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Original Article

Digito- Palmar Dermatoglyphic study in eczema patients in Davangere District

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ABSTRACT

Eczema is a pattern of inflammatory responses of the skin, characterized by spongiosis with varying degrees of acanthosis and a superficial perivascular lymphocytic infiltrate. Dermatoglyphic traits are genetically determined. Dermatoglyphic abnormalities are due to genetic or other factors that express their before the end of fifth month of foetal development. The objectives of the present study was to identify patterns of dermal ridges on finger tips and palms in eczema patients and apparently healthy subjects and to initiate preventive measures of eczema in early detection programme and to focus the predictive strength of specific dermatoglyphic patterns in eczema patients. The present study was carried out on 50 eczema patients in JJM Medical College, Davangere which was compared with 50 normal apparently healthy individuals. Data analysis was done. Chi square test was used to compare the different groups. In the present study decrease in frequency of total arches and whorls in eczema patients were observed. There are significant differences in eczema patients in various dermatoglyphics features when compared to normal. Hence it is possible to identify the risk population with the help of dermatoglyphics.

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1. Introduction

Eczema is a pattern of inflammatory responses of the skin, which can be defined either histological or clinically. Clinically, acute eczema is associated with marked erythema, superficial papules and vesicles which easily excoriate and lead to crusts. Chronic eczema is composed of rather faint erythema, infiltration and scaling.¹ Histologically eczema is an inflammatory skin reaction characterized by spongiosis with varying degrees of acanthosis and a superficial perivascular lymphocytic infiltrate.² The word eczema seems to be originated in 543 AD and is derived from the Greek word meaning 'to boil forth or to effervesce'.³

Dermatoglyphics is the scientific study of epidermal ridges and their configurations on the palmar region of hand and fingers and plantar region of foot and toes. The term dermatoglyphics was coined by Cummins and Midlo in 1926 and was derived from Greek

words 'derma' means skin and 'glyphics' means carvings.⁴

The ridge pattern depends upon the cornified layer of epidermis and dermal papillae. The typical patterns of epidermal ridges are determined since formation in foetus. There is proliferation of cells in the lower zone of epidermis which projects into the dermis as a regularly spaced thickenings, then dermis subsequently projects upward in the epidermal hollows, this gives rise to epidermal ridges.⁵ The ridges are differentiated in their definitive forms during third and fourth month of foetal life and once formed remains permanent and never change throughout the life except in the dimension in proportion to the growth of an individual. The original ridge characteristics are not disturbed unless the skin is damaged to a depth of about one millimeter.⁶

Development of dermatoglyphic patterns is under genetic control. This is evident from the clear resemblance of dermatoglyphics among related persons.⁷ There are many diseases known to be caused by abnormal genes. Whenever there is any abnormality in the genetic make up of parents, it is inherited

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FINGERTIP PATTERN CONFIGURATION

Galton F (1892)¹⁰, divided fingertip patterns into 3 groups - Loops, Arches and Whorls.

Finger Tip Patterns:

a) Arch (A):

An arch is the simplest pattern. It consists of more or less parallel ridges. The ridges curve the pattern area. The curve is proximally concave. The curve is gentle in low arch and sharp in high arch.

1.Simple or Plain Arch (Ap):

Ridges cross finger tip from one side to the other without recurving. It is not a true pattern.

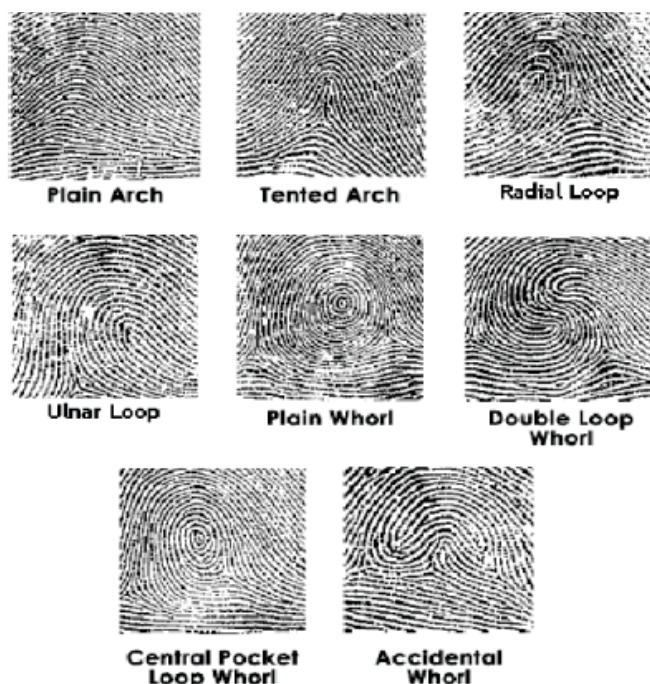
2.Tented Arch (At):

In Tented Arch, ridges meet at a point. So their smooth sweep is interrupted. The triradius is located near the midline axis and distal phalynx. The distal radiant of the triradius usually points towards the apex of the fingertip. The ridges passing over this radiant are abruptly elevated and form a tent like pattern.

Triradius:

Triradius is the point of confluence of ridges. The ridges usually radiate from this point in three different directions.

Figure.No.1: Showing different Finger Tip Patterns



b] Loop (L):

It is the most frequent pattern on finger tip. In this configuration series of ridges enter and leave the pattern area on same side.

- 1.Ulnar Loop (Lu): In Ulnar Loop ridges opens on the ulnar side.
- 2.Radial Loop (Lr): In Radial Loop ridges open on the radial side.

Triradius: The triradius is located on the finger tip and on the same sidewhere the loop is crossed.

C] Whorls (W):

According to Galton's classification, whorl is any ridge configuration with two or more triradii. According to Henry's classification whorl is a ridge configuration in which ridges actually encircle core and more complex patterns are called as 'Composites'. Whorls are usually classified into Simple/ Plain Whorls (Spiral or Concentric) and Double Loop Whorls(Twin loop or Lateral pocket loop).

Types:

a.Concentric Whorl (Wc):

The ridges are arranged as concentric rings or ellipse (around the core).

b.Spiral Whorl (Ws):

The ridges spiral around the core in clockwise or anti-clockwise direction.

c.Mixed Whorl (Wmix):

It contains circles and ellipse or spirals in the same pattern.

d.Central Pocket Whorl (Wcp):

It contains a smaller whorl within a loop . It is sub-classified as ulnar or radial according to the side on which outer loop opens.

f.Lateral Pocket Whorl (Wlp) or Twin Loop (Wtl):

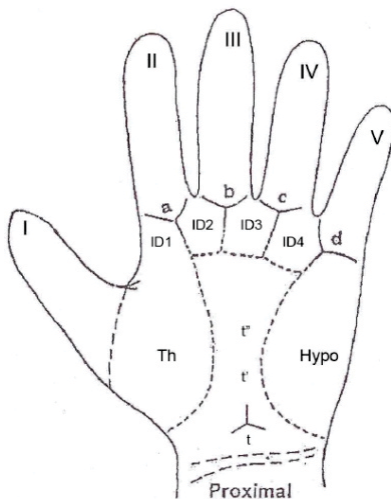
These types are morphologically similar, have 2 triradii. In lateral pocket whorl both ridges emanating from each core emerge on the same side of the pattern. In twin loop whorl the ridges emanating from each core open towards the opposite margin of the finger.

g.Accidentals (Wacc): Complex patterns, which cannot be classified as one of the above patterns, are called accidentals. They represent a combination of two or more configurations Similarly, pattern intensity of the palm can be expressed as the sum of all triradii present.

Ridge Counting; Ridge counting indicates the pattern size. It is primarily utilized in fingertips as a way of expressing the distance between digital triradii to the ridge density in a given area. The largest count is scored in a pattern with more than one possible count. Both simple and tented arches have '0' count. To some extent,

ridge count reflects the pattern type . The counting is done along the straight lines connecting the core and the triradius. Ridges containing triradial point and point of core are excluded. In case of whorl with two triradii and at least one point of core, two different counts are made, one from each triradii. Each count is made along a line drawn between the triradial point and the nearer point of core. The two counts are specified as first radial and second ulnar counts. Usually the symbols and ridge counts are recorded in order, beginning with the little finger of the left hand continuing to the thumb. While digits of right hand are started with thumb and continued up to little finger. Because the ridge counts are used to express the size only

FIGURE NO 2: Palm showing interdigital areas, thenar & hypothenar eminence & atd angle.



Axial Triradius (T):

The triradius or triradii close to palmar axis are termed as Axial triradius(t). Symbol t, t', t'' are used to designate the position of these triradii in the proximal distal direction on the palm

'atd' angle:

It is formed by lines drawn from digital triradius 'a' to the axial triradius 't' and from axial triradius't' to the digital triradius 'd'.The more distal the position of t, the larger the 'atd' angle.

Materials and Methods:

The present study was carried out on 50 eczema patients, 25 male and 25 females in J.J.M.Medical College, Davangere which was compared with 50 normal healthy individuals,25 male and 25 females. The prints were obtained by the ink method and analysed to find variations in dermatoglyphic features among patients & controls.

MATERIALS REQUIRED:

- 1.Camel quick drying duplicating ink. 2. Rubber roller. 3. Inking Slab- Thick glass sheet fixed over wooden support. 4. Century board. 5. White 'Map Litho' paper with a glazed surface on one side. 6. Pressure pad made up of rubber foam. 7. Cotton puffs. 8. Scale. 9. Pencil Pen. 10. Protractor – To measure 'atd' angle. 11. Needle with a sharp point, for ridge counting.

STEPS IN THE PRINTING METHOD:

The subjects were asked to clean their hands with soap and asked to dry their hands .The requisite amount of ink was placed on the glass slab and was uniformly spread by the rubber roller to get a thin even ink film on the glass slab. The thin film of ink was applied on the palm by passing the roller uniformly over the palm and digits taking care that the hollow of the palm and the flexor creases of the wrist were uniformly inked.

One hand of the subject was then placed on the sheet of paper from proximal to distal end. The palm was gently pressed between inter-metacarpal grooves at the root of fingers and on the dorsal side corresponding to thenar and hypothenar regions. The palm was then lifted from the paper in reverse order. The fingers were also printed below the palmar print by rolled finger print method. The tips of the fingers were rolled from radial to ulnar side. The same procedure was repeated for other hand on separate paper. The printed sheets were coded with name, age, sex, and for case group and control group. Then the prints were subjected for detail dermatoglyphic analysis with the help of magnifying hand lens and ridge counting was done with the help of a sharp needle. The details were noted.

Fig No 3: Palmar pattern, Finger tip pattern & atd angle



3. Results and Discussion:

Table No.1 Illustrates comparison of finger tip patterns between male patients & controls.

Pattern	Total value Pt	Total value Control	Chi-square value	P-value
Arches	29	19	2.083	0.148
Ulnar loops	340	452	18.55	0.0002
Radial loops	13	25	3.78	0.05
Whorls	151	191	4.67	0.03

Table No 1 shows increase in number of total arches in male eczema patients as compared to controls. Ulnar loops were predominant pattern seen in patients as compared to controls. Percentage of whorls were less in patients as compared to controls. This differences were statistically significant.

Table No.2: Illustrates comparison of finger tips patterns between female patients & controls

Pattern	Total value Pt	Total value Control	Chi-square value	P-value
Arches	5	32	19.703	0.0001
Ulnar loops	149	159	0.325	0.56
Radial loops	8	12	0.80	0.37
Whorls	110	83	4.403	0.035

Table No 2 shows decrease in number of total arches in female patients as compared to controls and this differences were statistically significant. Ulnar loops & Radial loops were decreased in number in female patients as compared to controls but this differences was not statistically significant. Whorls were less in female patients as compared to controls and this difference was statistically significant.

Table no 3: Illustrates mean of atd angle in male patients & controls.

Hand	Male pts	Male controls
Right	39.75	42.35
Left	41.25	44.81

Table no 4: Illustrates mean of atd angle in female patients & controls.

Hand	Female Patients	Female Controls
Right	41	41.4
Left	38.2	45.8

Table No 3 & 4 shows mean atd angles in both hand of male patients were lesser than that of controls, this difference was statistically significant. Mean atd angle in both the hands of female patients were lesser than that of controls. This difference was statistically significant with left hand only.

4. Discussion

In the present study of 50 eczema patients & 50 controls, the frequency of distribution of finger tip patterns in both hands of eczema patients had significant decreased arches than controls. Whorl pattern was found to be significantly decreased in eczema patients when compared to controls.

The scientific value of dermatoglyphics largely derives from the fact that dermal ridges appear in the third to fifth month of foetal development & the patterns once formed never change. Dermatoglyphic traits are genetically determined. Dermatoglyphic abnormalities are due to genetic or others factors that express their effect before the end of fifth month of foetal development.¹¹

Eczema is not a hereditary disease however twin studies indicate that susceptibility is an important risk factor . Susceptibility to eczema has been related to Multiple foci linked on chromosomes are identified, such as 1q21, 3p24, 22, 3q21, 3q14, 4p15, 5q, 13q14.¹²

Pour-Jafari H studied dermatoglyphics of eczema patients and found that arches were very much reduced in the study group (6.46%).¹³

Fuller studied eczema is an inflammatory skin reaction and found whorl pattern were very much reduced in the study group.¹⁴

Dermatoglyphics is a growing discipline and its easy and ready applicability renders it as a useful tool to the clinician. The relevance of dermatoglyphics is not to diagnose , but to prevent by predicting a disease; not for defining an existing disease, but to identify people with genetic predisposition to develop certain diseases.

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