



## The Study of Dermatoglyphics in Insulin Dependent Diabetes Mellitus

### KEYWORDS

Dermatoglyphics, Insulin-Dependent Diabetes Mellitus (IDDM), loop, arch, whorls.

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### ABSTRACT

*Aim of this study was to evaluate dermatoglyphics as an effective and economical screening method for diabetes mellitus type-I patients. MATERIAL AND METHODS: Dermatoglyphics patterns were studied in eighty cases (48 females and 32 males) of diagnosed type -1Diabetes Mellitus and they were compared with 63 cases of healthy individuals who were taken as controls. All are between the age groups of 10and 20years Each group was divided into male and female group to avoid any variations. Controls were carefully selected to be free from any disease as disease could influence the dermatoglyphic pattern. OBSERVATIONS: Observations were tabulated to find out distribution of finger-tip patterns, TFRC (Total finger ridge count)and AFRC (Absolute finger ridge count) values, Various angles in palm i.e. atd angle, adt angle and a-b ridge count. RESULTS AND CONCLUSIONS: whorls are chiefly confined to digit 1 of both females and male IDDM patients. Ulnar loops shows dominance in all digits except in digit-I in male IDDM patients. Radial loops were present only in digit -II of both male and female IDDM patients. The number of axial tri radius is present both in female and male IDDM patients which is increased when compared to controls. The mean atd and adt angles shows approximately similar readings in both sexes. TFRC and a-b ridge count are decreased both in male and female patients. Arches were present in I, II and V digits in both female and male IDDM patients.*

### INTRODUCTION:

Dermatoglyphics is a scientific method of reading lines and ridges of finger, palm and sole. The term Dermatoglyphics was first introduced in 1926 by Cummin and Midlo. The skin on the palmar and plantar surface is grooved by curious ridges, which form a variety of configurations. Each individual's ridge configurations are unique. The dermal ridge differentiations are genetically determined and influenced by environmental factors. It provides a simple , useful and inexpensive means for diagnostic value in several medical disorders for the last several decades<sup>1</sup>.

Abnormal dermatoglyphic patterns have been observed in several non-chromosomal genetic disorders and other diseases whose etiology may be influenced directly or indirectly, by genetic inheritance.<sup>2,3</sup> Type -I Diabetes is currently thought to occur in genetically predisposed individuals who are exposed to a series of environmental influences that precipitates the onset of disease.<sup>4</sup>. A significant link has been found between dermatoglyphic pattern and the disease. Dermatoglyphics may be effectively employed as a screening procedure in future and may help in the early detection of cases of diabetes mellitus

### MATERIALS AND METHODS:

The material for study consisted of finger and palm prints of patients selected. Consent of the patients and the controls was taken before the study. Dermatoglyphics patterns were studied in eighty cases (48 females and 32 males) of diagnosed type -1Diabetes Mellitus and they were compared with 63 cases of healthy individuals who were taken as controls. All are between the age groups of 10and 20years. A small dab of ink is placed on the inking slab and spread with roller into thin even film. Palm is carefully and uniformly spread with inked roller to cover the whole area of palm to be printed for examination. Plain prints are recorded

without rotation of digits by contact of ball of finger. The rolled prints are taken by rotation of finger, both in inking and printing, in order to obtain complete impression of fingertip (ball). This method enables us to record the complete imprints including palmar surfaces of all five digits in one attempt. These prints are studied with the help of a magnifying lens for observation under different heads. The printed sheets were coded with name, age and sex for case group (DM) and control group. The prints were then 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 palmar prints were analysed qualitatively and quantitatively.

**Materials required :**Black Duplicating ink (Kores) , Ink pad , Printing cards (White 'Map Litho' paper with a glazed surface on one side) , Magnifying hand lens , Cotton puffs , Scale and pencil pen , Protractor- To measure atd angle , Needle with a sharp point, for ridge counting.

### The qualitative and quantitative parameters observed are:

1. The types and frequency of digital patterns – loop, arch, whorls.
2. TFRC - Total finger ridge count Total Finger Ridge Count (TFRC).
3. atd - angle
4. adt angle
5. a-b ridge count

### OBSERVATIONS:

Observations were compared between controls and diabetics.

1. ulnar loops shows maximum percentage frequency in both right and left hands of female patients and controls.

- TFRC is high in normal females and decreased in patients.
- a-b ridge count is also decreased in patients when compared to normal controls.
- presence of axial triradius is increased in patients when compared to normal controls.
- ulnar loops shows increased percentage frequency in first and fifth finger of normal controls whereas whorls shows increased percentage frequency in 1<sup>st</sup> digit of both right and left hands of patients.

Ulnar loops show maximum percentage frequency in both right and left hands of male normal controls, whereas whorls show s maximum perdccentage of frequency in right and left hands of male patients. TFRC is high in controls and decreased in IDDM male patients. A-b ridge count is decreased in IDDM male patients when compared to controls. Presence of axial triradius is high in patients when compared to controls. Ulnar loops shows increased percentage frequency in 1<sup>st</sup> and V<sup>th</sup> digit of controls whereas whorls show increased percentage frequency in 1<sup>st</sup> and V<sup>th</sup> digit of IDDM patients.

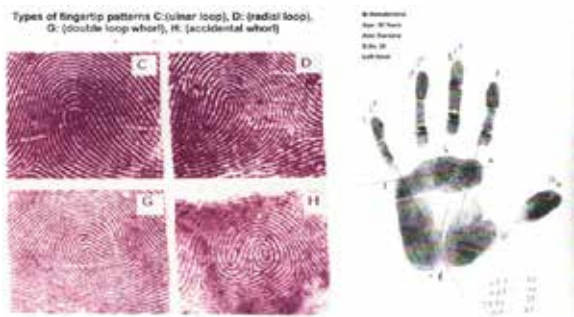
**DISCUSSION AND CONCLUSION:**

The salient features are derived from statistical analysis by SPSS-PC package showing the coparative digita pattern distribution between controls and patients of the same sex.

- In female controls, first digit shows three patterns, arches, ulnar loops and whorls. Out of these 70% are ulnar loops, arches 5%, whorls 25%. In IDDM female patients three patterns are seen. out of these, whorls are 70.8% arches 22.9%, ulnar loops 6.3%.
- In normals second digit shows ulnar loops 45%, arches 17.5%, radial loops 2.5% and whorls 35%. All four patterns are seen in both controls and patients in female patients. In females ulnar loops 43.8%, whorls 39.6%, arches 8.3%, radial loops 8.3%.
- TFRC mean in normals 130.80 and in patients 67.33. S.D in controls 17.47, in patients 6.14. In controls a-b ridge count mean is 77.45, in patient 55.77. S.D in normals 10.08 and in patients 7.32.
- In male controls first digit shows 43.5% ulnar loops, 39.1% whorls, 17.4% arches. In male IDDM patients whorls 84.4% ulnar loops 9.4%, arches 6.3%.
- In male controls second digit shows all four patterns, whorls 47.8%, ulnar loops 26.1%, radial loops 17.4%, arches 28.1%, radial loops 3.1%.
- TFRC mean in controls 138.69 and S.D. is 16.54 and in IDDM patients, the TFRC mean is 75.62 and S.D. is 7.20. In controls mean of a-b ridge count is 85.91, S.D. is 8.67. In IDDM mean is 56.18 and S.D. is 4.00. Both TFRC and a-d ridge counts are decreased in IDDM patients. Ravindranath and Thomas (1995)<sup>5</sup> however have reported a decrease in TFRC in diabetic group. Rajanigandha Pai et al (2006)<sup>6</sup> have observed no statistical difference in TFRC of controls and cases.

whorls are chiefly confined to digit 1 of both females and male IDDM patients. Ulnar loops shows dominance in all digits except in digit-I in male IDDM patients. Radial loops were present only in digit -II of both male and female IDDM patients. The number

of axial tri radius is present both in female and male IDDM patients which is increased when compared to controls. The mean atd and adt angles shows approximately similar readings in both sexes. TFRC and a-b ridge count are decreased both in male and female patients. Arches were present in I, II and V digits in both female and male IDDM patients. These findings are correlated with Vera M. Cabrera E. Gueu R: 1995 study of dermatoglyphics in insulin dependent diabetes mellitus patients in Acta diabetol and in 1993 dermatoglyphics in type 1 diabetes mellitus study by Ziegler A.G., Mathies R. Ziegelmayer G, ChopraV, Rodewald A, Standi E<sup>7</sup>.



MALE IDDM PATIENTS FINGER TIP PATTERN CONFIGURATIONS & atd, adt ANGLES - 1A

Hand	Digit	Pattern	atd	adt
Right	I	Ulnar Loop	120	120
Right	II	Ulnar Loop	120	120
Right	III	Ulnar Loop	120	120
Right	IV	Ulnar Loop	120	120
Right	V	Ulnar Loop	120	120
Left	I	Ulnar Loop	120	120
Left	II	Ulnar Loop	120	120
Left	III	Ulnar Loop	120	120
Left	IV	Ulnar Loop	120	120
Left	V	Ulnar Loop	120	120

MALE IDDM PATIENTS EACH DIGIT CONFIGURATION & TFRC, a-b RIDGE COUNTS- 1B

Hand	Digit	Pattern	TFRC	a-b Ridge Count
Right	I	Ulnar Loop	67.33	55.77
Right	II	Ulnar Loop	67.33	55.77
Right	III	Ulnar Loop	67.33	55.77
Right	IV	Ulnar Loop	67.33	55.77
Right	V	Ulnar Loop	67.33	55.77
Left	I	Ulnar Loop	67.33	55.77
Left	II	Ulnar Loop	67.33	55.77
Left	III	Ulnar Loop	67.33	55.77
Left	IV	Ulnar Loop	67.33	55.77
Left	V	Ulnar Loop	67.33	55.77

Normal Male & Female Control Mean & S.D. - 1A

Hand	Digit	Pattern	atd	adt
Right	I	Ulnar Loop	120	120
Right	II	Ulnar Loop	120	120
Right	III	Ulnar Loop	120	120
Right	IV	Ulnar Loop	120	120
Right	V	Ulnar Loop	120	120
Left	I	Ulnar Loop	120	120
Left	II	Ulnar Loop	120	120
Left	III	Ulnar Loop	120	120
Left	IV	Ulnar Loop	120	120
Left	V	Ulnar Loop	120	120

Normal Male & Female Control Mean & S.D. - 1B

Hand	Digit	Pattern	TFRC	a-b Ridge Count
Right	I	Ulnar Loop	130.80	77.45
Right	II	Ulnar Loop	130.80	77.45
Right	III	Ulnar Loop	130.80	77.45
Right	IV	Ulnar Loop	130.80	77.45
Right	V	Ulnar Loop	130.80	77.45
Left	I	Ulnar Loop	130.80	77.45
Left	II	Ulnar Loop	130.80	77.45
Left	III	Ulnar Loop	130.80	77.45
Left	IV	Ulnar Loop	130.80	77.45
Left	V	Ulnar Loop	130.80	77.45

Female Mean & S.D. Control of Finger Tip Configuration & atd, adt Angles - 2A

Hand	Digit	Pattern	atd	adt
Right	I	Ulnar Loop	120	120
Right	II	Ulnar Loop	120	120
Right	III	Ulnar Loop	120	120
Right	IV	Ulnar Loop	120	120
Right	V	Ulnar Loop	120	120
Left	I	Ulnar Loop	120	120
Left	II	Ulnar Loop	120	120
Left	III	Ulnar Loop	120	120
Left	IV	Ulnar Loop	120	120
Left	V	Ulnar Loop	120	120

Female Mean & S.D. Control of Finger Tip Configuration & TFRC, a-b Ridge Counts - 2B

Hand	Digit	Pattern	TFRC	a-b Ridge Count
Right	I	Ulnar Loop	138.69	85.91
Right	II	Ulnar Loop	138.69	85.91
Right	III	Ulnar Loop	138.69	85.91
Right	IV	Ulnar Loop	138.69	85.91
Right	V	Ulnar Loop	138.69	85.91
Left	I	Ulnar Loop	138.69	85.91
Left	II	Ulnar Loop	138.69	85.91
Left	III	Ulnar Loop	138.69	85.91
Left	IV	Ulnar Loop	138.69	85.91
Left	V	Ulnar Loop	138.69	85.91

The image shows two side-by-side tables, likely representing dermatoglyphic data. The left table is titled "NORMAL FINGER POWER OF FINGER COMPOSITIONAL AND ANGLE" and the right table is titled "NORMAL FINGER POWER OF FINGER COMPOSITIONAL AND ANGLE". Both tables have multiple columns for different finger types and measurements.

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