

## **Utility of dermatoglyphics in Type II Diabetes Mellitus (T2DM) to assess the risk for IHD: A pilot study.**

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### **Abstract**

**Dermatoglyphics is the scientific study of fingerprints. Recently, interest has been developed in associating Dermatoglyphics with various diseases. Therefore, this study was undertaken to find the frequency of various fingerprint patterns in Type 2 diabetes mellitus (T2DM) with and without ischemic heart disease (IHD). This study also intended to find the frequency of finger print patterns in T2DM patients having the family history of cardiovascular disease. Twenty five T2DM male patients in the age group of 38-65 years were selected, of which 18 had ischemic heart disease (IHD) and 16 patients had the family history of cardiovascular events. The right hand fingerprints of patients were obtained on an A4 size paper. The papers were coded and analyzed for finger print patterns, based on IHD and family history after categorizing them into 4 groups. In T2DM patients, there was higher frequency of whorls than other patterns. This study observed that in T2DM patients with IHD exhibited less frequency of arches, high frequency of whorls and ulnar loops when compared with T2DM patients without IHD, but the difference was not statistically significant. Finger print patterns of patients with family history of cardiovascular disorders had high frequency of radial loop type of finger print pattern and lower frequency of arches. Dermatoglyphics in T2DM and in patients with family history of CVD, it did not show preponderance of any of the fingerprints in IHD. Therefore, dermatoglyphics may be T2DM but not in identifying the risk category for IHD.**

**Keywords.** Dermatoglyphics, T2DM, Fingerprint patterns

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### **Introduction**

Diabetes mellitus is a non communicable disease which is rising in India. It is predicted that, India will have the greatest number of diabetic individuals globally by 2030 i.e. an increase from 31.7 million in 2000 to 79.4 million in 2030.<sup>1</sup> The risk for occurrence of diabetes mellitus in an individual is more in the presence of a family history. In Indian population, 75% of Diabetic patients have first degree family history of diabetes.<sup>2</sup> According to the WHO estimation, a significant amount of the health budget goes to Diabetes health care and related disabilities.<sup>3</sup> Therefore, identifying the risk category and taking up the preventive measures is highly economical.

In human beings the palmar surface of the hand contains various configurations of characteristic ridge patterns and is commonly called as finger prints. The science or study

of these finger prints is called as Dermatoglyphics.<sup>4</sup> Dermatoglyphics are widely used in criminology; it is only recently that, interest has been developed in associating it with medical and genetic diagnosis. Fingerprints are permanently configured before the 20th week of gestation. They have a significant genetic component and non-genetic components. The non-genetic component is determined by the environment of early pregnancy during which tissue differentiation and organogenesis are happening.<sup>5</sup> Therefore, this study intended to look at the frequency of fingerprints in T2DM who are having IHD (non genetic component) and with family history of IHD (genetic component). This can be helpful in screening process for identifying risk category in Type 2 diabetes for IHD.

### **Methodology**

This case control study involved 25 known Type II Diabetes mellitus (T2DM) male patients in the age group of 38-65years. Of which 18 had ischemic heart disease (IHD) and 16 patients had the family history of cardiovascular events. Based on this, they were divided into four groups which are as follows:

- Group 1: T2DM without ischemic heart disease (IHD) (n=7)
- Group 2: T2DM with IHD (18)
- Group 3: T2DM with family history of IHD and without IHD (n=5)
- Group 4: T2DM with family history of IHD and with IHD (n= 11)

Comparisons were made between group 1& 2 and between group 3& 4. Only males were chosen to avoid gender bias. Subjects with Psoriasis, Down’s syndrome, Epilepsy, Cancer, Schizophrenia and Type I diabetes mellitus were excluded from the study. The study was conducted at Jayadeva Institute of cardiology, Bangalore after obtaining the approval from Ethical Committee. The proforma consisted of demographic history, family history of cardiovascular disease and clinical data of diabetes, details of the presence of major cardiovascular risk factors like smoking and alcohol.

The fingerprints were obtained by the method suggested by Cummins and Midlo. <sup>6</sup> The prints were taken by washing off the hands and drying off with the use of a cloth, so that the hand is not moist. A uniform layer of finger printing ink was applied on the patient’s right hand palm and fingers. The print of the palm was taken by making an

impression on the paper and the prints of the fingers were taken by roll on technique where the coated finger will be rolled from the edge of the finger to the other end on the white A4 size sheet of paper until a visible print is seen. The patient’s gender, age, and family history were noted. The study was double blinded by assigning a code number to each patient. Fisher’s exact test was used to compare the count data between the groups.

**Results**

This study analyzed the digital finger print pattern of 25 cases of T2DM patients in the age group 38-65 years. In T2DM patients, whorls (36.7%) dominated the finger print patterns significant (p<0.001) (Table-1). This study observed that there was less frequency of arches in T2DM patients ‘without IHD’ (Group 1), but this was not statistically significant (Table 2). T2DM patients having family history of cardiovascular disorders were again divided into ‘with IHD’ (Group 4) and ‘without IHD’ (Group 3). Statistical analysis between the groups 3 and 4 did not show significant difference (Table 3).

*Table 1: Proportion of Finger print patterns in T2DM*

Fingerprint Pattern	Frequency	P value
Whorls	47 (37.6%)	<0.001
Ulnar loops	25 (20%)	
Radial loops	35 (28%)	
Arches	18(14.4%)	

*Chi square test*

*Table 2. Comparison between Group 1 and Group 2*

Fingerprint Pattern	T2DM		Odds ratio	P value
	Without IHD; Group 1(n=7) Total Finger pattern = 35(5x7)	With IHD; Group 2 (n=18) Total Finger pattern = 90(5x18)		
Whorls	12 (34.3%)	35 (38.9%)	0.82	0.68
Ulnar loops	5 (14.2%)	20 (22.2%)	0.58	0.45
Radial loops	10 (28.5%)	25 (27.8%)	1.03	1.00
Arches	8 (23%)	10 (11.1%)	2.35	0.15

*Fisher's Exact Test, HS – Highly significant (p<0.01), S – Significant (p<0.05), NS – Not significant (p>0.05)*

*Table 3. Comparison between Group 3 and Group 4*

Fingerprint Pattern	T2DM with Family history of CVD		Odds ratio	P value
	Without IHD; Group 3 (n=5) Total Finger pattern = 25(5x5)	With IHD; Group 4 (n=11) Total Finger pattern =55(5x11)		
Whorls	6 (24%)	15 (27.3%)	0.84	1.00
Ulnar loops	7 (28%)	15 (27.3%)	1.03	1.00
Radial loops	10 (40%)	20 (36.4%)	1.16	0.80
Arches	2 (8%)	5 (9%)	0.87	1.00

Fisher's Exact Test, HS – Highly significant ( $p < 0.001$ ), S – Significant ( $p < 0.05$ ), NS – Not significant ( $p > 0.05$ )

## Discussion

The word “Dermatoglyphics” actually refers to the friction ridge formations which appear on the palms of the hands and soles of the feet. It has wide application in criminology. Now, interest has been developed in associating Dermatoglyphics with diseases. Study of finger print pattern is part of Dermatoglyphics and its association with Type 2 diabetes is one of the current research areas.<sup>7, 8</sup> The underlying rationale is that both Diabetes and Dermatoglyphics have genetic and environmental factors. This study intended to extend the Dermatoglyphics for identify the risk category for IHD in T2DM patients as this is less addressed in literature.

This study showed that T2DM patients had significantly high number (36.7%,  $p < 0.001$ ) of whorls. But, Kumar dam et al had observed high frequency of loops pattern in T2DM patients.<sup>9</sup> The results also showed that T2DM patients with IHD showed less frequency of arches, though it was not statistically significant. Since the sample size was less, probably a higher sample size may be required to establish an association. Comparison of finger print patterns between the patients with and without IHD but having a family history of CVD did not shown any difference in the frequency. This infers that T2DM patients with family history of CVD share common genetic component of Dermatoglyphics which may not be a sole factor responsible for the present pathological condition and suggest the role of environmental factors also.

Since this was a pilot study, it was limited by its sample size. Another limitation of this study is that it has not considered the other aspects of the Dermatoglyphics like palm patterns, atd angle, thenar patterns, hypothenar patterns and digital asymmetry.

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