

## The Study Of Palmar Dermatoglyphics In Non-Insulin Dependent Diabetes Mellitus Patients

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### ABSTRACT:

**Aims and Objectives:** To study the finger and palmar dermatoglyphic pattern, establish sexual differences and find out whether a specific dermatoglyphic trait/ features exists in non-insulin dependent diabetes mellitus patients and whether it is significant. **Background:** Dermatoglyphics is the scientific study of papillary ridges in the palm of the hand and fingers and soles of the feet and toes. The dermal ridges and the configuration which is once formed are not affected by age, development and environmental changes in the post-natal life and so, it has the potential to predict various genetic and acquired disorders with a genetic influence. The etiology of diabetes mellitus is multifactorial with genetics playing an important role. Taking into consideration the genetic predisposition of dermatoglyphics and diabetes mellitus type-2, the study was undertaken to find out correlation between them. **Methods:** The sample size is 100 patients (60 male and 40 female) of non-insulin dependent diabetes mellitus and Similarly 100 numbers of normal healthy individual (60 male and 40 female), all above 30 years of age group. The patients were selected from the medicine wards and diabetic outpatient department of Civil Hospital Ahmedabad. Dermatoglyphic prints were taken by the "INK METHOD" as described by CUMMINS (1936) and CUMMINS & MIDLO (1961). Observations thus made were compiled and tabulated. Mean and standard deviation were calculated further to test the significance of the differences of observations in different subgroup of study sample. **Results:** There is statistically significant decrease in whorl pattern is seen in total cases as well as in female of NIDDM cases. Statistically significant difference in loop pattern is seen in D-IV in female ( $p=0.01$ ) of NIDDM cases and whorl pattern is seen in D-IV in female ( $p=0.01$ ) and D-III in right hand ( $p=0.01$ ) of NIDDM cases. **Conclusion:** Thus from the present study, it appears that there do exist a variation in the dermatoglyphic patterns in NIDDM with an advantage of being very simple and economical 'ink' method. As the specific features of dermatoglyphic patterns are present in the NIDDM, it can be used for mass screening programme for prevention of NIDDM.

**Key Words:** Dermatoglyphics, Non-Insulin Dependent Diabetes Mellitus

### Introduction:

Dermatoglyphics is the scientific study of papillary ridges in the palm of the hand and fingers and soles of the feet and toes.<sup>10</sup> The term 'Dermatoglyphics' has its origin from Greek Words; 'Derma' means Skin and 'Glyphic' means carving.<sup>9</sup> This term was

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coined by Dr. Harold Cummins, the father of American fingerprint analysis and Midlo in 1926.

These ridges begin to appear in embryos at 10 weeks and are permanently established by 17 weeks. The epidermal ridges produce grooves on the surface of the palms and the soles, including the digits (fingers and toes). The type of pattern that develops is determined genetically and constitutes the basis for examining fingerprints in criminal investigations and medical genetics.<sup>8</sup> The original ridge characteristics are not disturbed unless the skin is damaged to a depth of about 1 mm.<sup>2</sup> The first classification of finger prints (digital patterns) into arches, loops and whorls was done by Sir Francis Galton in 1890.<sup>6</sup>

The dermal ridges and the configuration which is once formed are not affected by age, development and environmental changes in the post-natal life and so, it has the potential to predict various genetic and acquired disorders with a genetic influence.<sup>3, 1</sup> The etiology of diabetes mellitus is multifactorial with genetics playing an important role.

Taking into consideration the genetic predisposition of dermatoglyphics and diabetes mellitus type-2, the study was undertaken to find out correlation between them. So that dermatoglyphic study may be helpful in the diagnosis of predisposition towards this disease at an earlier age.

#### Materials and Methods:

100 patients (60 male and 40female) of non-insulin dependent diabetes mellitus and Similarly 100 numbers of normal healthy individual (60 male and 40female), all above 30 years of age group were selected from the medicine wards and diabetic outpatient department of Civil Hospital Ahmedabad. Patients having Deformity of hand, Ridges obscured by injury to hand, ridge aplasia, Chromosomal abnormalities like klinefelter's syndrome, Turner's syndrome, Known cases of Down's syndrome, congenital rubella, leukaemia and Alzheimer dementia were excluded.

Dermatoglyphic prints were taken by the "INK METHOD" as described by CUMMINS (1936)<sup>4</sup> and CUMMINS & MIDLO (1961)<sup>3</sup>. After obtaining informed consent from the patients and controls, both the hands were thoroughly washed and Dermatoglyphic prints were taken on white paper. The prints were then subjected for detailed 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 on the same paper with the pencil. Observations thus made were compiled and tabulated. Mean and standard deviation were calculated further to test the significance of the differences of observations in different subgroup of study sample. Z test was used.

$$Z = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{\frac{SD_1^2}{N_1} + \frac{SD_2^2}{N_2}}}$$

Where  $X_1$ ,  $SD_1$ , and  $N_1$  are the mean, standard deviation and size of the one subgroup and  $X_2$ ,  $SD_2$ , and  $N_2$  are the mean, standard deviation and size of the second subgroup of study sample.

## Confidence limits for Z test

No	Z value	P value	Significance
1	If Calculated Z Value <1.96	P>0.05	Not Significant
2	If Calculated Z Value $\geq$ 1.96	P $\leq$ 0.05	Significant

## Result:

Qualitative analysis of Finger Tips is done according to Galton's Classification.<sup>6</sup> Henry ER added 'Composite' as 4th group to demarcate more complex patterns and it includes Central Pocket Loop, Lateral Pocket Loop, Twin Loop, and Accidental Whorls.<sup>7</sup>

Table – 1 percentage wise distribution of total finger tip patterns in NIDDM and control

Subject	Sex	Side	Total Loops		Total Arches		Total Whorls	
			No	%	No	%	No	%
NIDDM	Male(M)	Right	168	56	23	7.66	109	36.33
		Left	178	59.33	18	6.0	104	34.66
		TOTAL (R + L)	346	57.66	41	6.83	213	35.5
	Female(F)	Right	119	59.5	17	8.5	64	32
		Left	124	62	19	9.5	57	28.5
		TOTAL (R + L)	243	60.75	36	9.0	121	30.25
	TOTAL (M + F)	Right	287	57.4	40	8.0	173	34.6
		Left	302	60.4	37	7.4	161	32.2
		TOTAL (R + L)	589	58.9	77	7.7	334	33.4
Control	Male(M)	Right	158	52.66	25	8.33	117	39
		Left	171	57	26	8.66	103	34.33
		TOTAL (R + L)	329	54.83	51	8.5	220	36.66
	Female(F)	Right	113	56.5	10	5	77	38.5
		Left	108	54	10	5	82	41
		TOTAL (R + L)	221	55.25	20	5	159	39.75
	TOTAL (M + F)	Right	271	54.2	35	7	194	38.8
		Left	279	55.8	36	7.2	185	37
		TOTAL (R + L)	550	55.0	71	7.1	379	37.9

**Table- 2 statistical comparison of Total Finger Tip Pattern between NIDDM and control**

Finger tip patterns	Cases		Control		Chi-sq	p-value	Remark
	No	%	No	%			
Loop	589	58.9	550	55	2.94	0.08	NS
Arch	77	7.7	71	7.1	0.18	0.66	NS
Whorl	334	33.4	379	37.9	4.21	0.03	S

There is decrease in the percentage of whorl pattern in NIDDM cases as compared to the controls with statistically significant difference as p-value is 0.03.

**Table- 3 Digit wise frequency distribution of finger tip patterns in NIDDM and control in males and females**

FTP	Subject	Males (60+60)					Females(40+40)				
		D-I	D-II	D-III	D-IV	D-V	D-I	D-II	D-III	D-IV	D-V
Loop	NIDDM	60	55	91	50	90	42	38	61	41	61
	Control	56	50	82	46	95	40	40	55	25	61
	Chi Sq	0.15	0.27	1.32	0.01	0.37	0.02	0.02	0.78	5.80	0.03
	P value	0.69	0.60	0.24	0.91	0.53	0.87	0.87	0.37	0.01	0.85
	Remarks	NS	NS	NS	NS	NS	NS	NS	NS	S	NS
Arch	NIDDM	4	16	10	6	5	5	15	10	3	3
	Control	6	25	8	4	8	2	9	6	3	0
	Chi Sq	0.10	1.88	0.06	0.10	0.32	0.59	1.22	0.62	0.17	1.35
	P value	0.74	0.17	0.80	0.74	0.56	0.43	0.26	0.42	0.67	0.24
	Remarks	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Whorl	NIDDM	56	49	19	64	25	33	27	9	36	16
	Control	58	45	30	70	17	38	31	19	52	19
	Chi Sq	0.01	0.15	2.56	0.42	1.41	0.40	0.24	3.50	5.68	0.14
	P value	0.89	0.69	0.10	0.51	0.23	0.52	0.62	0.06	0.01	0.70
	Remarks	NS	NS	NS	NS	NS	NS	NS	NS	S	NS

Table-3: shows digit wise frequency distribution of finger tip patterns in NIDDM and control in males and females. The frequency of whorl decrease in most of the digits of NIDDM cases in both sex with statistically significant difference seen in D-IV in female (p value= 0.01) and no statistically significant difference in any other digits of NIDDM cases when compared with control.

**Table-4 Digit wise frequency distribution of finger tip patterns in NIDDM and control in both hands**

FTP	Subject	Right hand					Left hand				
		D-I	D-II	D-III	D-IV	D-V	D-I	D-II	D-III	D-IV	D-V
Loop	NIDDM	45	41	80	43	78	57	52	72	48	73
	Control	51	41	69	35	75	45	49	68	36	81
	Chi Sq	0.50	0.02	2.63	1.02	0.11	2.42	0.08	0.21	2.48	1.38
	P value	0.47	0.88	0.10	0.31	0.73	0.11	0.77	0.64	0.11	0.23
	Remarks	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Arch	NIDDM	5	19	8	4	4	4	12	12	5	4
	Control	3	17	6	4	5	5	17	8	3	3
	Chi Sq	0.13	0.03	0.07	0.13	0.00	0.00	0.64	0.50	0.13	0.00
	P value	0.71	0.85	0.78	0.71	1.00	1.00	0.42	0.47	0.71	1.00
	Remarks	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Whorl	NIDDM	50	40	12	53	18	39	36	16	47	23
	Control	46	42	25	61	20	50	34	24	61	16
	Chi Sq	0.18	0.02	6.22	0.99	0.03	2.02	0.02	1.53	3.40	1.14
	P value	0.67	0.88	0.01	0.31	0.85	0.15	0.88	0.21	0.06	0.28
	Remarks	NS	NS	S	NS	NS	NS	NS	NS	NS	NS

Table-4: shows digit wise frequency distribution of finger tip patterns in NIDDM and control in both hands. There is slight decrease in frequency of whorl pattern in most of the digits both hands of NIDDM cases with statistically significant difference seen in D-III of right hand (p value=0.01) when compared with control.

**Discussion:****Table-5 Comparison of Qualitative data between different studies:**

	<b>Sant SM (1980)<sup>(13)</sup></b>	<b>Ravindranath R (1995)<sup>(12)</sup></b>	<b>Vera M (1995)<sup>(14)</sup></b>	<b>R. S. Bali (2005)<sup>(5)</sup></b>	<b>Pushpa Burute (2007)<sup>(11)</sup></b>	<b>Present study</b>
<b>Loops</b>	Decrease (Lu)	Increase(s)	-	Increase (Lu)	Increase (Lu)	Increase (Lu)
<b>Arches</b>	Increase(f)	Increase(s)	Increase	-	Increase	Increase(s)(f)
<b>Whorls</b>	Increase	Decrease(s)	-	-	Decrease	Decrease(s)

[s=significant, Lu=loop ulnar, f=female, m=male]

**Whorl:-**

In the present study, statistically significant decrease in whorl pattern is seen in total NIDDM cases (33.4%) as well as in female (30.25%) but not significant decrease in male (35.5%) NIDDM cases when compared to control (37.9%, 39.75% and 36.66% respectively). The frequency of whorl is decreased in most digits of both sexes but not significant except statistically significant difference seen in D-IV in female ( $p=0.01$ ) and D-III in right hand ( $p=0.01$ ) of NIDDM cases when compared to control.

**Conclusion:**

Thus from the present study, it appears that there do exist a variation in the dermatoglyphic patterns in NIDDM with an advantage of being very simple and economical 'ink' method. Moreover the materials required for the dermatoglyphic procedure are easily available and portable. As the specific features of dermatoglyphic patterns are present in the NIDDM, it can be used for mass screening programme for prevention of NIDDM.

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