. Sydney Line represents Proximal Transverse crease extending beyond hypothenar eminence to the ulnar margin of the palm. The distal transverse crease persists and appears normal.[13]

CONGENITAL MALFORMATIONS OF HUMAN DERMATOGLYPHICS

Malformations of the ridged skin are sometimes seen on the volar aspects of human hands and feet. The study of congenital malformations as physical signs in pediatric practice is very important.

Classification of congenital malformation of Dermatoglyphics

I) Ridge Aplasia

This is a rare malformation. In this epidermal ridges over the entire palmar and plantar surface are absent. The palmar and interphalangeal flexion creases remain normal. The palmar and plantar surfaces do not sweat. Terry R and Richard L S reported the absence of fingerprints in five consecutive generations.

II) Ridge hypoplasia

In ridge hypoplasia, ridges are present but they are reduced in height. This condition is inherited as an autosomal dominant trait. The epidermal ridge atrophy is partly reversible change found in extreme old age and in some people with mental sub-normality and 90 to 95% of adults with coeliac disease.

III) Ridge dissociation

In ridge dissociation, the ridges instead of running in more or less parallel lines, are broken up into disorganized short ridges and are often dot like.

It is a heterogeneous condition which can be inherited as an autosomal dominant trait or it can be sporadic. It is present in 18% schizophrenics. Ridge dissociation occurs, with increased frequency in individuals suffering from various medical disorders.

IV) Ridge-off-the-end

The fingertip ridges in this condition run vertically of the end of fingertips. It is unassociated with any disease but the hair pattern on the head is abnormal in some cases.[13]

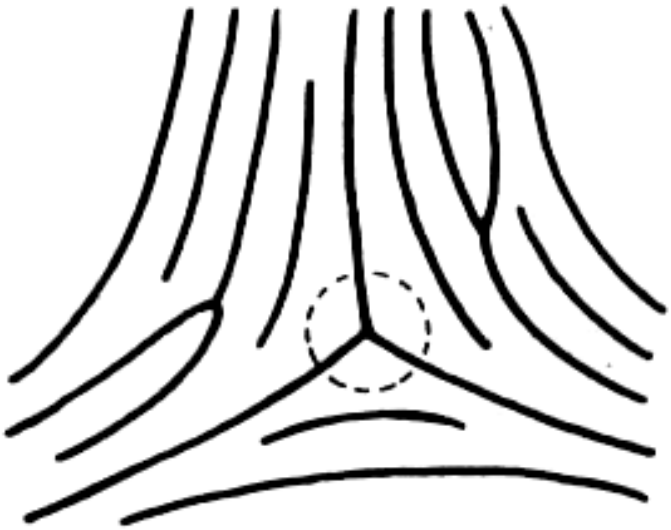


Fig.1.Triradius

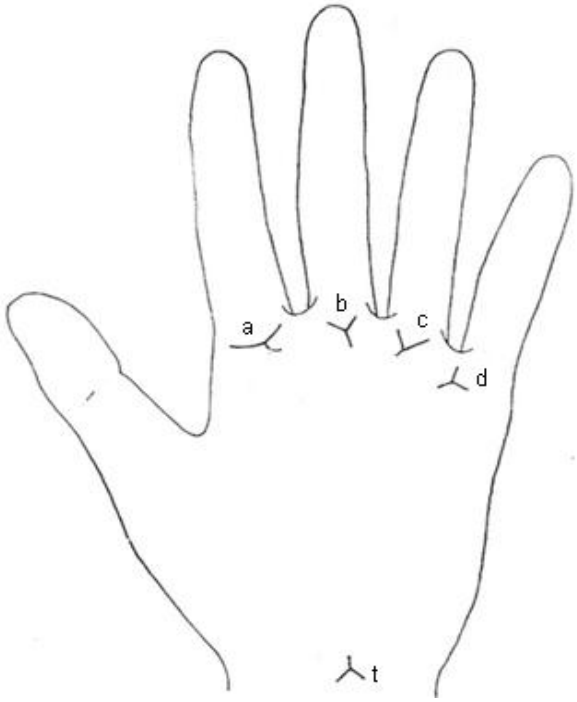


Fig.2. Palmar dermatoglyphic patterns

Fig.3.a. Fingertip pattern-simple arch

Fig. 3.b. Fingertip pattern- tented arch

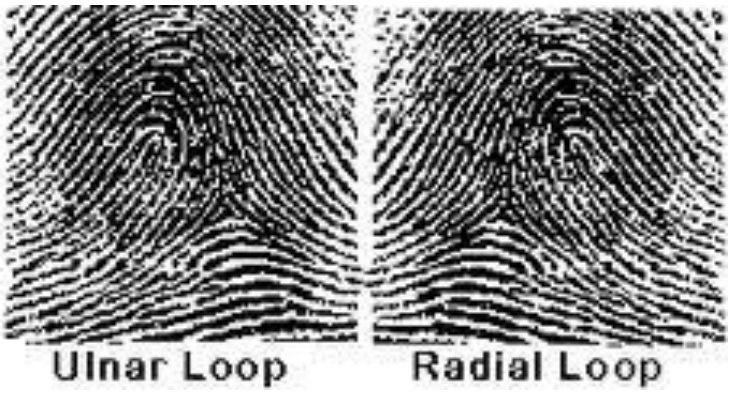


Fig.4. Fingertip pattern- ulnar loop/radial loop

Fig.5. Fingertip pattern- whorl

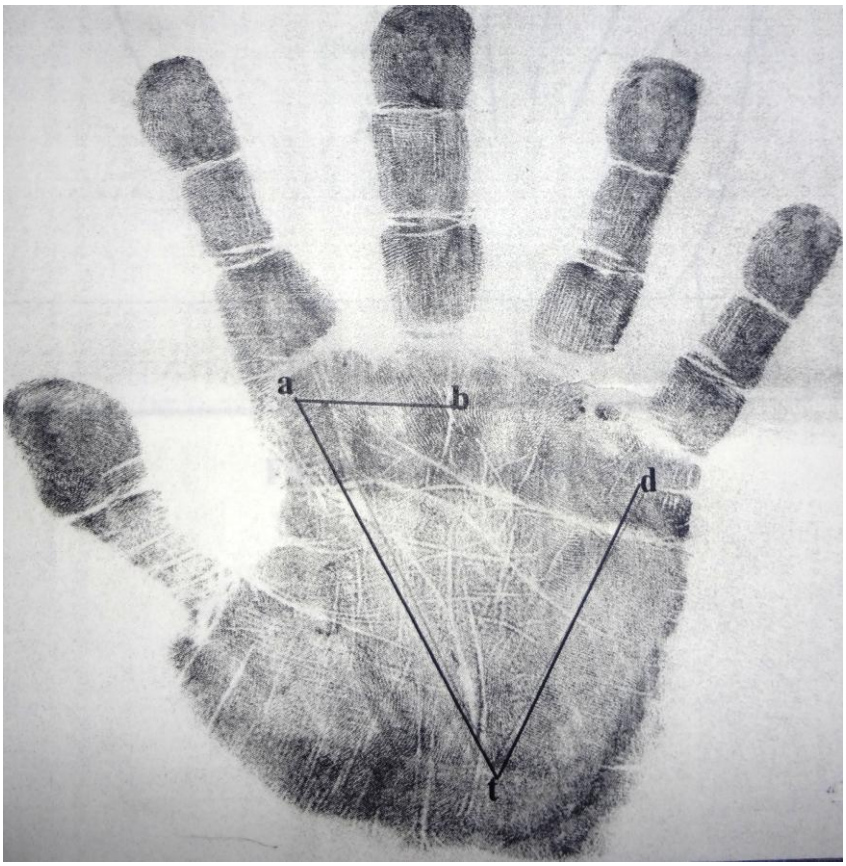


Fig. 6‘atd’Angle and ab ridge count

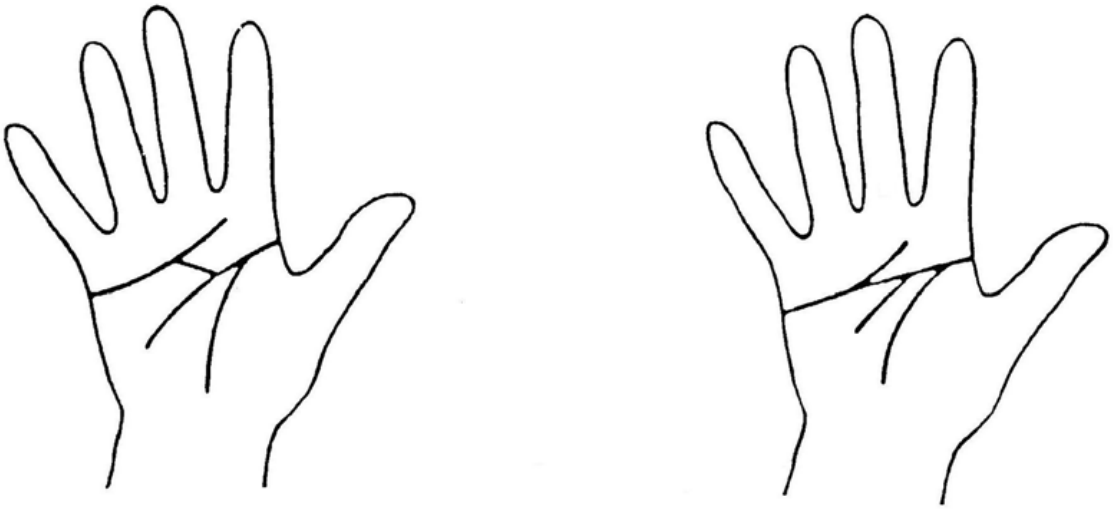


Fig.7. Simian crease -TYPE-I AND TYPE-II

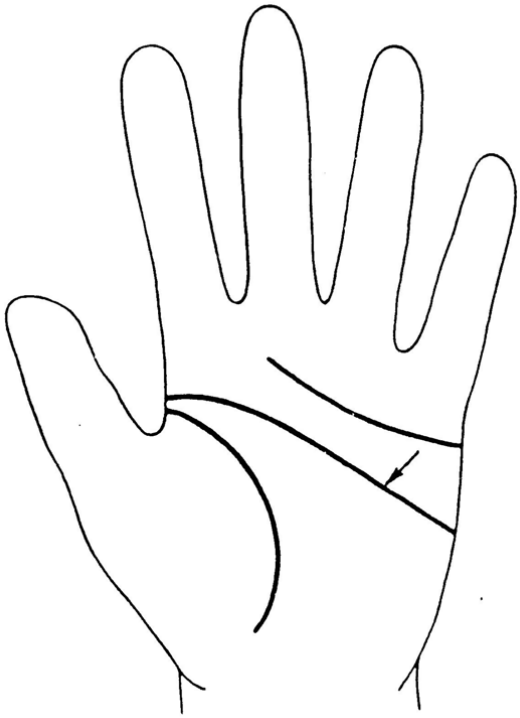


Fig.8. Sydney line

Fig. 9. Method of ridge counting in loop.

Fig.10. Method of ridge counting in Whorl

The earliest dermatoglyphic studies in schizophrenic persons were those of Poll[30], Moller[31], and Duis[32], who noted that the normal sex difference in dermatoglyphics patterns was reduced in their schizophrenic sample. Poll[30] was the first person to study comprehensively the finger patterns of patients of schizophrenia. He analysed the prints of a German series comprising 232 males and 545 females and compared them with a sample of the normal general population of the respective sex. He observed a lower incidence of whorls in the male schizophrenics than in control males, while in female schizophrenics the incidence was higher than in the normal females. He also noted slight increase in arches in male schizophrenics than in control males. The usual sex differences with respect to the frequency of a type of dermatoglyphic pattern were thus eliminated in the schizophrenic patients.

From a study of Danish schizophrenics, Moller[31] confirmed Poll's[30] observations, allowing for racial differences which were apparent in both affected and control samples. Findings of Duis[32] on an East Prussian series were similar to those of Poll[30] and Moller[31]. Wendt and Zell[33] found a difference in dermatoglyphics in male

and female in another German series of schizophrenics but strangely not in their control group. This was the only study in which the normal male-female sex difference was not reported in the control population. The reason for this was not clear. Their observation was that male schizophrenics had actually a slightly increased incidence of whorls over the control males and a slight decrease in arches as compared to the control males. These findings were contrary to those of earlier workers.

Pons[34] and Raphael and Raphael[35] investigated only males. In a Spanish sample, Pons[34] observed no difference in the frequency of finger print patterns between schizophrenics and controls but reported an increased frequency of patterns in third interdigital area (I3) in schizophrenics as compared to controls.

Raphael and Raphael[35] employed rigorous criteria for selection of schizophrenic males. After thorough screening, a series of 100 cases was finally selected at the Ypsilanti State Hospital, Ypsilanti, Michigan. They reported an increase in the frequency of whorls, decrease in ulnar loops and a higher incidence of total arches with a very high proportion of tented arches in schizophrenics as compared to controls. They found statistically highly significant increase in pattern dissociations in the schizophrenics, which was rare in the general population.

Beckman and Norring[36] reported a higher frequency of whorls in male schizophrenics but not in female patients. The frequency of patterns in the I4 area of left hand was found to be higher in patients of both sexes than in control population.

Singh[37] had reported significant increase in the frequency of arches among male schizophrenics and increase in whorls and ulnar loops in female schizophrenics as compared to controls of respective sex. There was also a greater frequency of disrupted ridges in the schizophrenics as compared to controls.

Mellor[38] studied 232 male and 253 female British schizophrenics in the age group of 16 to 60 years. He found statistically significant differences in both qualitative and quantitative features. Percentage of whorls and loops was increased and percentage of arches was decreased in schizophrenic females as compared to control females. Percentage of whorls, loops and arches was almost equal in schizophrenics and control males. Increased frequency of patterns in third interdigital area was found in schizophrenics particularly in catatonic and hebephrenic types as compared to controls. The 'atd' angle was significantly higher in both sexes of schizophrenics as compared to controls.

Rosner et al.[39] studied 40 male Negro schizophrenics and found reduced frequency of central pocket loops on left index finger and right thumb of schizophrenics as compared to controls. Right index finger of schizophrenics showed increased frequency of ulnar loops than controls.

Stowens et al. [40] conducted a comparative dermatoglyphic study of 82 hospitalized schizophrenics and 295 controls. All of the subjects were adult white females. The dermatoglyphic variables which contributed most to the discrimination between the two groups were: the higher frequency of abnormal palmar creases, the increased frequency of arches and the decreased frequency of radial loops on the index finger among the schizophrenic sample.

Rothhammer et al. [41] keeping in view the methodological limitations of the previous studies analysed the dermatoglyphics of 47 male and 50 female schizophrenics in Chile. On the basis of small sample size they concluded that no particular dermatoglyphic features characterize schizophrenia. Dermatoglyphics cannot be used either as an auxillary tool for evaluation of the role of genetic factors

in the etiology of this mental disorder or as a diagnostic instrument. All these comparative studies resulted in contradictory findings and have been inconclusive.

Review done by Wendt et al. [42] on this subject had attributed this confusing situation to the heterogeneity of schizophrenia, ethnic and geographic variations in finger print pattern frequencies and sampling methods resulting into disagreement between the reported results. Polednak[43] compared finger prints of 40 Negro schizophrenic males with 105 control males and found decreased percentage of arches in schizophrenics as compared to controls. He also observed increased percentage of patterns in the fourth interdigital area and reduced percentage of patterns in third interdigital area of schizophrenics as compared to controls.

Murthy[44] compared the dermatoglyphics of 240 (120 males and female each) schizophrenics with the same number of controls. The sample consisted of ethnically similar groups (based on residence, religion, ethnic background and caste in North India). It was found that the schizophrenics and normal differed both in qualitative and quantitative features. Male schizophrenics had increase in arch pattern frequency and a decrease in whorl frequency in comparison to controls. Palmar patterns were also different in schizophrenics when compared to normal. Frequencies of patterns in second and third interdigital areas were significantly lower in schizophrenics than in normal. These findings of Murthy and Wig have been supported by other investigators as well. Further analysis of data for the subcategories showed that the four subcategories were different in dermatoglyphic features, though all the quantitative differences were not significant. It was noted that there was a tendency for movement towards the opposite sex as noted by Sank.

The quantitative and qualitative finger and palmar ridge characteristics of a sample of 219 Italian Schizophrenic males and 105 controls were studied by Kemali

et al.[45] Patients with proven or suspected mental retardation and with congenital somatic anomalies were excluded. Their observations were as follows: Percentage of total loops was increased particularly on the middle finger of schizophrenics and that of whorls and arches was reduced in schizophrenics than controls. Total finger ridge count was reduced in schizophrenics than controls. a-b ridge count did not show any difference in schizophrenics and controls. Schizophrenics showed higher values of atd angle than controls but the difference between means was not statistically significant.

Eswaraiah[46] studied palm prints of 118 male schizophrenics and compared them with prints of 536 normals. The high frequency of single radial base crease and absence of C-lines were observed among the schizophrenics as compared to normal population. His findings were similar to Biswas and Bardhan and Bali.

Laha NN[47] studied dermatoglyphics of 50 female schizophrenics and compared them with 50 normal females. Diseased state was established by clinical examination and necessary investigations. Results obtained were as follows : 1) When percentage of ridge patterns on finger tips (all ten) were taken into consideration then ulnar loops had the highest representations in schizophrenics than normals, followed by whorls (38.4 and 28.6% respectively), double loops (6.2 and 6.6% respectively), arches (4.8 and 5.4% respectively) and radial loops (1 and 2.8% respectively) in the descending order of frequency. 2) Mean values of ridge count from triradial point to point of core, between schizophrenics and normals revealed statistically insignificant difference. 3) Mean values of right and left inter-triradial interval a-d showed statistically highly significant and significant decrease respectively in schizophrenics as compared to controls. Right intert-riradial interval b-c also showed significant

decrease in schizophrenics as compared to controls whereas on left the decrease was statistically insignificant.

Ponnudurai[48] compared the dermatoglyphic variations between 100 male schizophrenics and the same number of controls. He matched both control and diseased group with respect to age, sex and ethnic background and found a marginal difference between the schizophrenics and normal on the qualitative aspect. Among the digital patterns, there was a tendency for the whorls to appear less frequently on the left first digits among schizophrenics and the frequency of arch pattern on left digits was greater among them. However the difference in ridge count and 'atd' angle was not significant.

Cannon M et al. [49] from Ireland studied finger and palm prints from 46 schizophrenic patients and 43, age and sex matched normal controls. Seven prints were judged to have very high densities of secondary creases. These abnormal prints were all from the schizophrenic group. Patients with high densities of creases were severely ill, had more than 5 admissions to hospital and required higher doses of drugs.

Sengupta and Das[50] worked to find out possible association between palmar dermatoglyphic characteristics and the disease. Dermatoglyphic prints of eighty patients diagnosed according to usual clinical criteria formed the actual study sample and were collected from the psychiatry department of Assam Medical College, Dibrugarh. Results obtained were as follows: 1) 'atd' angle- Both the sexes of schizophrenics as compared to normals record a lower mean atd angle on both hands, either considered separately or together. 2) The a-b ridge count- The schizophrenics show a comparatively lower ridge counts as compared to controls. The difference was found to be statistically significant.

Varma et al. [51] studied dermatoglyphic patterns in 250 schizophrenics and 90 controls. Results obtained were as follows: 1)The frequency of arches in the patients and control groups was similar. 2) The frequency of loops in the control group was higher than in the patient group. The trend was consistent in all the digits. 3) The whorls in the patient group showed an increase over the control group in all the digits. This finding was not statistically significant.

Srinivas M et al. [52] compared handprints of 30 schizophrenics from Bangalore with same number of age and sex matched controls. They noted significant increase in the loop pattern in the third interdigital area of the schizophrenic patients as compared to controls.

Sivkov S and Akabaliev V[53] studied handprints of 42 schizophrenic patients and 36 controls with an objective to analyse the value of specific dermatoglyphic characters in assessing prenatal injuries in schizophrenic patients. Results obtained were as follows: 1) In male schizophrenics there was an increased frequency of whorls and in females there was an increased frequency of arches as compared to controls. 2) Patients with an onset of disease at an early age showed higher frequency of radial loop pattern in the hypothenar area.

Sathe and Gajbe[54] studied 400 schizophrenic patients from Nagpur. They found significantly reduced arch pattern in finger tips of schizophrenics, with no significant differences in mean counts of whorls and loops in schizophrenics as compared to controls. Female schizophrenics showed higher proportion of whorls compared to controls. Palmar pattern frequency was increased significantly in thenar with first interdigital area in female schizophrenics. Main line index was significantly decreased in female, marginally in schizophrenic males; a-b ridge count was

significantly lower in schizophrenics. Disrupted patterns were increased in male schizophrenics as compared to male controls.

Fearon P et al.[4] from Ireland studied finger and hand prints of 150 schizophrenics with those of 92 healthy controls and found that patients had a reduced mean total a-b ridge count when compared with controls. There was a significant linear trend for lower total a-b ridge count and increasing incidence of schizophrenia, implying a continuous increase in the risk for schizophrenia with reduction in total a-b ridge count.

Chakraborty D et al.[12] studied Dermatoglyphic in Malay Subjects with Bipolar Mood Disorder , a total of seventy-five Malay patients of either sex were included in this study by performing clinical examination DSM IV criteria for bipolar mood disorder. Forty-nine patients were males and 26 patients were females. One hundred and two Malay individuals, age and sex matched, were taken as the control group. The frequencies of radial loops were increased in patients compared to the controls. There was no significant difference in the atd angle between controls and patients

Jelovac et al.[55] analysed dermatoglyphics in bipolar affective disorder and schizophrenia and reported increased c-d ridge count of the left hand in bipolar mood disorder patients.

Blanca Gutiérrez et al. [17] studied Congenital dermatoglyphic malformations in severe bipolar disorder, assessed two congenital dermatoglyphic malformations (ridge dissociation and abnormal features) and two metric dermatoglyphic traits (total finger ridge count and total a-b ridge count) in a sample of 118 patients with chronic DSM-III-R bipolar illness, and 216 healthy controls. Bipolar cases showed a significant excess of ridge dissociation and abnormal features (OR=2.80; 95% CI: 2.31–3.38) when compared with controls. In the cases, the presence of anomalies was associated

with earlier age of onset. No differences were found for total finger ridge count and total a-b ridge count. No associations were found with sex or familial morbid risk of psychiatric disorders.

Balgir et al. [56] studied and compared dermatoglyphics in Bipolar disorders and schizophrenia, in his study of 240 adult schizophrenic patients and 120 adult manic depressive patients, the frequency of whorls was noted to be higher in manic depressive psychosis and arches higher in schizophrenics. The atd angle was greater in manic depressive psychosis; the axial triradius was more towards the digital end in and manic depressive psychosis.

Meharan Zarghami et al.[57] studied dermatoglyphic patterns in bipolar disorder and schizophrenia and observed that - the frequency of whorl pattern was higher in bipolar disorder group than in control group ($P<0.03$). The frequency of arches in schizophrenia group was less prevalent than that in control group ($P<0.002$). Dermatoglyphic analysis showed only significant differences in the 2nd and 3rd finger of the left hand between bipolar disorder and control group ($P<0.02$ and $P<01$ respectively). The difference was also significant in the 1st and 4th finger of the right hand as well as in the 4th finger of the left hand between schizophrenia and control group ($P<0.04$, $P<04$, and $P<02$ respectively). Dermatoglyphic pattern of the bipolar disorder and schizophrenia patients was not significantly different. They concluded that higher whorl pattern in the 2^{nd} and 3^{rd} finger of the left hand and lower arches in the 1st and 4^{th} finger of the right hand as well as in the 4th finger of the left hand may be associated with disorder and schizophrenia respectively.

Balgir et al.[58] studied dermatoglyphics in MDP and according to the study – in fingerprint pattern 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. 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.

Yousefi-Nooraie R et al.[59] in his research of Dermatoglyphic asymmetry in schizophrenic and bipolar patients found that- mean Right total finger ridge count of schizophrenic group was low as compared to MDP and control. The data was statistically not significant. In his study the mean Right ab ridge count of schizophrenic patients was high, as compared to MDP group and lower than that of control. The data was statistically not significant. With respect to right atd angle – the mean atd angle in Schizophrenic sample, Bipolar sample, and Control sample was- 46.2 (s.d=9.2), 44 (s.d=8.3) and 42.9 (s.d=7.5) respectively. The data was statistically not significant. With respect to right atd angle – the mean atd angle in Schizophrenic sample, Bipolar sample, and Control sample was- 46.8 (s.d=9.5), 43.8 (s.d=7.6) and 42.7 (s.d=8.2) respectively. The data was statistically not significant.

MATERIAL AND METHODS

Material used

1. 'Kores' duplicating ink.
2. White crystal bond paper.
3. Soap, water and towel
4. Magnifying lens
5. Scale and Protractor

Method

The materials used are stamp pad, bond paper and roller. The modified Purvis Smith method was applied. Patients were asked to wash both their hands with soap and water so as to remove any oil or dirt. Black duplicating ink (Kores, Bombay) was smeared on both hands one by one and prints were be taken by rolling the hands from wrist creases to finger tips on the roller covered with bond paper.

Fingerprints:

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].[25]

Right Hand

Thumb → Index Finger → Middle Finger → Ring finger → Little Finger

(R_1) (R_2) (R_3) (R_4) (R_5)

Left Hand

Thumb → Index Finger → Middle Finger → Ring finger → Little Finger

(L1) (L_2) (L_3) (L_4) (L_5)

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 hand was horizontally placed against it and the rod was gradually rolled on the table. Complete palm impression, including the hollow of the palm was obtained over paper. Thus one set of finger prints and palm prints was obtained.

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

Collection of Data

SOURCE OF DATA

The material for the study was clinically diagnosed cases of schizophrenia (100) and 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 BLDE University's Shri. 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.

Method of Data Collection

Mean value of manic depressive psychosis and schizophrenia being 82.2 & standard deviation being 10.2 & considering 95% confidence limits,+/- 2 margin of error, the required sample size was 100.

$N= (1.96)^2S^2/d^2$, S= standard deviation=10.2, d= Margin of error=+/- 2

Study period: Study was carried out for a period of $1^1/_2$ years from November 2010 to April 2012

Sample size: Consecutive 100 patients of schizophrenia, manic depressive psychosis diagnosed clinically in the age group of 15- 70 yrs in both sexes & 100 non psychiatric people of same age group in both sexes as control.

The study includes both qualitative and quantitative measurements. Qualitative variables include finger print patterns (whorls, radial loop, arches, ulnar loop) and in the palm includes, ab ridge count & interdigital patterns. Quantitative variables includes Total Finger Ridge count, Absolute Finger ridge count and atd angle. Data was charted on a excel sheet and analysed using SPSS software and following statistical methods used.

1. Diagrammatic presentation.
2. Mean & Standard deviation.
3. Suitable statistical tests

INCLUSION CRITERIA:

Diagnosed cases of Schizophrenia and Manic Depressive Psychosis as per criteria lay down by Diagnostic and Statistical Manual of Mental Disorders, published by American Psychiatric Association (DSM-IV criteria). [60]

Schizophrenia: includes subtypes- paranoid, disorganized, catatonic, undifferentiated and residual.[60] Diagnosed by consultant Psychiatrist according to DSM-IV criteria.

Manic Depressive Psychosis (MDP): [**Synonymous**- Bipolar Affective Disorder (**BPAD**), Bipolar disorders (**BID**), Bipolar Mood Disorder (**BMD**)] –this includes Bipolar-I, Bipolar –II and Bipolar Disorder not otherwise specified.[60] Diagnosed by consultant Psychiatrist according to DSM-IV criteria. [60]

EXCLUSION CRITERIA:

1. Infected hand.
2. Deep burns of fingers and palms leading to scars.
3. 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 data, the arithmetic mean and standard deviation were calculated. For qualitative data, the 'Chi' square test was applied wherever necessary.[61]

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. .Whorls were recorded as double loop whorls and whorls, but for quantitative analysis, they were grouped together and were called as whorls.

'p' value is probability rate at 0.05 level of significance for the corresponding degree of freedom.

$p<0.05$ is significant.

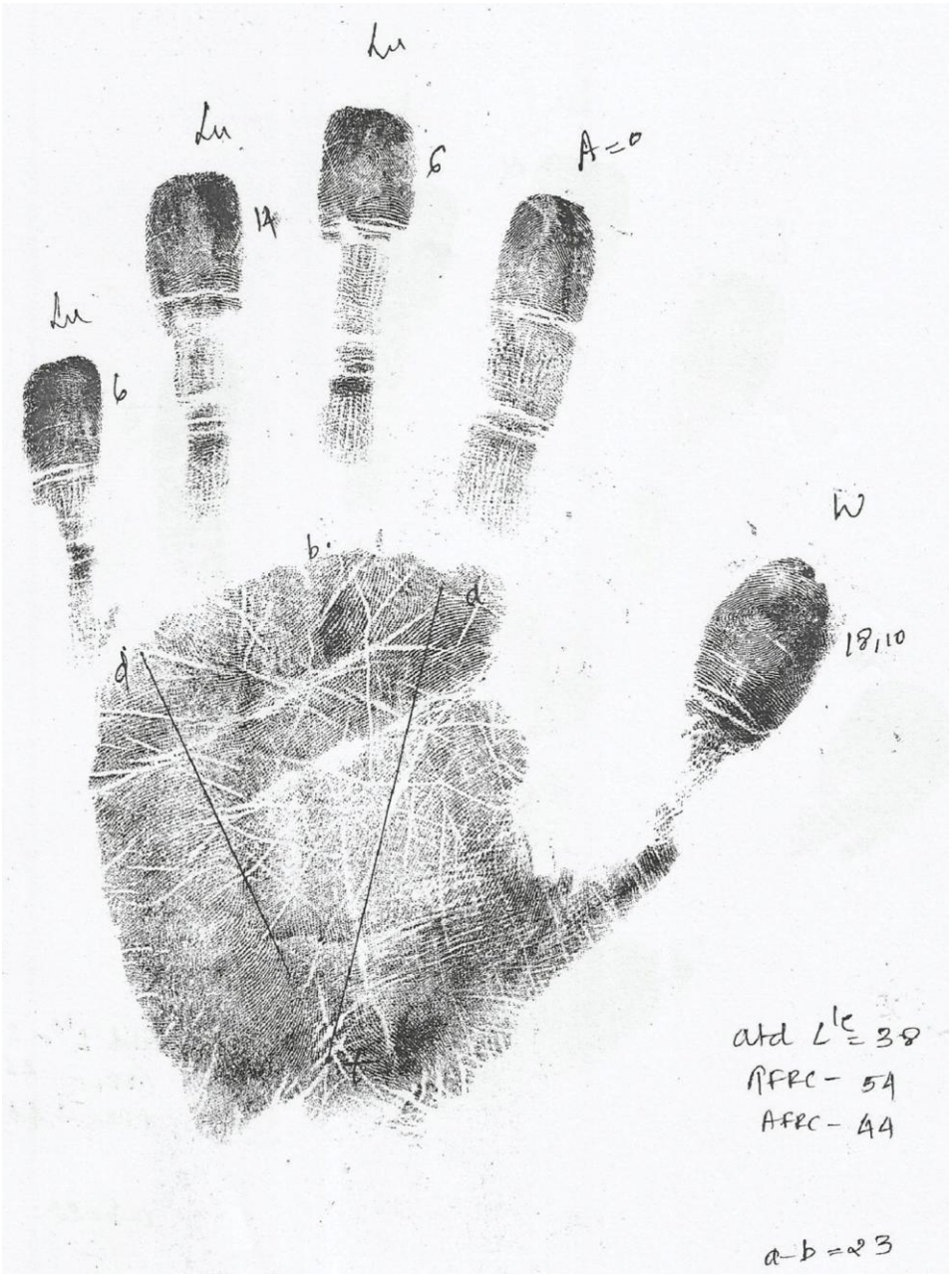
$p>0.05$ is not-significant.

PROCEDURE OF TAKING THE PRINT FROM SUBJECTS

SAMPLE PRINTS

Right hand of Schizophrenic Male

Schizophrenic Male- Left hand



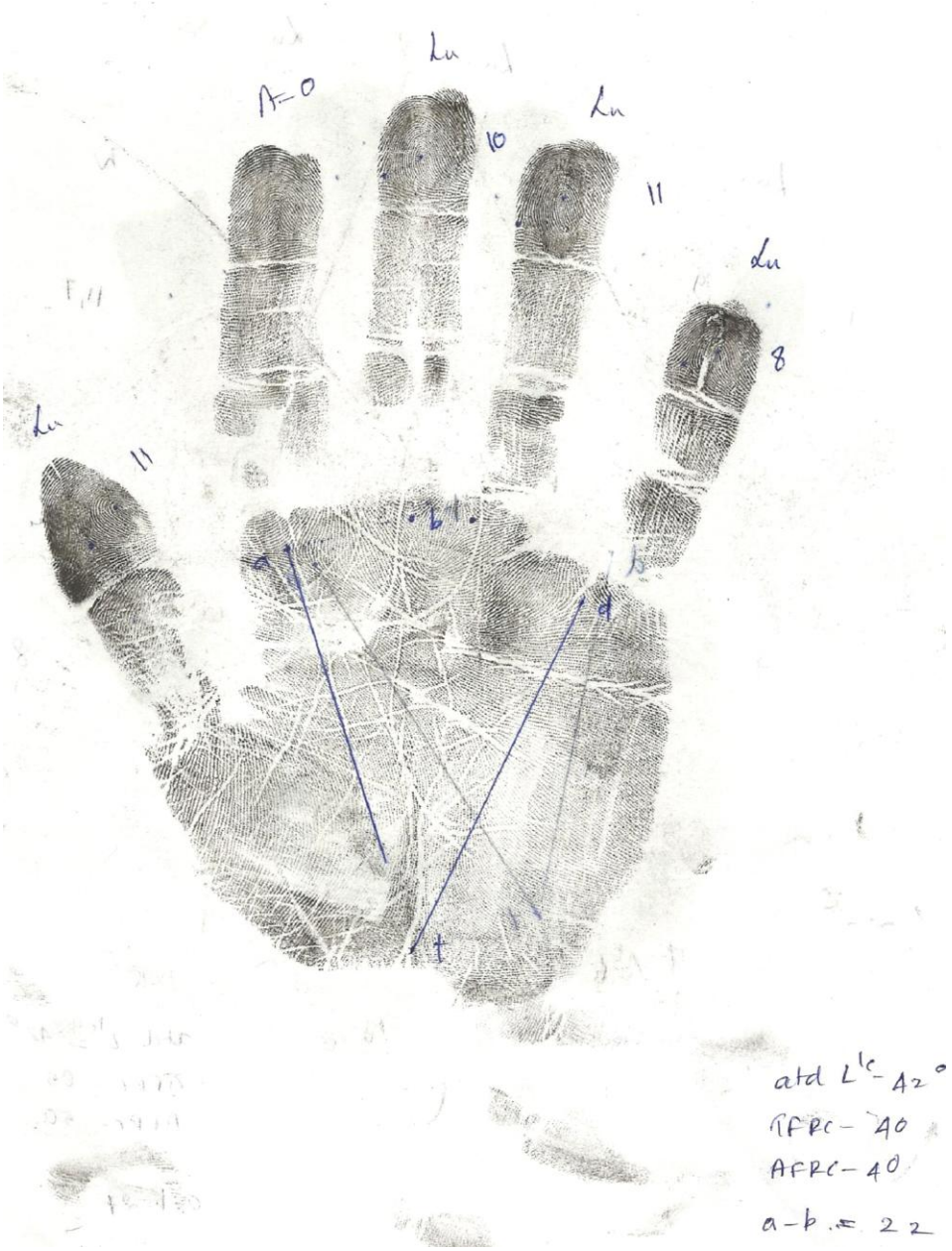
Right hand Schizophrenic Female Patients

Left hand of Schizophrenic Female Patients

Right hand of MDP Male Patients

Left hand of MDP Male Patients

Right hand of MDP Female Patients

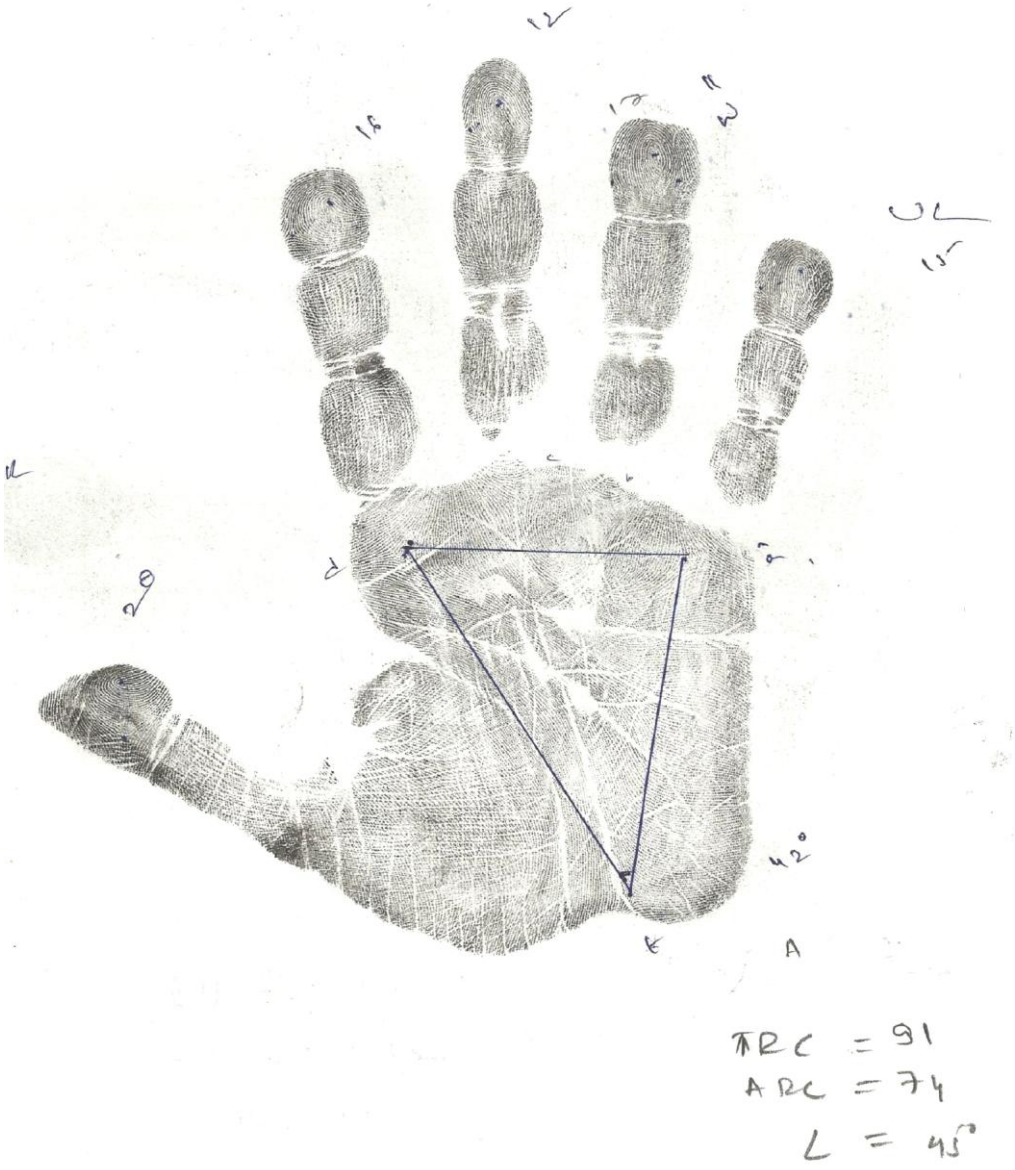


Left hand of MDP Female Patients

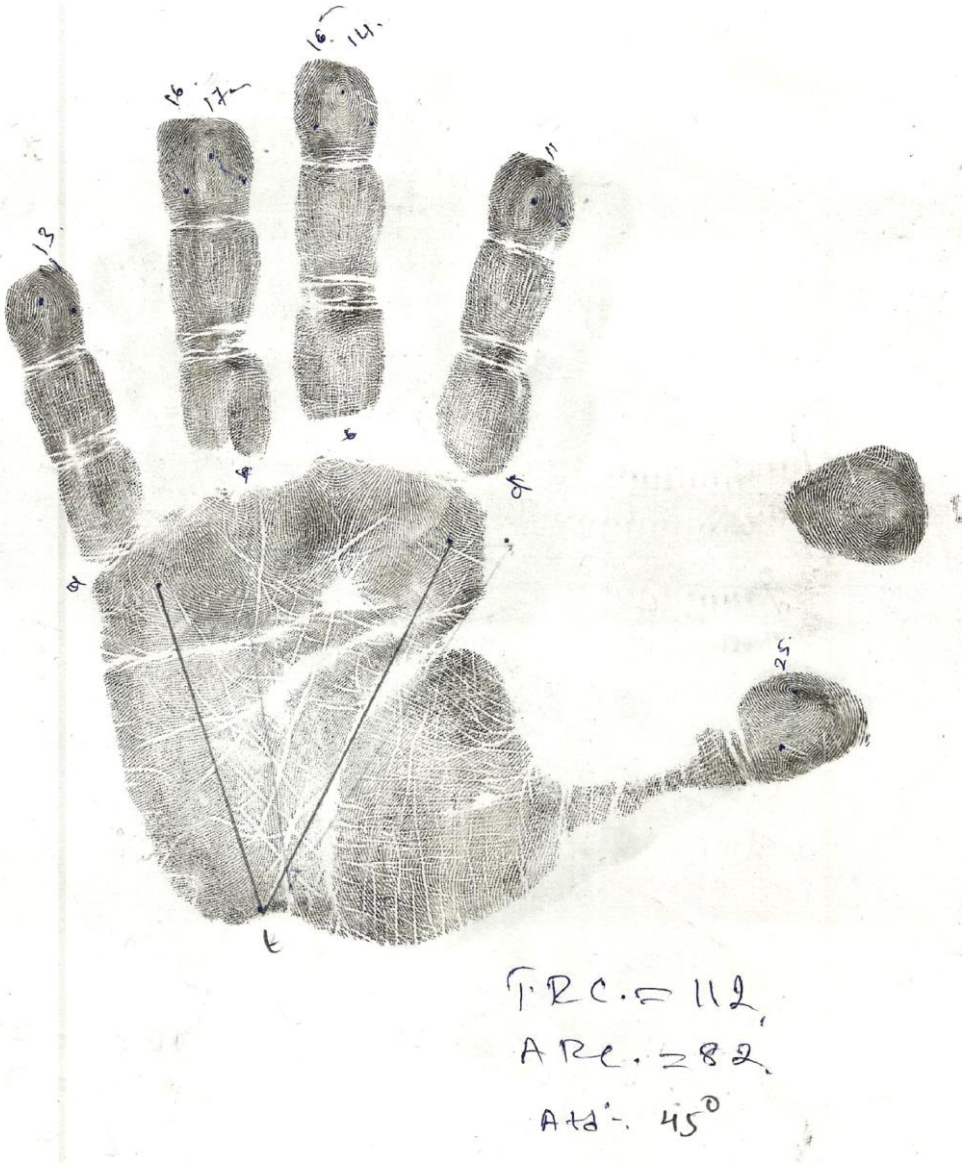
Right hand of Control Male

Left hand of Control Male

Right hand of Control Female



Left hand of Control Female



RESULTS

The present study was carried out at BLDE University's Shri. B.M. Patil Medical College, Hospital and Research Centre, Bijapur. Patients enrolled were those attending out-patient and in-patient department of Psychiatry. Study group consisted of finger and palm prints of clinically diagnosed cases of schizophrenia (100) and manic depressive psychosis (100) as per DSM-IV criteria in the age group of 15 – 70 years. Finger and palm prints of 100 normal people of same age group were used as control. The data was analyzed by appropriate test at 0.05 level of significance with chi square test for qualitative data and t test and ANOVA for quantitative data using Minitab and SPSS and EPI info version 7 statistical softwares and the same is presented below.

Table No.1: Digit wise frequency of patterns in male schizophrenics.

Digit	W		LU		LR		A	
	No	%	No	%	No	%	No	%
R_1	26	52	22	44	1	2	1	2
R_2	21	42	18	36	4	8	7	14
R_3	9	18	40	80	1	2	0	0
R_4	34	68	14	28	0	0	2	4
R_5	16	32	34	68	0	0	0	0
L_1	19	38	29	58	0	0	2	4
L_2	18	36	23	46	2	4	7	14
L_3	7	14	41	82	0	0	2	4
L_4	27	54	21	42	1	2	1	2
L_5	11	22	39	78	0	0	0	0

The above table shows frequency and percentage of patterns in male schizophrenic patients. In digits R1, R2, R4 and L4 whorls were the most commonly occuring patterns, whereas in digits R3, R5, L1, L2, L3 and L5 ulnar loops were most common .

Graph No.1- Digit Wise Frequency Of Patterns In Male Schizophrenics.

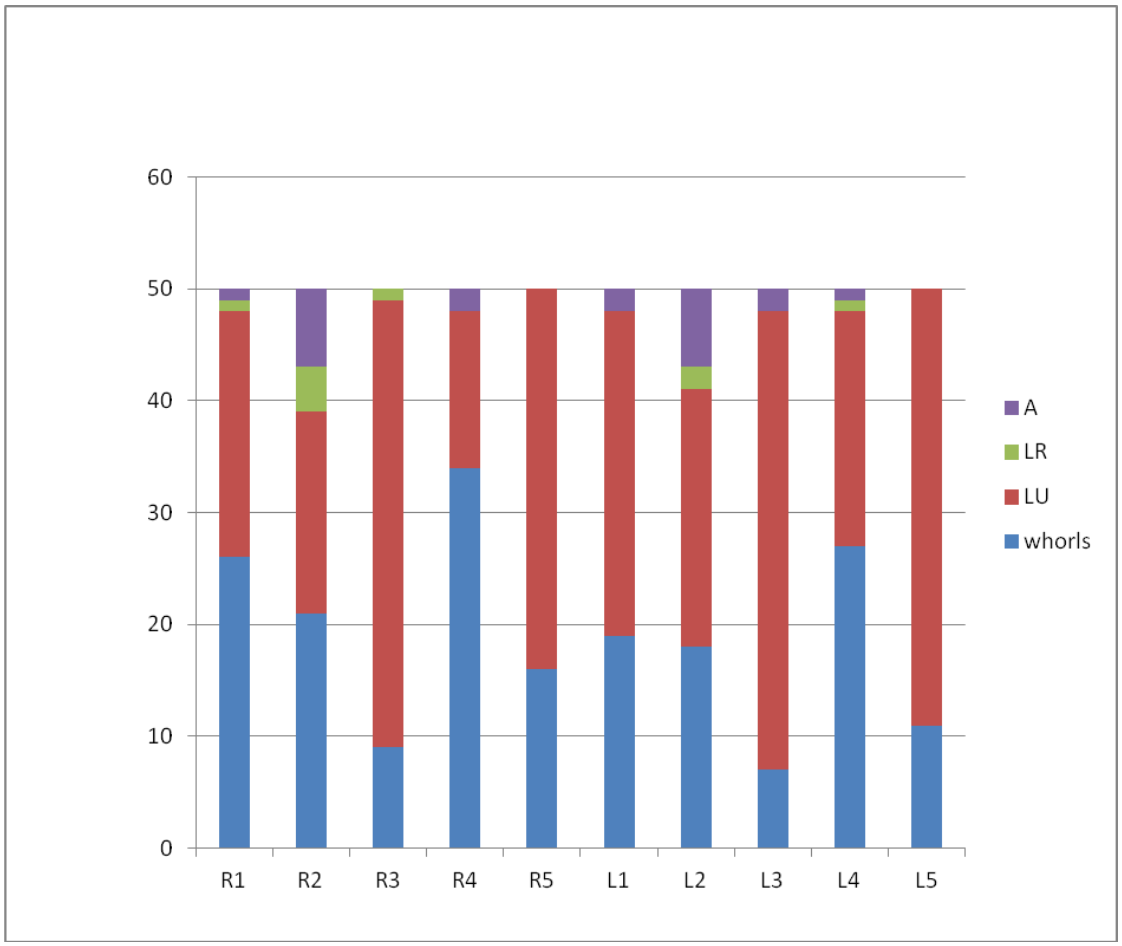


Table No. 2: Digit Wise Frequency Of Patterns In Female Schizophrenics.

Digit	W		LU		LR		A	
	No	%	No	%	No	%	No	%
R_1	19	38	27	54	1	2	3	6
R_2	21	42	25	50	1	2	3	6
R_3	9	18	38	76	0	0	3	6
R_4	26	52	21	42	0	0	3	6
R_5	12	24	35	70	2	4	1	2
L_1	24	48	22	44	0	0	4	8
L_2	20	40	23	46	3	6	4	8
L_3	18	36	26	52	1	2	5	10
L_4	28	56	18	36	3	6	1	2
L_5	12	24	38	76	0	0	0	0

The above table shows frequency and percentage of patterns in female schizophrenic patients. In digits R4, L1 and L4 whorls were the most commonly occurring patterns, whereas in digits R1, R2, R3, R5, L2, L3 and L5 ulnar loops are the most common patterns.

Table No.3: Digit Wise Frequency Of Pattern In Male MDP patients.

Digit	W		LU		LR		A	
	No	%	No	%	No	%	No	%
R_1	28	49.1	29	50.9	0	0	0	0
R_2	29	50.9	20	35.1	0	0	8	14
R_3	19	33.3	35	61.4	0	0	3	5.3
R_4	23	40.4	34	59.6	0	0	0	0
R_5	16	28.1	40	70.2	0	0	1	1.8
L_1	20	35.1	35	61.4	0	0	2	3.5
L_2	29	50.9	23	40.4	0	0	5	8.8
L_3	20	35.1	33	57.9	1	1.8	3	5.3
L_4	21	36.8	34	59.6	2	3.5	0	0
L_5	18	31.6	37	64.9	0	0	2	3.5

The above table shows frequency and percentage of patterns in male MDP patients. In digits R2 and L2 whorls were the most commonly occurring patterns, whereas in digits R1, R3, R4, R5, L1, L3, L4, and L5 ulnar loops were most common.

Table No.4: Digit Wise Frequency Of Patterns In Female MDP patients.

Digit	W		LU		LR		A	
	No	%	No	%	No	%	No	%
R_1	22	51.2	21	48.8	0	0	0	0
R_2	19	44.2	16	37.2	1	2.3	7	16.3
R_3	12	27.9	29	67.3	0	0	2	4.7
R_4	17	39.5	26	60.5	0	0	0	0
R_5	11	25.6	30	69.8	1	2.3	1	2.3
L_1	19	44.2	23	53.5	0	0	1	2.3
L_2	21	48.8	16	37.2	1	2.3	5	11.6
L_3	11	25.6	27	62.8	1	2.3	4	9.3
L_4	18	41.9	23	53.5	1	2.3	1	2.3
L_5	12	27.9	31	72.1	0	0	0	0

The above table shows frequency and percentage of patterns in female MDP patients. In digits R1, R2 and L2 whorls were the most commonly occurring patterns, whereas in digits R3, R4, R5, L1, L3, L4, and L5 ulnar loops were most common.

Table No.5: Digit Wise Frequency Of Patterns In Male Controls.

Digit	W		LU		LR		A	
	No	%	No	%	No	%	No	%
R_1	18	36	29	58	0	0	3	6
R_2	19	38	20	40	4	8	7	14
R_3	10	20	38	76	0	0	2	4
R_4	30	60	20	40	0	0	0	0
R_5	14	28	35	70	0	0	1	2
L_1	17	34	29	58	1	2	3	6
L_2	18	36	22	44	3	6	7	14
L_3	15	30	33	66	0	0	2	4
L_4	33	66	17	34	0	0`	0	0
L_5	14	28	36	72	0	0	0	0

The above table shows frequency and percentage of patterns in female MDP patients. In digits R4 and L4 whorls were the most commonly occurring patterns, whereas in digits R1, R2, R3,R5, L1, L2, L3, and L5 ulnar loops were most common.

Table No.6: Digit Wise Frequency Of Patterns In Female Controls.

Digit	W		LU		LR		A	
	No	%	No	%	No	%	No	%
R_1	18	36	29	58	0	0	3	6
R_2	19	38	24	48	2	4	5	10
R_3	10	20	36	72	1	2	3	6
R_4	25	50	23	46	0	0	2	4
R_5	7	14	42	84	0	0	1	2
L_1	21	42	24	48	0	0	5	10
L_2	17	34	20	40	3	6	10	20
L_3	14	28	31	62	1	2	4	8
L_4	22	44	27	54	0	0	1	2
L_5	10	20	38	76	1	2	1	2

The above table shows frequency and percentage of patterns in female MDP patients. In digit R4 whorls were the most commonly occurring patterns, whereas in rest of the digits i.e. R1, R2,R3, R5, L1, L2,L3, L4, and L5 ulnar loops were most common.

Table No.7: Digit Wise Frequency Of Patterns In Schizophrenic Males and Control Males.

Digit	Schizophrenic Males								Control Males							
	W		LU		LR		A		W		LU		LR		A	
	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
R_1	26	52	22	44	1	2	1	2	18	36	29	58	0	0	3	6
R_2	21	42	18	36	4	8	7	14	19	38	20	40	4	8	7	14
R_3	9	18	40	80	1	2	0	0	10	20	38	76	0	0	2	4
R_4	34	68	14	28	0	0	2	4	30	60	20	40	0	0	0	0
R_5	16	32	34	68	0	0	0	0	14	28	35	70	0	0	1	2
L_1	19	38	29	58	0	0	2	4	17	34	29	58	1	2	3	6
L_2	18	36	23	46	2	4	7	14	18	36	22	44	3	6	7	14
L_3	7	14	41	82	0	0	2	4	15	30	33	66	0	0	2	4
L_4	27	54	21	42	1	2	1	2	33	66	17	34	0	0	0	0
L_5	11	22	39	78	0	0	0	0	14	28	36	72	0	0	0	0
Total	**188**	**37.6**	**281**	**56.2**	**9**	**1.8**	**22**	**4.4**	**188**	**37.6**	**279**	**55.8**	**8**	**1.6**	**25**	**5**

The above table depicts the number and percentage of fingerprint patterns in male schizophrenics and controls in individual fingers.

In digit R1 there was increase in whorls while ulnar loops and arches were decreased in male schizophrenics in comparison with controls. Radial loops were absent in controls.

In male schizophrenics there was increase in whorls and decrease in ulnar loops in digit R2, in comparison with controls, while radial loops and arches were equal in both male schizophrenics and controls.

In male schizophrenics in digit R3 there was increase in ulnar loops and radial loops while whorls were decreased in comparison with controls. Arches were absent in male schizophrenics.

In male schizophrenics in digit R4 there was increase in whorls and arches while ulnar loops were decreased in comparison with controls. Radial loops were absent in male schizophrenics.

In male schizophrenics in digit R5 there was increase in whorls while ulnar loops were decreased in comparison with controls. Arches and radial loops were absent in male schizophrenics.

In male schizophrenics in digit L1 there was increase in whorls while arches were decreased in comparison with controls. Ulnar loops were equal in both male schizophrenics and controls. Radial loops were absent in male schizophrenics.

In male schizophrenics in digit L2 there was increase in ulnar loops while radial loops were decreased in comparison with controls. Whorls and arches were equal in both male schizophrenics and controls.

In male schizophrenics in digit L3 there was increase in ulnar loops while whorls were decreased in comparison with controls. Arches were equal in both male schizophrenics and controls. Radial loops were absent in both male schizophrenics and controls.

In male schizophrenics in digit L4 there was increase in ulnar loops, arches and radial loops while whorls were decreased in comparison with controls.

In male schizophrenics in digit L5 there was increase in ulnar loops while whorls were decreased in comparison with controls. Arches and radial loops were absent in both male schizophrenics and controls.

Table No.8: Digit Wise Frequency Of Patterns In Schizophrenic Females and Control Females.

Digit	Schizophrenic Females								Control Females							
	W		LU		LR		A		W		LU		LR		A	
	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
R_1	19	38	27	54	1	2	3	6	18	36	29	58	0	0	3	6
R_2	21	42	25	50	1	2	3	6	19	38	24	48	2	4	5	10
R_3	9	18	38	76	0	0	3	6	10	20	36	72	1	2	3	6
R_4	26	52	21	42	0	0	3	6	25	50	23	46	0	0	2	4
R_5	12	24	35	70	2	4	1	2	7	14	42	84	0	0	1	2
L_1	24	48	22	44	0	0	4	8	21	42	24	48	0	0	5	10
L_2	20	40	23	46	3	6	4	8	17	34	20	40	3	6	10	20
L_3	18	36	26	52	1	2	5	10	14	28	31	62	1	2	4	8
L_4	28	56	18	36	3	6	1	2	22	44	27	54	0	0	1	2
L_5	12	24	38	76	0	0	0	0	10	20	38	76	1	2	1	2
Total	**189**	**37.8**	**273**	**54.6**	**11**	**2.2**	**27**	**5.4**	**163**	**32.6**	**294**	**58.8**	**8**	**1.6**	**35**	**7**

The above table depicts the number and percentage of fingerprint patterns in female schizophrenics and controls in individual fingers.

In female schizophrenics in digit R1 there was increase in whorls and radial loops while ulnar loops were decreased in comparison with controls. Arches were equal in both female schizophrenics and controls.

In female schizophrenics there was increase in whorls and ulnar loops and decrease in radial loops and arches in digit R2, in comparison with controls.

In female schizophrenics in digit R3 there was increase in ulnar loops while whorls were decreased in comparison with controls. Arches were equal in both female schizophrenics and controls whereas radial loops were absent in both female schizophrenics and controls.

In female schizophrenics in digit R4 there was increase in whorls and arches while ulnar loops were decreased in comparison with controls. Radial loops were absent in both female schizophrenics and controls.

In female schizophrenics in digit R5 there was increase in whorls and radial loops while ulnar loops were decreased in comparison with controls. Arches were equal in both female schizophrenics and controls.

In female schizophrenics in digit L1 there was increase in whorls while arches and ulnar loops were decreased in comparison with controls. Radial loops were absent in both female schizophrenics and controls.

In female schizophrenics in digit L2 there was increase in whorls and ulnar loops while arches were decreased in comparison with controls. Radial loops were equal in both female schizophrenics and controls.

In female schizophrenics in digit L3 there was increase in whorls and arches while ulnar loops were decreased in comparison with controls. Radial loops were equal in both female schizophrenics and controls.

In female schizophrenics in digit L4 there was increase in whorls and radial loops while ulnar loops were decreased in comparison with controls. Arches were equal in both female schizophrenics and controls.

In female schizophrenics in digit L5 there was increase in whorls in comparison with controls. Ulnar loops were equal in both female schizophrenics and controls. Arches and radial loops were absent in both male schizophrenics and controls.

Table No.9: Digit Wise Frequency Of Patterns In Male MDP patients and Controls.

Digit	MDP Males								Control Males							
	W		LU		LR		A		W		LU		LR		A	
	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
R_1	28	49.1	29	50.9	0	0	0	0	18	36	29	58	0	0	3	6
R_2	29	50.9	20	35.1	0	0	8	14	19	38	20	40	4	8	7	14
R_3	19	33.3	35	61.4	0	0	3	5.3	10	20	38	76	0	0	2	4
R_4	23	40.4	34	59.6	0	0	0	0	30	60	20	40	0	0	0	0
R_5	16	28.1	40	70.2	0	0	1	1.8	14	28	35	70	0	0	1	2
L_1	20	35.1	35	61.4	0	0	2	3.5	17	34	29	58	1	2	3	6
L_2	29	50.9	23	40.4	0	0	5	8.8	18	36	22	44	3	6	7	14
L_3	20	35.1	33	57.9	1	1.8	3	5.3	15	30	33	66	0	0	2	4
L_4	21	36.8	34	59.6	2	3.5	0	0	33	66	17	34	0	0	0	0
L_5	18	31.6	37	64.9	0	0	2	3.5	14	28	36	72	0	0	0	0
Total	**223**	**39.1**	**320**	**56.1**	**3**	**0.5**	**24**	**4.2**	**188**	**37.6**	**279**	**55.8**	**8**	**1.6**	**25**	**5**

The above table depicts the number and percentage of fingerprint patterns in male MDP patients and controls in individual fingers.

In digit R1 there was increase in whorls while ulnar loops were decreased in male MDP patients in comparison with controls. Arches and radial loops were absent in both male MDP patients and controls.

In male MDP patients there was increase in whorls and decrease in ulnar loops in digit R2, in comparison with controls, while arches were equal in both male MDP patients and controls. Radial loops were absent in male MDP patients.

In male MDP patients in digit R3 there was increase in whorls and arches while ulnar loops were decreased in comparison with controls. Radial loops were absent in both male MDP patients and controls.

In male MDP patients in digit R4 there was increase in ulnar loops while whorls were decreased in comparison with controls. Arches and radial loops were absent in both male MDP patients and controls.

In male MDP patients in digit R5 there was increase in whorls and ulnar loops while arches were decreased in comparison with controls. Radial loops were absent in both male MDP patients and controls.

In male MDP patients in digit L1 there was increase in whorls and ulnar loops while arches were decreased in comparison with controls.. Radial loops were absent in male MDP patients.

In male MDP patients in digit L2 there was increase in whorls while ulnar loops and arches were decreased in comparison with controls. Radial loops were absent in male MDP patients.

In male MDP patients in digit L3 there was increase in whorls, arches and radial loops while ulnar loops were decreased in comparison with controls.

In male MDP patients in digit L4 there was increase in ulnar loops and radial loops while whorls were decreased in comparison with controls. Arches were absent in male MDP patients.

In male MDP patients in digit L5 there was increase in whorls and arches while ulnar loops were decreased in comparison with controls. Radial loops were absent in both male MDP patients and controls.

Table No.10: Digit Wise Frequency Of Patterns In Female MDP patients and Controls.

Digit	MDP Females								Control Females							
	W		LU		LR		A		W		LU		LR		A	
	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
R_1	22	51.2	21	48.8	0	0	0	0	18	36	29	58	0	0	3	6
R_2	19	44.2	16	37.2	1	2.3	7	16.3	19	38	24	48	2	4	5	10
R_3	12	27.9	29	67.3	0	0	2	4.7	10	20	36	72	1	2	3	6
R_4	17	39.5	26	60.5	0	0	0	0	25	50	23	46	0	0	2	4
R_5	11	25.6	30	69.8	1	2.3	1	2.3	7	14	42	84	0	0	1	2
L_1	19	44.2	23	53.5	0	0	1	2.3	21	42	24	48	0	0	5	10
L_2	21	48.8	16	37.2	1	2.3	5	11.6	17	34	20	40	3	6	10	20
L_3	11	25.6	27	62.8	1	2.3	4	9.3	14	28	31	62	1	2	4	8
L_4	18	41.9	23	53.5	1	2.3	1	2.3	22	44	27	54	0	0	1	2
L_5	12	27.9	31	72.1	0	0	0	0	10	20	38	76	1	2	1	2
Total	**162**	**37.6**	**242**	**56.2**	**5**	**1.8**	**21**	**4.8**	**163**	**32.6**	**294**	**58.8**	**8**	**1.6**	**35**	**7**

The above table depicts the number and percentage of fingerprint patterns in female MDP patients and controls in individual fingers.

In digit R1 there was increase in whorls while ulnar loops were decreased in female MDP patients in comparison with controls. Arches and radial loops were absent in both female MDP patients and controls.

In female MDP patients there was increase in whorls and arches; decrease in ulnar loops and radial loops in digit R2, in comparison with controls.

In female MDP patients in digit R3 there was increase in whorls while ulnar loops and arches were decreased in comparison with controls. Radial loops were absent in female MDP patients.

In female MDP patients in digit R4 there was increase in ulnar loops while whorls were decreased in comparison with controls. Arches and radial loops were absent in both female MDP patients and controls.

In female MDP patients in digit R5 there was increase in whorls, arches and radial loops while ulnar loops were decreased in comparison with controls.

In female MDP patients in digit L1 there was increase in whorls and ulnar loops while arches were decreased in comparison with controls. Radial loops were absent in both male MDP patients and controls.

In female MDP patients in digit L2 there was increase in whorls while ulnar loops arches and radial loops were decreased in comparison with controls.

In female MDP patients in digit L3 there was increase in whorls, arches and radial loops while ulnar loops were decreased in comparison with controls.

In female MDP patients in digit L4 there was increase in arches and radial loops while ulnar loops and whorls were decreased in comparison with controls.

In female MDP patients in digit L5 there was increase in whorls while ulnar loops were decreased in comparison with controls. Arches and radial loops were absent in female MDP patients.

Table No.11: Comparison Of Fingerprint Patterns In Right Hand Of Schizophrenic Males & Control Males.

Male-right hand	**W**		**LU**		**LR**		**A**		**Statistics**
	No	%	No	%	No	%	No	%	$\chi 2 = 2.659$
Schizophrenics	91	36.4	142	56.8	4	1.6	13	5.2	d(f)= 3
Controls	106	42.4	128	51.2	6	2.4	10	4	p= 0.447

The above table reveals - Loops were most frequently occurring patterns in schizophrenics & controls. Increased incidence of ulnar loops (56.8% vs. 51.2%), arches (5.2% vs. 4%) decreased incidence of whorls (56.2% vs. 57.3%) and radial loops (0.8% vs. 1.6%) was seen in right hand of Male Schizophrenic patients as compared with controls .It can also be appreciated that the difference was statistically non significant (p= 0.447).

Table No.12: Comparison Of Fingerprint Patterns In Left Hand Of Schizophrenic Males & Control Males.

Male- left hand	W		LU		LR		A		Statistics
	No	%	No	%	No	%	No	%	
Schizophrenics	97	38.8	137	54.8	4	1.6	12	4.8	$\chi 2$= 2.283 d(f)= 3
Controls	82	32.8	153	61.2	3	1.2	12	4.8	p= 0.516

The above table reveals - Loops were most frequently occurring patterns in schizophrenics & controls. Increased incidence of whorls (38.8% vs. 32.8%),and radial loops (1.6% vs. 1.2%) and decreased incidence of ulnar loops (54.8% vs. 61.2%) was seen in left hand of Male Schizophrenia patients as compared with controls. Incidence of arches remained same in both groups (4.8% vs. 4.8%). It can also be appreciated that the difference was statistically non significant (p= 0.516).

Table No.13: Comparison Of Fingerprint Patterns In Right Hand Of Schizophrenic Females & Control Females.

Female- Right hand	W		LU		LR		A		Statistics
	No	%	No	%	No	%	No	%	
Schizophrenics	87	34.8	146	58.4	4	1.6	13	5.2	$\chi 2$= 0.688 d(f)= 3
Controls	79	31.6	154	61.6	3	1.2	14	5.6	p= 0.876

The above table reveals - Loops were most frequently occurring patterns in schizophrenics & controls. Increased incidence of whorls (34.8% vs. 31.6%), and radial

loops (1.6% vs. 1.2%). decreased incidence of ulnar loops (61.6% vs. 58.4%) and arches (5.2% vs. 5.6%) was seen in right hand of female Schizophrenia patients as compared with controls. It can also be appreciated that the difference was statistically non significant (P= 0.876).

Table No.14: Comparison Of Fingerprint Patterns In Left Hand Of Schizophrenic Females & Control females.

Female-left hand	**W**		**LU**		**LR**		**A**		**Statistics**
	No	%	No	%	No	%	No	%	$\chi 2$= 2.283
Schizophrenics	84	33.6	140	56	5	2	21	8.4	d(f)= 3
Controls	102	40.8	127	50.8	7	2.8	14	5.6	p= 0.250

The above table reveals - Loops were most frequently occurring patterns in schizophrenics & controls. Decreased incidence of whorls (33.6% vs. 40.8%), and radial loops (2% vs. 2.8%). Increased incidence of ulnar loops (56% vs. 50.8%) and arches (8.4% vs. 5.6%) was seen in left hand of female Schizophrenia patients as compared with controls. It can also be appreciated that the difference was statistically non significant (p= 0.250).

Table No.15: Comparison Of Fingerprint Patterns In Schizophrenic Males & Control Males.

Male- Right + Left	W		LU		LR		A		Statistics
	No	%	No	%	No	%	No	%	$\chi 2$= 0.257
Schizophrenics	188	37.6	279	55.8	8	1.6	25	5	d(f)= 3
Controls	188	37.6	281	56.2	9	1.2	22	4.4	p= 0.968

The above table reveals - **Loops** were most frequently occurring patterns in schizophrenics & controls. Incidence of whorls remained same in both groups (37.6%), decreased incidence of ulnar loops (55.8% vs. 56.2%). Increased incidence of radial loops (1.6% vs. 1.2%) and arches (5% vs. 4.4%) was seen in male schizophrenic patients as compared with controls. It can also be appreciated that the difference was statistically non significant (p= 0.968).

Table No.16: Comparison Of Fingerprint Patterns In Female Schizophrenics & Controls.

Female- Right + Left	W		LU		LR		A		Statistics
	No	%	No	%	No	%	No	%	$\chi 2$= 4.20
Schizophrenics	189	37.8	294	58.8	8	1.6	35	7	d(f)= 3
Controls	163	32.6	273	54.6	11	2.2	27	5.4	p= 0.240

The above table reveals - Loops were most frequently occurring patterns in both the schizophrenics & controls. Increased incidence of loops (58.8% vs. 54.6%), and

arches (7% vs. 5.4%) and decreased incidence of whorls (32.6% vs. 37.8%) and radial loops (1.6% vs. 2.2%) was seen in female schizophrenic patients as compared with controls. It can also be appreciated that the difference was statistically non significant (p= 0.240).

Graph No.2-Comparison Of Fingerprint Patterns In Female Schizophrenics & Controls

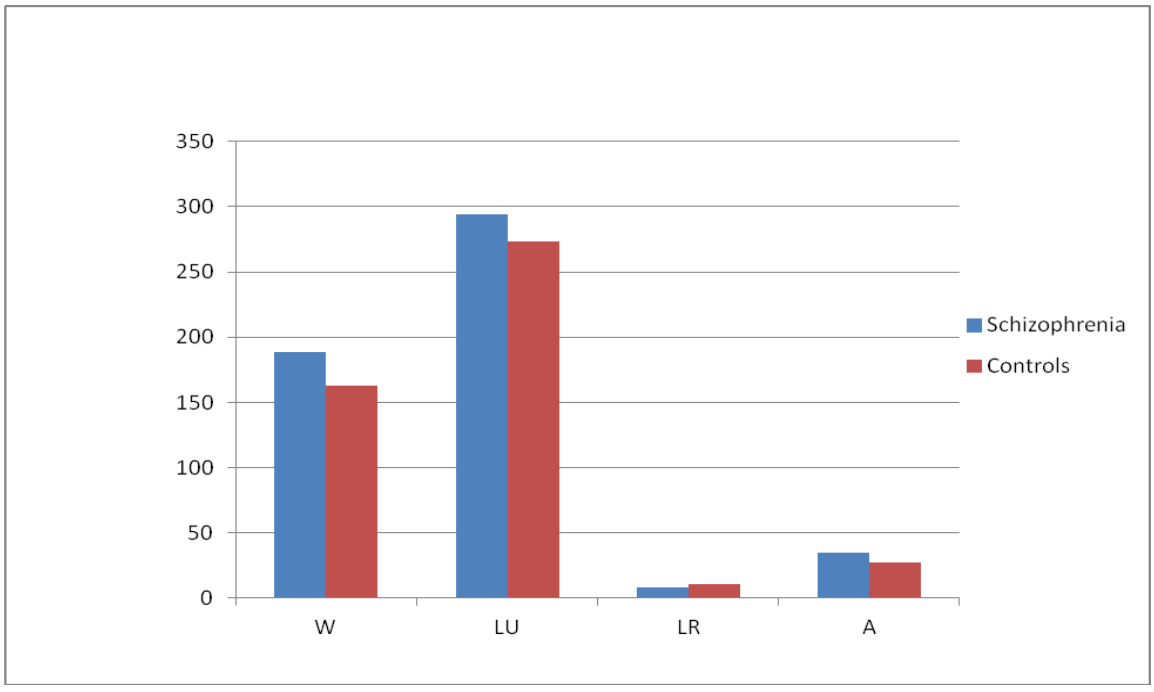


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Table No.17: Comparison Of Fingerprint Patterns In Schizophrenics & Controls.

Patterns	Schizophrenics (Male+Female)	Controls (Male+Female))	χ^2	p value
W	377 (37.7)	351 (35.1)	χ^2=2.8,d(f)=3	p= 0.42
L U	554 (55.4)	573 (57.3)		
L R	20 (2)	16 (1.6)		
A	49 (4.9)	60 (6)		

The above table shows - Loops were the most frequently occurring patterns in both the schizophrenics & controls. In schizophrenic patients as compared with control there was -Increased incidence of whorls (37.7% vs. 35.1%), and radial loops (2% vs. 1.6%) and decreased incidence of loops (55.4% vs. 57.3%) and arches (6% vs. 4.2%). It can also be appreciated that the difference was statistically non significant (p= 0.42).

Table No.18: Comparison Of Fingerprint Patterns In Right Hand Of Male MDP Patients & Controls.

Male	W		LU		LR		A		Statistics
Right hand	No	%	No	%	No	%	No	%	χ^2= 5.423
MDP	115	40.4	158	55.4	0	0	12	4.2	d(f)= 3
Controls	91	36.4	142	56.8	4	1.6	13	5.2	p= 0.143

From the above table it seen that- increased incidence of whorls (40.4%vs. 36.4%), decreased incidence of arches (4.2%vs. 5.2%), ulnar loops (55.4%vs. 56.8%) and

radial loops (0%vs. 1.6%) was seen in right hand of MDP males as compared with right hand of control males. The difference was statistically non significant (p= 0.143).

Table No.19: Comparison of fingerprint patterns in left hand of Male MDP Patients & Controls.

Male- left hand	W		LU		LR		A		Statistics
	No	%	No	%	No	%	No	%	$\chi 2$= 0.536
MDP	108	37.9	162	56.8	3	1.1	12	4.2	d(f)= 3
Controls	97	38.8	137	54.8	4	1.6	12	4.2	p= 0.911

From the above table it seen that- decreased incidence of whorls (37.9%vs. 38.8%), similar incidence of arches (4.2%vs. 4.2%), increased ulnar loops (56.8%vs. 54.8%) and decreased incidence radial loops (1.1%vs. 1.6%) was observed in left hand of MDP males as compared with left hand of control males. It can also be seen that the difference was statistically non significant (p= 0.91).

Table No.20: Comparison Of Fingerprint Patterns In Right Hand Of Female MDP Patients & Controls.

Female- right hand	W		LU		LR		A		Statistics
	No	%	No	%	No	%	No	%	$\chi 2$= 1.979
MDP	81	37.7	122	56.7	2	0.9	10	4.7	d(f)= 3
Controls	79	31.6	154	61.6	3	1.2	14	5.6	p= 0.577

The above table depicts- increased incidence of whorls (37.7% vs. 31.5%), decreased incidence of arches (4.7%vs. 5.6%), ulnar loops (56.7% vs. 61.6%) and radial

loops (0.9% vs. 1.2%) in right hand of MDP females as compared with right hand of control females. It can also be appreciated that the difference was statistically non significant (p= 0.57).

Table No.21: Comparison Of Fingerprint Patterns In Left Hand Of Female MDP Patients & Controls

Female-left hand	W		LU		LR		A		Statistics
	No	%	No	%	No	%	No	%	$\chi 2$= 2.598
MDP	81	37.7	120	55.8	3	1.4	11	5.1	d(f)= 3
Controls	84	33.6	140	56	5	2	21	8.4	p= 0.458

The above table shows- increased incidence of whorls (37.7% vs. 33.6%), decreased incidence of arches (5.1% vs. 8.4%), ulnar loops (55.8% vs. 56%) and radial loops (1.4% vs. 2%) in left hand of MDP females as compared with left hand of control females. It can also be appreciated that the difference was statistically non significant (p= 0.48).

Table No.22: Comparison Of Fingerprint Patterns In Male MDP Patients & Controls

Male-Right + Left	W		LU		LR		A		Statistics
	No	%	No	%	No	%	No	%	$\chi 2$= 3.516
MDP	223	39.1	320	56.1	3	0.5	24	4.2	d(f)= 3
Controls	188	37.6	279	55.8	8	1.6	25	5	p= 0.319

The above described table 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. It can also be appreciated that the difference was statistically non-significant (p= 0.31).

Table No.23: Comparison Of Fingerprint Patterns In Female MDP Patients & Controls

Female- Right + Left	**W**		**LU**		**LR**		**A**		**Statistics**
	No	%	No	%	No	%	No	%	$\chi 2$= 3.994
MDP	162	37.7	242	56.3	5	1.2	21	4.9	d(f)= 3
Controls	163	32.6	294	58.8	8	1.6	35	7	p= 0.262

The above table shows- increased incidence of whorls (37.7% vs. 32.6%), decreased incidence of arches (4.9% vs. 7%), ulnar loops (56.3% vs. 5883%) 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).

Table No.24: 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 %)	χ^2**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 %)		

The above table 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).

Table No.25: Comparison Of Fingerprint Patterns In Schizophrenics, MDP And Controls

Patterns	Schizophrenics (Male+Female)	MDP (Male+Female)	Controls (Male+Female))
W	377 (37.7%)	385 (38.5%)	351 (35.1%)
L U	554 (55.4%)	562 (56.2%)	573 (57.3%)
L R	20 (2%)	8 (0.8%)	16 (1.6%)
A	49 (4.9%)	45 (4.5%)	60 (6%)

χ^2=9.48 d(f)=6 p=0.148

From the above table it can be seen that- Whorls- 37.7% in Schizophrenia, 38.5 in MDP and 35.1% in controls. Ulnar-Loops are most frequently occurring patterns in all the three groups namely- 55.4% in Schizophrenia, 56.2 % in MDP and 57.3% in control group. Radial loops were more frequently seen in Schizophrenia (2%) than MDP (0.8%) or Controls (1.6%). Arches were more frequently occurring patterns in control group (6%) than Schizophrenia (4.9%) or MDP (4.5%). Statistically there was no significant difference in occurrence of the patterns in all the three groups ($p= 0.148$).

Table No.26: Comparison Of Quantitative Dermatoglyphic Features In Schizophrenics & Controls.

Feature	Group (N=100)	Mean	Std. Deviation	t-value	Sig. (2-tailed)
AFRC	Schizophrenics	151.91	48.764	-.335	.738
	Controls	154.75	69.381		
TFRC	Schizophrenics	117.01	31.504	.036	.972
	Controls	117.18	35.692		
R-abRC	Schizophrenics	29.69	6.761	-6.550	.000
	Controls	35.72	6.249		
L-abRC	Schizophrenics	30.32	6.268	-6.473	.000
	Controls	35.94	5.976		
R-atd	Schizophrenics	40.09	4.515	1.440	.152
	Controls	39.11	5.095		
L-atd	Schizophrenics	40.75	5.273	1.680	.095
	Controls	39.50	5.252		

The above described table shows that the Mean AFRC in Schizophrenics was lower (151.9) with S.D. of 48.76 as compared to control group which was having AFRC of 154.7 with S.D. of 69.3. This difference was statistically not Significant. (p=0.738**).**

The above described table shows that the Mean TFRC in Schizophrenics was lower (117.01) with S.D. of 31.5 as compared to control group which was having TFRC of 117.18 with S.D. of 35.6. This difference was statistically not significant. (p=0.972**).**

The above described table shows that the Mean ab-RC in right hand of Schizophrenics was lower (29.69) with S.D. of 6.7 as compared to control group which was having ab-RC of 35.72 with S.D. of 6.2. This difference was statistically highly significant. (p=0.000)**.**

The above described table shows that the Mean ab-RC in left hand of Schizophrenics was lower (30.32) with S.D. of 6.2 as compared to control group which was having ab-RC of 35.94 with S.D. of 5.9 This difference was statistically highly significant. (p=0.000)**.**

The above described table shows that the Mean atd angle on right hand in Schizophrenics was higher (40.09) with S.D. of 4.5 as compared to control group which was having atd angle of 39.11 with S.D. of 5.09. This difference is statistically not significant. (p=0.152**).**

The above described table shows that the Mean atd angle on left hand in Schizophrenics was higher (40.75) with S.D. of 5.2 as compared to control group which was having atd angle of 39.50 with S.D. of 5.2. This difference was statistically not significant. (p=0.095**).**

Graph No.3- Comparison Of Quantitative Dermatoglyphic Features In Schizophrenics & Controls.

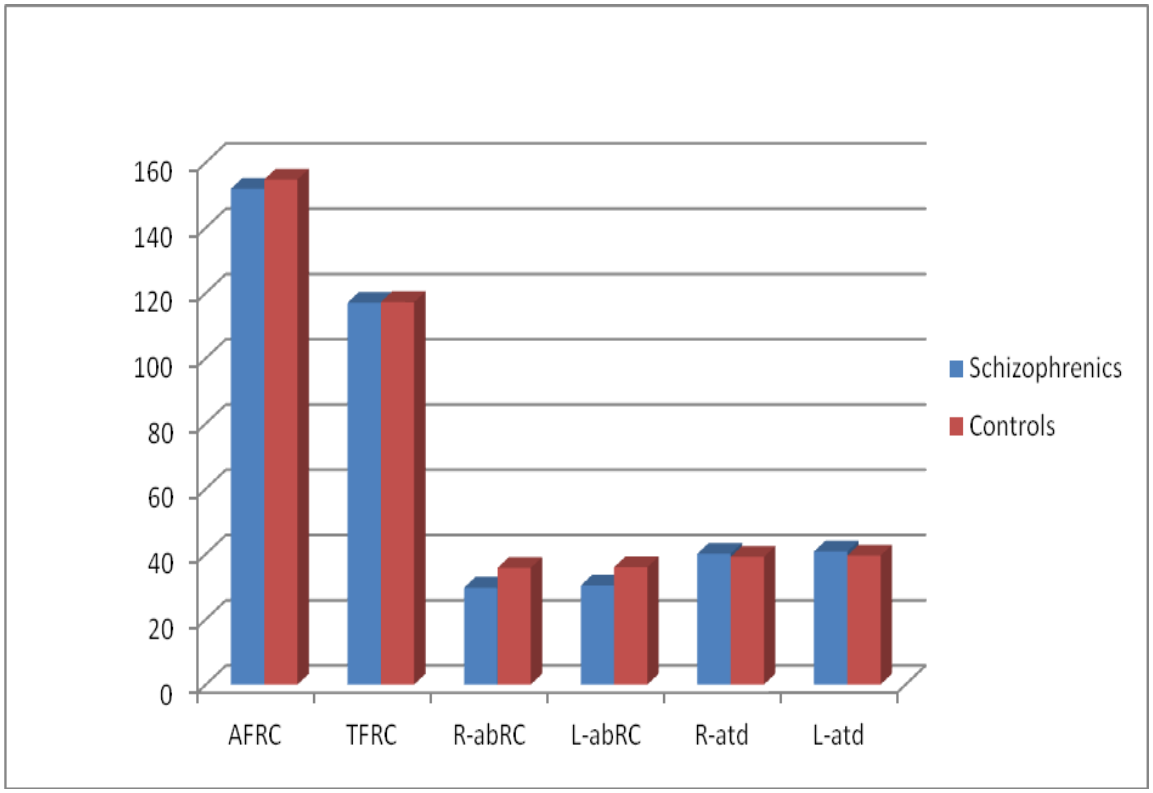

Table No.27: Comparison Of Quantitative Dermatoglyphic Features Of MDP Patients & Controls.

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			4.102	.000
	Controls	39.50	5.252		

The above described table shows that the Mean AFRC in MDP was lower (142.9) with S.D. of 51.8 as compared to control group which was having AFRC of 154.7 with S.D. of 69.3. This difference was statistically not Significant. (p=0.174**).**

The above described table shows that the Mean TFRC in MDP was lower (108.15) with S.D. of 23.6 as compared to control group which was having TFRC of 117.18 with S.D. of 35.6. This difference was statistically significant.(p=0.04**).**

The above described table shows that the Mean ab-RC on right hand in MDP was lower (26.2) with S.D. of 4.1 as compared to control group which was having ab-RC of 35.72 with S.D. of 6.2. This difference was statistically highly significant. (P=0.000**).**

The above described table shows that the Mean ab-RC on left hand in MDP was lower (26.38) with S.D. of 3.4 as compared to control group which was having ab-RC of 35.94 with S.D. of 5.9 This difference was statistically highly significant. (P=0.000**).**

The above described table shows that the Mean atd angle on right hand in MDP was higher (42.08) with S.D. of 5.2 as compared to control group which was having atd angle of 39.11 with S.D. of 5.09. This difference was statistically highly significant. (P=0.000**).**

The above described table shows that the Mean atd angle on left hand in MDP was higher (42.62) with S.D. of 5.5 as compared to control group which was having atd angle of 39.50 with S.D. of 5.2. This difference was statistically highly significant. (P=0.000**).**

Graph No.4- Comparison Of Quantitative Dermatoglyphic Features Of MDP Patients & Controls.

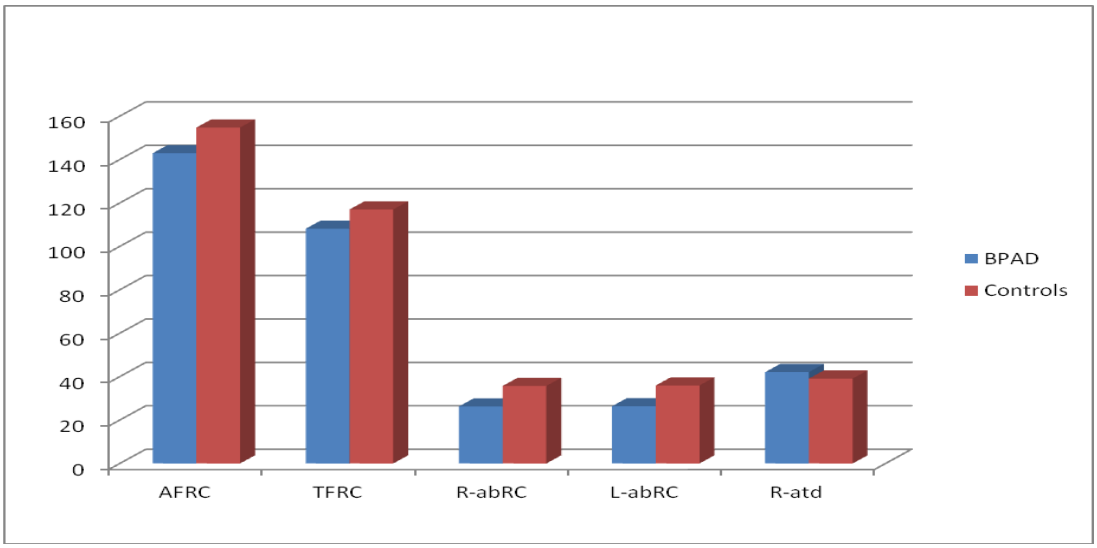

Table No.28: Comparison Of Quantitative Dermatoglyphic Features In Schizophrenics, MDP Patients, And Controls.

Features	Condition (N= 100)	Mean	Std. Deviation	F- value	Sig. (2-tailed)
AFRC	Schizophrenics	151.91	48.764	1.15	0.3156
	MDP	142.92	51.890		
	Controls	154.75	69.381		
TFRC	Schizophrenics	117.01	31.504	3.048	0.049
	MDP	108.15	23.614		
	Controls	117.18	35.692		
R-abRC	Schizophrenics	29.69	6.761	67.37	0.00001
	MDP	26.27	4.178		
	Controls	35.72	6.249		
L-abRC	Schizophrenics	30.32	6.268	79.77	0.00001
	MDP	26.38	3.481		
	Controls	35.94	5.976		
R-atd	Schizophrenics	40.09	4.515	9.336	0.001
	MDP	42.08	5.237		
	Controls	39.11	5.095		
L-atd	Schizophrenics	40.75	5.273	8.64	0.002
	MDP	42.62	5.503		
	Controls	39.50	5.252		

The above described table shows that the Mean AFRC in MDP and Schizophrenics was lower (142.9 & 151.9) with S.D. of 51.8 & 48.7 as compared to control group which was having AFRC of 154.7 with S.D. of 69.3. This difference was statistically not significant. (p=0.174**).**

The above described table shows that the Mean TFRC in MDP and Schizophrenics was lower (108.1 & 117.01) with S.D. of 51.8 & 48.7 as compared to control group which was having TFRC of 117.18 with S.D. of 35.6. This difference was statistically significant. (p=0.04**).**

The above described table shows that the Mean ab-RC on right hand in MDP and Schizophrenics was lower (26.27 & 29.69) with S.D. of 4.1 & 6.7 as compared to control group which was having ab-RC of 35.72 with S.D. of 6.2. This difference was statistically highly significant. (p=0.000**).**

The above described table shows that the Mean ab-RC in left hand of MDP and Schizophrenics was lower (26.38&30.32) with S.D. of 3.4 & 6.2 as compared to control group which was having ab-RC of 35.94 with S.D. of 5.9 This difference was statistically highly significant. (p=0.000**).**

The above described table shows that the Mean atd angle on right hand in MDP and Schizophrenics was lower (42.08 & 40.09) with S.D. of 5.2 & 4.5 as compared to control group which was having atd angle of 39.11 with S.D. of 5.09. This difference was statistically significant. (p=0.001**).**

The above described table shows that the Mean atd angle in left hand of MDP was and Schizophrenics was lower (42.06 & 40.7) with S.D. of 5.5 & 5.2 as compared to

control group which was having atd angle of 39.50 with S.D. of 5.2. This difference was statistically significant. (p=0.002**).**

Table No.29: Comparison Of Frequency Of Patterns In Interdigital Areas, Hypothenar Areas In Schizophrenics And Controls

Interdigital Pattern	Schizophrenics NO (%)	Controls NO (%)	$\chi 2$	Degree of Freedom	p value
TH /I1	4 (2)	1 (0.5)	1.846	1	.174
I2	9 (4.5)	0 (0)	9.424	1	.002
I3	65 (32.5)	74 (37)	1.911	1	.167
I4	60 (30)	66 (33)	.772	1	.380
HYT	21 (10.5)	17 (8.7)	.520	1	.471

The above described table shows frequency of interdigital patterns in schizophrenia and controls, it can be noted that in schizophrenia highest number of patterns were seen I3 and I4 areas (32.5% & 30%) and in controls its I4 & I3 (37% & 33%). Statistically significant difference was found only in I2 area (p=0.002).

Graph No.5- Comparison Of Frequency Of Patterns In Interdigital Areas, Hypothenar Areas In Schizophrenics And Controls

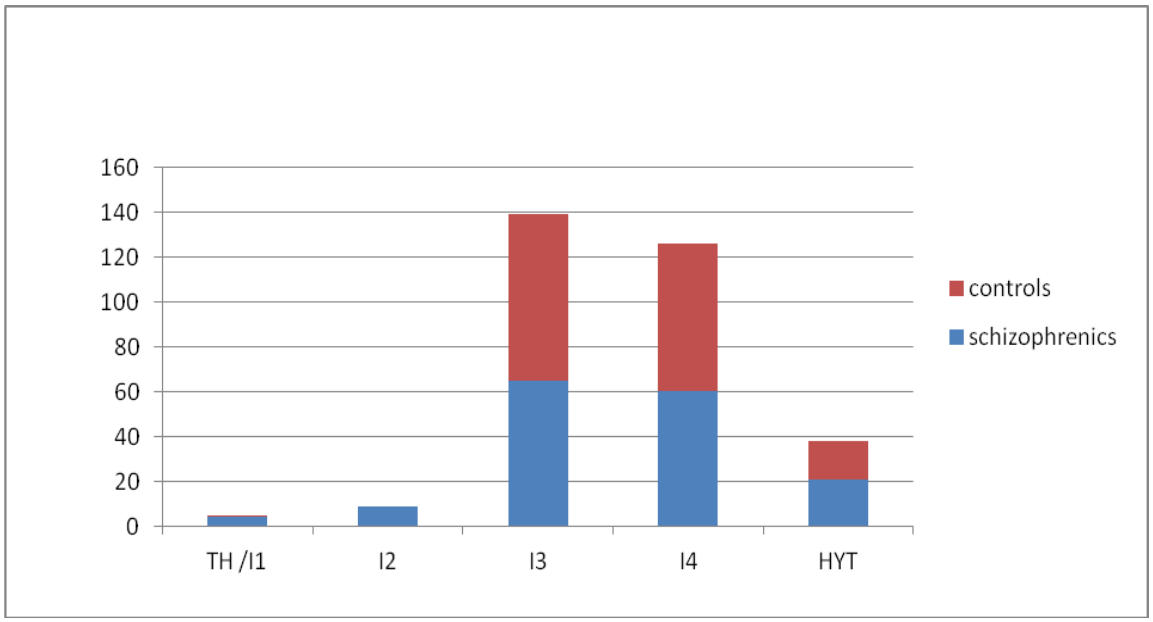

Table No.30: Comparison Of Frequency Of Patterns In Interdigital Areas, Hypothenar Areas In MDP Patients And Controls

Interdigital Pattern	MDP NO (%)	Controls NO (%)	χ^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

The above described table 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 No.31: Comparison Of Frequency Of Patterns In Interdigital Areas, Hypothenar Areas In Schizophrenics, MDP Patients And Controls

Interdigital pattern	schizophrenia NO (%)	MDP NO (%)	CONTROL NO (%)
TH /I2	4 (2)	0 (0)	1 (0.5)
I2	9 (4.5)	9 (4.5)	0 (0)
I3	65 (32.5)	63 (31.5)	74 (37)
I4	60 (30)	78 (39)	66 (33)
HYT	21 (10.5)	20 (10)	17 (8.7)

$\chi 2=17.71$ d(f) =8 p=0.023 Sig

The above described table shows frequency of interdigital patterns in MDP, Schizophrenics and controls, it can be noted that, in schizophrenic group highest number of patterns were seen I3 and I4 areas (32% & 30%) and lowest in TH/I1 (2%) whereas in MDP highest number of patterns were seen I4 and I3 areas (39% & 31%) and lowest in TH/I1 (0%) and lastly in controls highest number of patterns were seen also same that was I3 & I4 (37% & 33%) and lowest in I2. The difference was statistically significant (p=0.023).

DISCUSSION

The present study consists of 100 schizophrenic patients (50 males and 50 females) and 100 bipolar affective disorder patients (57 males and 43 females) clinically diagnosed under DSM- IV criteria in the age group of 15-70 years and 100 healthy controls (50 males and 50 females) in the age group of 15-70 years. The hand prints were obtained by ink method and were analyzed extensively to study and compare the dermatoglyphic patterns of patients and controls.

The following parameters were observed in the study group and control group

1. Qualitative analysis of finger tip patterns.
2. Quantitative analysis of finger prints, i.e. Total finger ridge count and Absolute finger ridge count.
3. Patterns in interdigital areas and hypothenar areas.
4. atd angle.
5. a-b ridge count.

In the present study of 100 schizophrenics and 100 controls, the frequency of distribution of finger tip patterns in both hands were Whorls: schizophrenics -37.7%, controls- 35.1%; ulnar loops: schizophrenics-55.4%, controls-57.3%; radial loops : schizophrenics-2%, controls- 1.6%; arches : schizophrenics-4.9%,controls-6%. The frequency of whorls and radial loops were increased in schizophrenics in comparison with controls. The results were not statistically significant (p-0.42).

Wendt and Zell[33] in their study of dermatoglyphics in male and female German schizophrenics observed that male schizophrenics had actually a slightly increased incidence of whorls over the control males and a slight decrease in arches as compared to the control males. These observations are at par with our findings (Table no-1 and 7).

Poll[30] analysed the prints of German schizophrenic patients comprising 232 males and 545 females and compared them with a sample of the normal general population of the respective sex. He observed a lower incidence of whorls in the male schizophrenics than in control males, while in female schizophrenics the incidence was higher than in the normal females. He also noted slight increase in arches in male schizophrenics than in control males. In present study incidence of whorls in male schizophrenics and control was same (Table no-15) but in female schizophrenics the whorls were increased (Table no-16).

Pons [34] observed no statistically significant difference in the frequency of finger print patterns between schizophrenics and controls. In present study also the difference was statistically not-significant (Table no-17).

Raphael and Raphael[35] in their study of schizophrenic males reported an increase in the frequency of whorls, decrease in ulnar loops and a higher incidence of total arches in schizophrenics as compared to controls. These findings were similar to our results (Table no- 1 & 15) except in present study incidence of whorls remained same in both schizophrenics as well as controls.

Beckman and Norring[36] reported a lower frequency of whorls in female schizophrenic patients. This finding is similar to present study results (Table no-2 & 16)

Mellor studied[38] 232 male and 253 female schizophrenics. Percentage of whorls and loops were increased and percentage of arches was decreased in schizophrenic females as compared to control females. Percentage of whorls, loops and arches was almost equal in schizophrenics and control males. This study is in total agreement with findings of present study (Table no-1, 2, 15 & 16)

Kemali et al[45] studied finger and palmar ridge characteristics of a sample of 219 Italian Schizophrenic males and 105 controls. Their observations were: Percentage of total loops was increased particularly on the middle finger (R3 & L3) of schizophrenics. This observation was consistent with results of present study also (Table no-1 & 7).

Laha NN[47] studied dermatoglyphics of 50 female schizophrenics and compared them with 50 normal females. Percentage of ridge patterns on finger tips (all ten) were taken into consideration, the observations were: whorls (38.4 and 28.6% respectively), then ulnar loops (51.2 % vs. 56.4%), arches (4.8% and 5.4% respectively) and radial loops (1 %and 2.8% respectively). These findings are almost similar to our findings (Table no-8 & 16) except in present study radial loops were increased in female schizophrenics.

Varma et al.[51] studied dermatoglyphic patterns in 250 schizophrenics and 90 controls. The frequency of loops in the patient group was lower than in the control group. The frequency of arches in the patients and control groups was similar. This finding was not statistically significant. These findings are similar to our observations in the present study (Table no- 7 & 17)

Sivkov S and Akabaliev V [53] studied handprints of 42 schizophrenic patients and 36 controls they observed there was an increased frequency of whorls in male

schizophrenics. This is in contrast to our findings of similar incidence of whorls in both the group (Table no-15). There was also an increased frequency of arches in females schizophrenics as compared to controls, this finding is consistent with results of present study (Table no-16).

Sathe and Gajbe[54] studied 400 schizophrenic patients from Nagpur. They found significantly reduced arch patterns in finger tips of schizophrenics, with no significant differences in counts of whorls and loops in schizophrenics as compared to controls. These findings are in total agreement with present study (Table no-17). Female schizophrenics showed higher proportion of whorls compared to controls; this finding is also consistent with our results of present study (Table no-16).

Srinivas Murthy R & Wig NN[44] observed whorls: schizophrenics -41.54%, controls- 47.17%; loops: schizophrenics-54.33%, controls-50.58%; arches: schizophrenics-4.33%, controls-2.25% in a study of 120 schizophrenics and 120 controls. Male schizophrenics had increase in arch patterns frequency. The above findings are consistent with our findings in the present study (Table no-15)

Vishwanathan CP et al.[62] (1980) observed Whorls: schizophrenics -39.6%, controls-37%; ulnar loops: schizophrenics-53.9%, controls-56.5%; radial loops: schizophrenics-1.9%, controls- 2%; arches: schizophrenics-4.61%, controls-4.48% in a study of 100 schizophrenics and 160 controls. Finger print patterns did not show statistically significant difference. The above study results are in total agreement with findings of present study except arch pattern in present study showed decreasing trend (Table no-17).

Jhingan HP & Munjal GC [63] (1989) observed fewer arches and whorl patterns and more loops on the fingers in a study of 50 female catatonic schizophrenics and 50 normal females. Results of this study are contrary to findings of present study (Table no-16)

In another study by Jhingan HP & Munjal GC[64] of 50 male catatonic schizophrenics and 50 normal males the patients were found to have more arches and loops and less whorls. Partly consistent with our results of present study (Table no-15)

In the present study (Table no-26), 100 schizophrenics and 100 controls there is decrease in the mean values of absolute finger ridge count in schizophrenics (151.91) in comparison to the control group (154.75) which was not statistically significant. There is decrease in total finger ridge count in schizophrenics (117.01) as compared to controls (117.18); the values are statistically not significant (Table no-26).

In a study by Srinivas Murthy R & Wig NN (1977) [44] the observations in 120 schizophrenics and 120 controls were there was decrease in the Total finger ridge count in schizophrenics (141.38) in comparison to the control group (148.04), which was not statistically significant.

In a similar study by Jhingan HP & Munjal GC[64] in male catatonic schizophrenics total finger ridge count was lower. The observations of these two studies are comparable to the observations of present study (Table no-26).

Kemali et al [45] in their study of 219 Italian Schizophrenic males and 105 controls observed that total finger ridge count was reduced in schizophrenics than in controls. This finding is similar to present study (Table no-26).

Ponnudurai[48] compared the dermatoglyphic variations between 100 male schizophrenics and the same number of controls. The difference in ridge count was

statistically not significant In present study also the difference is statically not significant (Table no-26).

In the present study of 100 schizophrenics and 100 controls, the mean a-b ridge count in the right hand (29.69) and in the left hand (30.32) of schizophrenics was decreased when compared to right hand (35.72) and left hand (35.94) of controls. These values were statistically significant (Table no-26).

Fearon[4] examined finger and palm prints of 148 patients and 89 controls and observed significantly lower mean right a-b ridge count(38.8 vs. 41.0, p=0.004) and lower mean left a-b ridge count(39.0 vs. 42.0, p=0.006).

Sarthak Sengupta, Sanghamitra Das Bhuyan[50] studied palm prints of 55 male and 33 female schizophrenic patients. Means of a-b ridge counts of patients showed a comparatively lower ridge count.

In the same study[50], dermatoglyphic prints of eighty patients and 79 healthy individuals. The schizophrenics showed a comparatively lower a-b ridge counts as compared to controls. The difference was found to be statistically significant.

Findings of above described studies are similar to our observations in the present study, which is also statistically significant (Table no-26).

Kemali et al[45]studied a sample of 219 Italian Schizophrenic males and 105 controls the a-b ridge count did not show any difference in schizophrenics and controls. Results of this study are in contradiction to our observations in the present study, which showed statistically significant results with respect to mean a-b ridge count (Table no-26).

In present study of 100 schizophrenics and 100 controls atd angle was decreased in schizophrenic patients (right atd angle-29.69, left atd angle- 30.32) when compared to controls (right-35.72 left-35.94) which was statistically not significant

Sarthak Sengupta and Sanghamitra Das Bhuyan[50] in study of palm prints of 55 male and 33 female schizophrenic patients, observed that both the sexes of schizophrenics as compared to normals recorded a lower mean atd angle on both hands, either considered separately or together. However, the values were not significant.

Jhingan HP and Munjal GC[64] in their study of 50 male catatonic schizophrenics and 50 controls observed decrease in the atd angle (mean=74.48) when compared to controls (mean=82.55) which was statistically significant.

The observations of both the studies described above coincide with observations of present study (Table no-26).

In a study of 85 schizophrenics and 75 controls Vishwanathan C P, et al [62] observed increase in the mean values of atd angle in schizophrenic males (mean=77.64) when compared to controls (mean=76.51) which was statistically not significant.

In 120 schizophrenics and 120 controls, Srinivas Murthy R & Wig NN (1977) [44] observed an increase in the mean values of atd angle (mean=78.25) in schizophrenics when compared to controls (mean=77.42), the values were statistically not significant.

In their study of 50 male catatonic schizophrenics and 50 controls Jhingan H P, Munjal G C [64] observed increase in the atd angle (mean=84.16) when compared to controls (mean=79.46), the values did not differ significantly.

Observations of the three studies described above are contrary to observations of present study (Table no-26).

Mellor's [38] sample consisted of 232 male and 253 female British schizophrenics in the age group of 16 to 60 years; he observed that the 'atd' angle was significantly higher in both sexes of schizophrenics as compared to controls.

In a sample of 219 Italian Schizophrenic males and 105 controls were studied by Kemali et al[45] Schizophrenics showed higher values of atd angle than controls but the difference between means was not statistically significant

The observations of both the studies described above are contrary to observations of present study (Table no-26).

In the present study (table-29) when frequency of occurrence of patterns in interdigital areas in schizophrenia was compared with control group the patterns were as follows- Thenar + I1=2% vs 0.5%, I2=4.5% vs 0%, I-3=32.6% vs 33%, I4=30% vs 33, and Hypothenar = 10.5% vs 8.7. The comparative data was significant only at I-2 (p=0.002).

In the present study (table-30) when frequency of occurrence of patterns in interdigital areas in MDP was compared with control group the pattern were as follows- Thenar + I1=0% vs 0.5% , I2=4.5% vs 0%, I3=31.5% vs 37%, I4=39% vs 33, and Hypothenar= 10% vs 8.7. The comparative data was significant at I-2 (p=0.002) and I-4(p=0.04) areas.

In the present study (table-31) when frequency of occurrence of patterns in interdigital areas in MDP, schizophrenics was compared with control group using ANOVA test, the comparative data was statistically significant with a p value of 0.023.

Vishwanathan CP et al.[62] observed increase an increase in I3 pattern which was significant in schizophrenic males (50.59) when compared to normal males (38.67). Pons

[34] but reported an increased frequency of patterns in third interdigital area (I3) in schizophrenics as compared to controls.

Mellor[38] in his study of 232 male and 253 female British schizophrenics in the age group of 16 to 60 years interpreted increased frequency of patterns in third interdigital area in schizophrenics as compared to controls.

Srinivas N. et al.[52] compared handprints of 30 schizophrenics from Bangalore with same number of age and sex matched controls. They noted significant increase in the loop pattern in the third interdigital area of the schizophrenic patients as compared to controls. Observations of all the four studies described above are similar to results of present study (Table no-29).

Jhingan HP & Munjal GC[64] observed fewer patterns in I3 palmar area. Frequency of patterns in the thenar/I1 palmar area in schizophrenics was 8 as compared to 13 controls. In I2 palmar area, patients had a total of 9 patterns whereas controls had 8. Number of patterns in I-4 palmar area of patients was 61 as compared to 55 of controls.

Murthy[44] compared the dermatoglyphics of 240 (120 males and female each) schizophrenics with the same number of controls. Palmar patterns were also different in schizophrenics and normal. Frequencies of patterns in second and third interdigital areas were significantly lower in schizophrenics than in normal.

Polednak[43] compared finger prints of 40 Negro schizophrenic males with 105 control males and found reduced percentage of patterns in third interdigital area of schizophrenics as compared to controls. Observations of all the studies described above are contrary to observations of present study (Table no-29).

Balgir et al.[58] 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%). 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 no-30).

Balgir RS et al.[56] studied dermatoglyphics in MDP and Schizophrenia, 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 no-9 & 10).

With respect to patterns in interdigital areas in male MDP cases- Thenar/ I1=15%, I2=14%, I3=76.6%, I4=66.6%, and Hypothenar= 38.3% as compared with male schizophrenic group- Thenar/ I-1=3%, I-2=6%, I-3- 36.6%, I-4- 45.8%, and Hypothenar-21.6%. Data was statistically significant at all interdigital areas. With respect to patterns in interdigital areas In female MDP cases as compared with female schizophrenic group – Thenar / I-1=10.8% vs 4.5% , I-2=10.8% vs 5.8%, I-3=65.6% vs 38.7%, I-4=67.6% vs 50.8, and Hypothenar= 36.6% vs 30. The comparative data was significant at all interdigital areas except at I-2 and Hypothenar area. The results of this study are nearly similar to results of present study (Table no-31). Mean TFRC of MDP was 141.6

(s.d=42.3), as compared with schizophrenic group of 141.3 (s.d=40.78).This comparison was statistically non-significant. This finding was also similar to present study (Table no-28), except that the result of present study was statistically significant.

Mean atd angle of MDP was low, as compared with schizophrenics. This comparison was statistically significant ($p< 0.001$). This observation is similar to present study (Table no-28).

Yousefi-Nooraie R et al.[59] in his research of Dermatoglyphic asymmetry in schizophrenic and bipolar patients found that- mean TFRC of schizophrenic group was low (77.4) as compared to MDP (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 schizophrenics and controls (Table no-31), but this difference is statistically significant ($p=0.049$).

In the same study [59] the mean Right ab-ridge count in schizophrenics was high (41.4), as compared to 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 schizophrenics is higher than MDP group (Table no-31), but this difference was statistically highly significant ($p=0.00001$).

In the same study [59] the mean Left ab-ridge count in Schizophrenic sample was also high (43.4) as compared with Bipolar sample (42.1), and Control sample (42.2). The data was statistically not significant ($p=0.6$). Similar to this study in present study the mean Right ab-ridge count in schizophrenics is higher than MDP group (Table no-31), but this difference was statistically highly significant ($p=0.00001$).

In the same above mentioned study[59], the mean of right atd angle in Schizophrenic sample, Bipolar sample, and Control sample was- 46.2 (s.d=9.2), 44 (s.d=8.3) and 42.9 (s.d=7.5) respectively. The data was statistically not significant (p=0.3). Contrary to this study in present study the mean Right atd-angle in schizophrenics is lower than MDP group and higher than control (Table no-31), and this difference statistically significant (p=0.001).

In the same study[59] the mean atd angle in Schizophrenic sample, Bipolar sample, and Control sample was- 46.8 (s.d=9.5), 43.8 (s.d=7.6) and 42.7 (s.d=8.2) respectively. The data was statistically not significant (p=0.1). Contrary to this study in present study the mean left atd-angle in schizophrenics is lower than MDP group and higher than control (Table no-31), difference being statistically significant (p=0.002).

Chakraborty D et al.[12] 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 no-09) except for arches which were found to be increased in present study.

Chakraborty D et al.[12] 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 no-09) 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 consistent with present study (Table no-28).

Jelovac N et al.[55] studied dermatoglyphics in MDP, Schizophrenia and control groups and according to his study- mean TFRC in Schizophrenia, MDP and control groups was 123.92, 116.86 & 141.03 respectively. The difference was statistically significant (p=0.005).This finding is similar to finding in present study (Table no-28).

Mean Right ab-RC in Schizophrenia, MDP and control groups was - 35.4, 35.3 and 41.8 respectively. The difference was statistically significant (p=0.001). Mean left ab-RC in Schizophrenia, MDP, and control groups was - 37.6, 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 no-28).

Mean atd angle in right hand of Schizophrenia, MDP and control groups was -, 41.40, 42.06 and 47.42 respectively. The difference was statistically significant (p=0.001).Mean atd angle in left hand of Schizophrenia, MDP and control groups was - 40.23, 41.61and 47.86 respectively. The difference was statistically significant (p=0.001).This finding was also similar to finding in present study (Table no-28).

CONCLUSIONS

In the present study the observed changes suggest significant difference in dermatoglyphic patterns in bipolar mood disorder, schizophrenia and control. Our findings match with most of the previous studies in schizophrenia and 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-The frequency of whorls and radial loops were increased in schizophrenics in comparison with controls. Percentage of total loops was increased particularly on the middle finger (R3 & L3) of schizophrenics. There is decrease in total finger ridge count in schizophrenics (117.01) as compared to controls, statistically non-significant. Mean a-b ridge count in the right hand and in the left hand of schizophrenics was decreased when compared to controls, statistically significant. The atd angle is decreased in schizophrenic patients when compared to controls, statistically not significant. Frequency of occurrence of patterns in interdigital areas in schizophrenia was compared with control group- more patterns seen in I3 & I4 areas, but data was statistically significant only at I2. In fingerprint pattern of MDP patients there were more loops, whorls next in frequency and least was arches when compared with control group. Frequency of occurrence of pattern in interdigital areas in MDP was compared with control group- more patterns seen in I3 & I4 areas, but data was statistically significant only at I2 and I4 areas. Mean atd angle of MDP was low, as compared with schizophrenics, this was statistically significant. Mean TFRC in MDP group is lower than schizophrenics and higher than controls, this difference is statistically significant. Mean Right & Left ab-ridge count in schizophrenics is higher than MDP

group; this difference was statistically highly significant. Mean Right atd-angle in schizophrenics is lower than MDP group and higher than control (Table no-31), and this difference was statistically significant (p=0.001). Difference in the mean right and left ab-RC in Schizophrenia, MDP and control groups was statistically significant. Difference in the Mean right and left atd angle of Schizophrenia, MDP and control groups was statistically significant

SUMMARY

The present study was done with the intention of exploring and comparing the dermatoglyphic parameters in patients of schizophrenia and manic depressive psychosis, the aim of the study was to determine the significant parameters applicable to schizophrenia and manic depressive psychosis.

The material of the study consisted of 100 patients of schizophrenia, 100 patients of manic depressive psychosis and 100 controls in the age group between 15-70 years. The following significant dermatoglyphic parameters have been found in the present study:

1. Difference in the mean right and left ab-RC in Schizophrenia, BPAD and control groups was statistically significant.

2. Mean atd angle of MDP was low, as compared with schizophrenics, this was statistically significant. Mean Right atd-angle in schizophrenics was lower than BPAD group and was higher than controls, this difference was statistically significant (p=0.001).

3. Difference in the Mean right and left atd angle of Schizophrenia, BPAD and control groups was statistically significant

4. Mean TFRC in BPAD group is lower than in schizophrenics and higher controls, this difference was statistically significant

5. In schizophrenics more patterns were seen in I3 & I4 areas, but data was statistically significant only at I2

6. In MDP more patterns were seen in I3 & I4 areas, but data was statistically significant only at I2 and I4 areas

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BLDE UNIVERSITY'S

SHRI B M PATIL MEDICAL COLLEGE, HOSPITAL, AND RESEARCH CENTRE. BIJAPUR

PROFORMA

FOR QUALITATIVE AND QUANTITATIVE ANALYSIS OF PALM AND FINGER PRINTS

NAME: ADDRESS:

AGE and SEX:

OCCUPATION:

OPD NO:

Signs of schizophrenia and manic depressive psychosis.

II FINGERPRINT PATTERN:

		R1	R2	R3	R4	R5	L1	L2	L3	L4	L5
1	Arch										
2	Radial Loop										
3	Ulnar Loop										
4	Whorl										
		Right Hand					Left Hand				

PALM PRINT PATTERN:

		Right Hand	**Left Hand**
5	'atd' angle		
6	a-b ridge count		
7	Interdigital pattern		

FINGER RIDGE COUNT OF BOTH HANDS:

		Number	Total Ridge
1	Arch		
2	Radial Loop		
3	Ulnar Loop		
4	Whorl		
5	TFRC AFRC		

CLEARANCE LETTER FROM INSTITUTIONAL ETHICAL COMMITTEE

B.L.D.E.U'S SHRI.B.M.PATIL MEDICAL COLLEGE, BIJAPUR-586103
INSTITUTIONAL ETHICAL COMMITTEE

Ethical Committee BIJAPUR-586103 OUT WARD No 123/10 Date 19/10/10 Shri B. M. PATIL Med.Col College

DR.M.S.BIRADAR
CHAIRMAN .I.E.C.
BLDEU'S SHRI: B.M.PATIL MEDICAL COLLEGE
BIJAPUR-586103

INSTITUTIONAL ETHICAL CLEARANCE CERTIFICATE

The Ethical Committee of this college met on 19-10-2010 at 10-30 am to scrutinize the Synopsis/Research projects of post graduate student/undergraduate student/Faculty members of this college from ethical clearance point of view. After scrutiny the following original/corrected & revised version Synopsis of the Thesis/Research project has been accorded Ethical Clearance.

Title Comparative Study of Palmar dermatoglyphics in patients with Schizophrenia, Manic depressive psychosis and non-psychiatric controls in age group between 15-70 years

Name of P.G. /U.G.Student /Faculty member Dr. Rekha. Hiremath. Dept of Anatomy

Name of Guide Dr. S.D. Desai, Prof & HOD. Anatomy

DR.M.S.BIRADAR
CHAIRMAN
INSTITUTIONAL ETHICAL COMMITTEE

Following documents were placed before E.C.for securitization:
1) Copy of Synopsis/Research project
2) Copy of informed consent form
3) Any other relevant document's

Schizophrenic male right hand (1-25)

Schizophrenic male left hand (1-25)

Schizophrenic male right hand (26- 50)

Schizophrenic male left hand (26- 50)

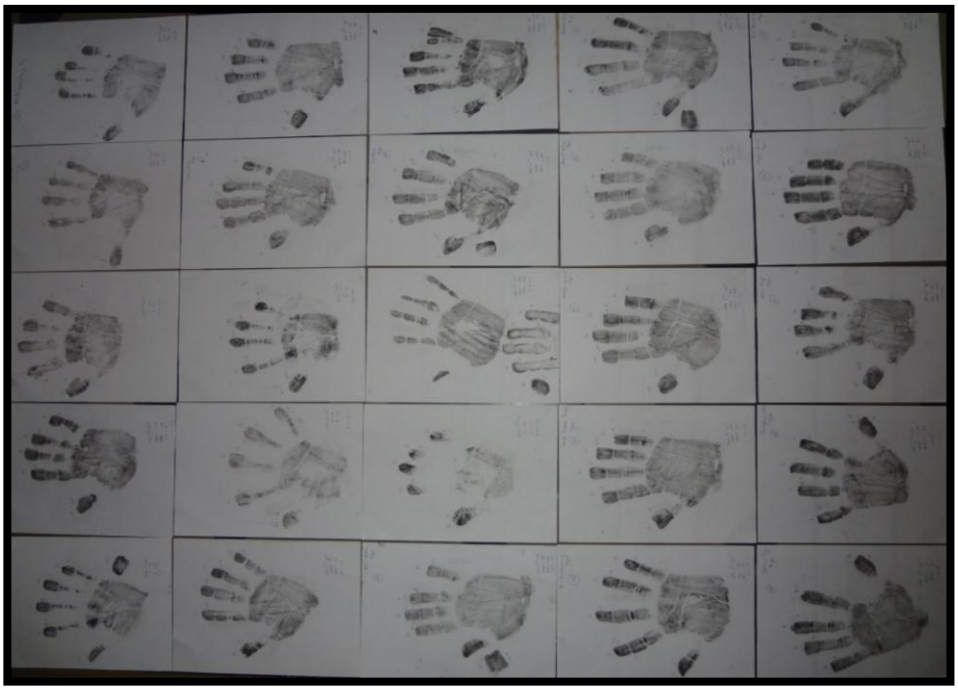
Schizophrenic female right hand (1-25)

Schizophrenic female left hand (1-25)

Schizophrenic female right hand (26- 50)

Schizophrenic female left hand (26-50)

MDP male right hand (1-25)



MDP male left hand (1-25)

MDP male right hand (26-50)

MDP male right hand (51-57)

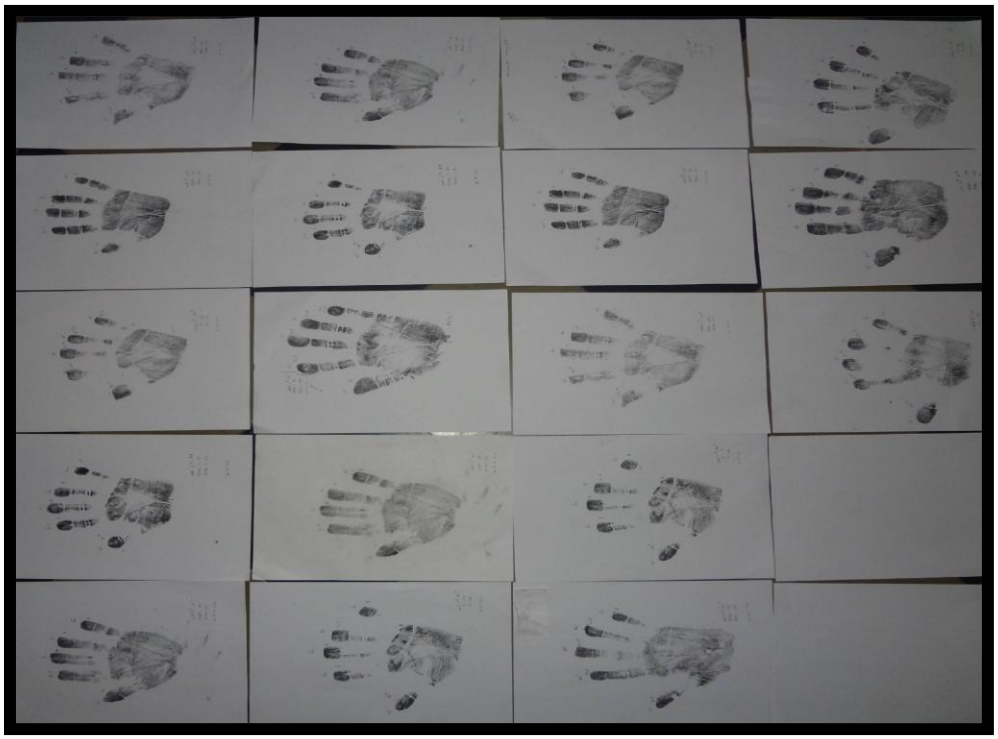
MDP male left hand (26-50)

MDP male left hand (51-57)

MDP female right hand (1-25)

MDP female left hand (1-25)

MDP female right hand (26-43)



MDP female left hand (26-43)

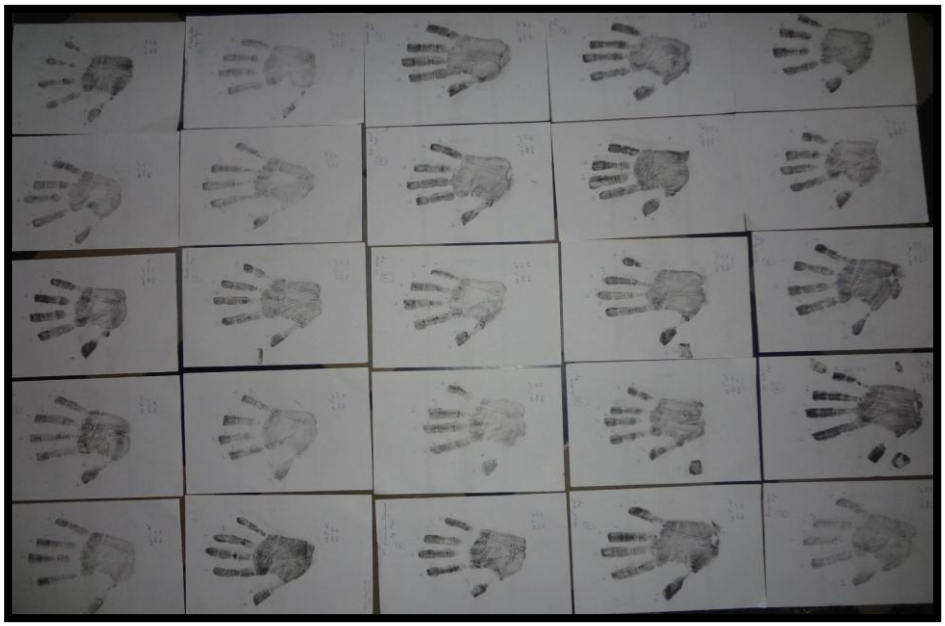
Control male right hand (1-25)

Control male left hand (1-25)

Control male right hand (26-50)

Control male left hand (26-50)

Control female right hand (1-25)



Control female left hand (1-25)

Control female right hand (26-50)

Control female left hand (26-50)

KEY TO MASTER CHART

A : NAME

B : R1

C : R2

D : R3

E : R4

F : R5

G : L1

H : L2

I : L3

J : L4

K : L5

L : AFRC

M : TFRC

N : RIGHT ab-RC

O : LEFT ab-RC

P : RIGHT atd Angle

Q : LEFT atd Angle

R : Right TH/I1

S : Right I2

T : Right I3

U : Right I4

V : RIGHT HYT

W : LEFT TH/I1

X : LEFT I2

Y : LEFT I3

Z : LEFT I4

AA : LEFT HYT