



## A Study on Inter Digital Area Ridge Count in Type 2 Diabetes Mellitus

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### ABSTRACT

**Background:** The inter digital areas are the area of distal palm between the fingers. The ridge counts of the inter digital area have been found useful as early diagnostic tool in number of genetically related clinical disorders. Diabetes Mellitus is one such condition which can be predicted by studying the inter digital area ridge count. Considering lacunae in the studies on the inter digital area ridge count of Type 2 Diabetes Mellitus in the Indian context, this study was carried out to delineate the inter digital area ridge count of Type 2 Diabetes Mellitus among Tamil Nadu population of India.

**Materials and Methods:** The inter digital area ridge count was carried out on one hundred Diabetes Mellitus patients and was compared with one hundred normal subjects (equal number of male and female). The subjects were 35 - 80 years of age group belonging to Salem population of Tamil Nadu.

**Results:** Significantly decreased levels of mean right a-b and left a-b ridge count were observed in male Type 2 Diabetes mellitus patients compared to normal male subjects. Increased levels of mean right b-c, right c-d, left b-c and left c-d ridge counts in female Type 2 Diabetes mellitus patients compared to normal female subjects but these values were statistically insignificant.

**Conclusion:** The knowledge of inter digital area ridge count is useful for early diagnosis of Diabetes Mellitus. This paper adds to the knowledge of inter digital area ridge count of the Tamil Nadu population, which would be of use to the early diagnostic tool to predict diabetes Mellitus.

**Key words:** Diabetes Mellitus, inter digital area, Ridge count, Tri radii.

### INTRODUCTION

"Dermatoglyphics" is the scientific study of dermal ridge pattern on volar surface of palm, fingers, sole and toes. [1-4] Differentiation of dermal ridges takes place during the early phase of fetal development. The resulting ridge configurations are genetically determined and they remain unchanged throughout life and genetic or chromosomal abnormalities might be reflected as alterations in dermal ridges, they can be used as a tool in the study of genetically influenced diseases. [2-4]

The Inter digital areas are the area of distal palm between the fingers. The digital triradii constitute important landmarks found on the palm for dermatoglyphic analysis. A tri radius is formed by the confluence of three ridge systems. The geometric centre of the tri radius is designated as a tri radial point. Ideally, the tri radial point is the meeting point of three ridges that form angles of approximately 120 degree with one another. [2]

Typically, there are four digital tri radii in the distal portion of the palm. They are found in the metacarpal region at the

base of digits II, III, IV and V. Each tri radius is normally associated with one digit. By convention, they are termed a, b, c, and d, proceeding in a radio - ulnar direction. The two distal radiants of each digital tri radius run laterally to the nearest inter digital area subtending the digit concerned. The proximal radiant is typically directed toward the center of the palm. [2]

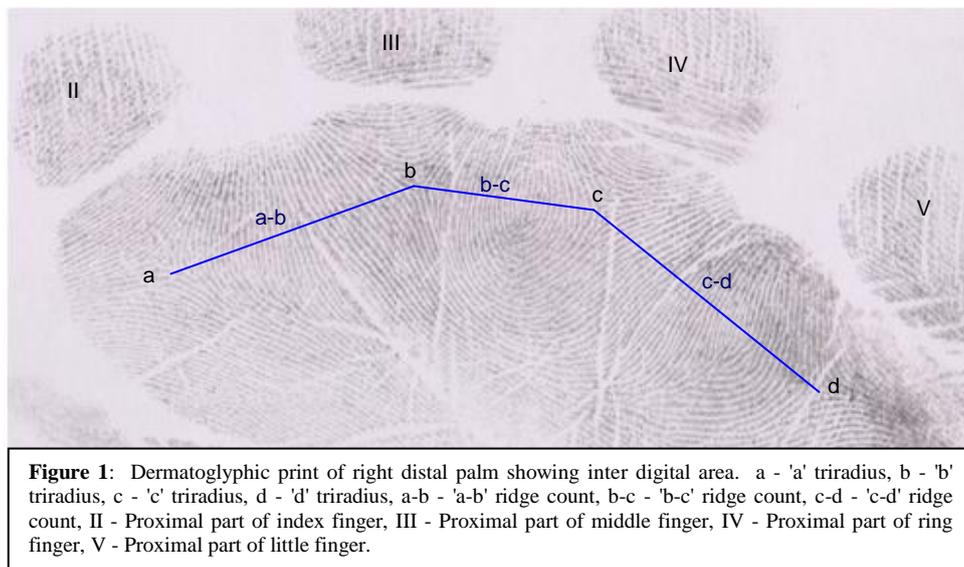
Ridges are counted between two digital tri radii. The ridge count obtained between tri radii "a" and "b" and is referred to as the a-b ridge count, 'b' and 'c' tri radii is b-c ridge count and 'c' and 'd' tri radii is c-d ridge count respectively. Counting is carried out along a straight line connecting both tri radial points. The count excludes the ridges forming the tri radii.

The knowledge of this inter digital area ridge count is essential for the Diabetologists treating diabetes mellitus. There is a paucity of information regarding the dermatoglyphic study of Tamil Nadu

population in the literature. The present study aims to fill this gap of information.

## MATERIALS AND METHODS

Data was collected from one hundred Type 2 DM patients and one hundred normal subjects (50 Males and 50 Females in each group). The subjects were 35 - 80 years of age group belonging to Salem population of Tamil Nadu. The study was carried out at VMKV medical college Hospital, Salem, India. Dermatoglyphic print of the hand were obtained by using Indian ink, by the Cummins, Midlo technique. After obtaining the Dermatoglyphic prints, the triradius at distal palm present close to the second, third, fourth and fifth digits were identified. The line was drawn between two tri radii of distal palm and inter digital areas ridge count were done by using a hand lens. Results were tabulated and statistical analysis was carried out.



## RESULTS

The results are depicted in the table - 1. Statistically significant decreased levels of mean right a-b and left a-b ridge count were observed in male Type 2 Diabetes mellitus patients compared to normal male subjects and also decreased levels of mean right b-c, left c-d ridge counts in male Type 2 Diabetes mellitus patients compared to

normal male subjects but these values were statistically insignificant.

Decreased level of mean right a-b ridge count was observed in female Type 2 Diabetes mellitus patients compared to normal female subjects but this value was statistically insignificant. Increased levels of mean right b-c, right c-d, left b-c and left c-d ridge counts in female Type 2 Diabetes

mellitus patients compared to normal female subjects but these values were statistically insignificant.

**Table 1: Inter digital areas ridge count between Type 2 DM and normal subjects.**

Parameters	Male subjects					Female Subjects				
	Normal		Type 2		P value	Normal		Type 2		P value
	Mean	SD	Mean	SD		Mean	SD	Mean	SD	
Right a-b	42.16	6.65	37.98	7.21	< 0.05*	40.30	4.78	39.40	5.01	> 0.05
Right b-c	26.02	8.43	24.10	6.38	> 0.05	23.20	8.38	26.06	5.77	> 0.05
Right c-d	35.46	9.62	35.52	5.51	> 0.05	34.62	10.58	37.42	6.72	> 0.05
Left a-b	42.72	5.94	39.10	5.81	< 0.05*	41.48	4.70	41.26	6.02	> 0.05
Left b-c	24.78	8.49	24.74	5.43	> 0.05	22.90	8.34	25.62	4.87	> 0.05
Left c-d	36.58	9.48	34.58	7.28	> 0.05	35.14	10.79	38.34	6.18	> 0.05

Statistical analysis was done by t-test: Data expressed as mean and SD,\* P-value < 0.05 was considered as statistically significant.

## DISCUSSION

From Maharashtra, Khan et al have studied the Dermatoglyphic prints of one hundred non-insulin dependent diabetes mellitus patients (equal number of male and females) and compared with dermatoglyphic prints of equal number of healthy controls. They found that the mean a-b ridge count in diabetics was significantly decreased (68.25) in comparison to non-diabetics (70.80). This difference was statistically significant (p<0.05).<sup>[5]</sup>

In an another study carried out in Maharashtra by Rakate et al on 75 type II diabetic patients and compared with an equal number of control group. Fingerprint patterns of 51 male and 24 female patients suffering from type II diabetes mellitus compared with 75 normal persons (47 males and 28 females). They found that the average a-b ridge count of diabetic patients were 36.00 on right hand, 37.00 on left hand in males and in females it was 34.66 on right hand, 35.33 on left hand which was more as compare to non-diabetic males counted 34.42 on right hand and 35.44 on left hand, in females 35.85 on right hand, 36.78 on left hand.<sup>[6]</sup>

Manoj Kumar Sharma et al from Jaipur have studied the dermatoglyphic patterns of 50 diabetic cases and 50 controls and they showed insignificantly increased mean values for the (a-b) ridge count of the female diabetic patients.<sup>[7]</sup> Vadgaonkar et al also observed insignificantly variable a-b ridge count in their study.<sup>[8]</sup>

In River State, Nigeria, Eberechi et al have observed that there is significant difference in the b-c palmar ridge count

between the diabetic patients and the essential hypertensive patients with the male essential hypertensive patients having a higher average value of 13.50 for the right hand and 13.54 for the left hand than male diabetic patients (12.45 for the right hand and 12.00 for the left hand). Also, b-c palmar ridge count in the female essential hypertensive patients had a higher average value of 14.14 for the right hand and 14.34 for the left hand than in the diabetic patients (13.50 for the right and 12.50 for the left hand), (P<0.05).<sup>[9]</sup>

The Study at North Coastal Andhra Pradesh Population conducted by Padmini M.P et al have reported their findings as follows: decreased levels of mean right a-b (25.02), left a-b (24.77) ridge counts in female Type 2 diabetes mellitus patients compared to control females (Right a-b 28.72, left a-b 29.82). Decreased levels of mean right b-c (14.15), left b-c (14.91) ridge counts in female Type 2 diabetes mellitus patients compared to control females (Right b-c 19.15, left b-c 18.15). Increased levels of mean right c-d (26.35), left c-d (24.32) ridge counts in female Type 2 diabetes mellitus patients compared to control females (Right c-d 21.7, left c-d 20.88). Decreased levels of mean right a-b (25.12), increased levels of mean left a-b (26.67) ridge counts in male Type 2 diabetes mellitus patients compared to control males (Right a-b 27.4, left a-b 17.42). Decreased levels of mean right b-c (15.91), left b-c (16.14) ridge counts in male Type 2 diabetes mellitus patients compared to control males (Right b-c 19.37, left b-c 18.15). Decreased levels of mean right c-d (22.82), left c-d

(21.62) ridge count in male Type 2 diabetes mellitus patients compared to control males (Right c-d 25.91, left c-d 23.28).<sup>[10]</sup>

In the present study it was observed that statistically decreased levels of mean right a-b and left a-b ridge count in male Type 2 Diabetes mellitus patients compared to normal male subjects and also decreased levels of mean right b-c, left c-d ridge counts in male Type 2 Diabetes mellitus patients compared to normal male subjects but these values were statistically insignificant. Decreased level of mean right a-b ridge count was observed in female Type 2 Diabetes mellitus patients compared to normal female subjects but this value was statistically insignificant. Increased levels of mean right b-c, right c-d, left b-c and left c-d ridge counts in female Type 2 Diabetes mellitus patients compared to normal female subjects but these values were statistically insignificant.

## CONCLUSION

The knowledge of inter digital area ridge count is essential for early diagnosis of Diabetes Mellitus. This paper adds to the knowledge of inter digital area ridge count of the Tamil Nadu population, which would be of use to the early diagnostic tool to predict diabetes Mellitus.

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