Original Research Article

A case-control study on relationship between dermatoglyphics and diabetes

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ABSTRACT

Background: Nowadays study of dermatoglyphics has an extraordinary significance in legal and criminal explores. Additionally, its investigation is identified with some hereditary sicknesses has an enormous application. Diabetes Mellitus is the silent killer of humanity and general medical issue. Dermatoglyphics might be viably utilized as a screening methodology in future and may help in the early recognition of instances of diabetes mellitus.

Materials and Methods: In our study, total of 100 patients were selected from the out door patient department from the hospital, out 0f 100 patients 50 patients those are suffering from diabetes made the experimental group and the other those are having no systemic condition made the other group or the control group. The establishment of the connection between the two groups by examining the each group the fact of presence or absence of dermatoglyphic design. In this total finger ridge count, indian ink technique was usd for taking up the hand, along with total ridge count of finger, absolute finger ridge count, ridge count for distal as well as lateral deviation along with palmer frequency design computerised along with lateral deviation with design frequency of the c- line and angles, which represent the qualitative boundary.

Results: The result that has been obtained from our study reveals that the total finger count of the ridge along with ridge count of the finer absolute, along with a-b count of the ridge were found to be higher in all the groups of the patient but found to be insignificant statistically. Angle "atd" that is present over both the sides of the hand in the patient were found to be expanded in all the groups that involve both the experimental groups and the control group, but with an exception in males that too in left side, but still they differ on the right side that too significantly (p<0.01, overall) and on the left side i.e. in case of females with p<0.001. The angles of tad and as well as 'tda' which were present over the two sides of the with respect to all the groups, that include the experimental one and the control one, but with an exception with respect to males with left 'tda' and in other case they significantly differ in case of females with left tad with p<0.01 and in case of right side tda with p<0.001 and with respect to all the groups with reference to right 'tda' with value of p<.01 the arch advanced frequencies along with the circle and the whorl in case of females with respect to the over all groups with an exception with loop were found to be increased significantly with p value i.e. p<0.05. The design of the spiral along with remnant were found to be totally limited to the thenar along with the hypothenar region in the male patients when get contrasted with the controls.

Conclusion: By the results of our study we concluded that, there is expansion in the radial variety and absence was found in case of proximal variety and the designs of the c – line in case of diabetics were reduced when it is compared to the control group. Our study results demonstrated that dermatoglyphic abnormalities can be utilized as a device which act as analytic for predicting the chance for the development of the disease known as diabetes in future.

1. Introduction

Dermatoglyphics deals the logical investigation of epidermal ridge designs on the palmar and plantar part of fingertips, palms, soles and toes.[1] The term 'Dermatoglyphics was coined by Cummins and Midlo (1926) and was derived from the Greek words 'derma' signifies skin and 'glyphics' signifies carvings (Penrose LS, 1963).[2,3] The skin on the palmar and plantar surfaces of man not smooth. It is scored by inquisitive ridges, which form a variety of designs as the dermal ridges start developing during the third intrauterine week as a result of physical or topological power.[3] Dermal ridges along with the arrangements which are once framed are not influenced by the age, advancement and ecological changes in the postnatal life thus it can possibly anticipate different hereditary and obtained disorders with a hereditary impact.[4]

Broad clinical interest in epidermal ridges grew distinctly over the most recent couple of years when it became apparent that numerous patients with chromosomal variations had strange ridge design. Assessment of skin ridges, subsequently vowed to give a basic, reasonable methods for data to decide if a given patient could have a specific chromosomal deformity.

1.1. Dermatoglyphics offers at least two significant focal points.[5]

1. The epidermal ridge designs on the hand and sole are completely evolved at birth and so, stay unaltered forever.
2. Scanning of the ridge patterns or recording these perpetual impressions can be cultivated quickly, reasonably and with no injury to the patient.
3. Finally, the relevance of dermatoglyphics is not to diagnose, but it is preventive by predicting a disease. Similarly, it is not for defining an existing disease, but for identifications of people with the genetic predisposition to develop certain diseases.

Diabetes Mellitus is the silent killer of mankind and general medical issue. Accordingly, researchers are searching for new techniques for its initial diagnosis and management. Indeed, even before that the primary expectation of it might assist with taking some prophylactic measures. One of the aetiology of Diabetes Mellitus is genetic. In this investigation, we are attempting to indicate the dermatoglyphic attributes to see if some particular quality exists in the Diabetes Mellitus patients.

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2. Materials and Methods

Total number of patients included in the study is 60 and all these 60 patients were contrasted and 60 patients were taken as control group. Confirmation that the patient is having diabetes mellitus id totally depend upon the clinical signs and symptoms given by the patient along with there blood glucose levels.

2.1. The Indian Ink method (Cumins and Midlow, 1961)

The technique that was introduced by cumins and midlow in the year 1961 that is now known as indian ink technique was utilized totally in the process of impression making with the help of camel copying ink.

The material that is utilised in our study is a piece of glass plate with dimension of 8.5x11 inches along with two plain paper of dimension 8.5x11 inches, a bottle of dimension10x4 inches, roller which is used for the dispersion of the ink, table, scale, pointed HB lead pencil along with mercury light, pointer for marking and a protractor, chemicals for washing the hand like ether and a good quality of central focal point which is enhancing.

The hands should be washed thoroughly with the help of chemicals and water and chemical ether was used to clean the dampness. Very small amount of replicating ink crushed out from the roller on a thin film for the process of direct ink over the fingers. The palm was spreaded with the help of roller that is inked to cover the palm, that has to be printed for appraisal. The paper was engaged over the compartment that is in round shape and the fingers were open after than the palm should move by the application of force over them and in the mean time by permitting the paper along with container to move in forward direction [Figure 1]. The fingerprints that were taken by different turns of the fingers both in inking and priting to get the proper impression of the finger prints. This technique will help us in recording the complete impression of the palm. After than all these prints were concentrated by central focal point that is intensifying for all the observed observations with respect to and under different heads.

3. Obeservations and Results

All the findings were recorded in a careful manner to get the quantitative as well as qualitative highlights of the dermatoglyphic from the prints from different hand of the different patients, that constitutes total of 60 patients, out of 60 30 were male and 30 were female and total number of patient under control group is 60, which constitutes of 17 females and 43 males.

45 percent was the total whole finger ridge count of the different patient examined with a range of 150-200 and for the control group it was concluded as 43 percent with a range of 100 to 150 for the control group. Mean for the diabetic group is 143.12 and for the control group it was

Table 1: Distribution with respecttot total finger count in both the sexes i.e. male and female, both in control and experimental group.

| | Male | | Female | |
	Diabetic	Control	Diabetic	Control
Mean ± SD	143.12 ± 37.27	134.23 ± 34.46	138.43 ± 35.38	148.54 ± 37.43
P-Value	> 0.05	> 0.05	> 0.05	> 0.05
Significant	NS	NS	NS	NS

NS = Not Significant.
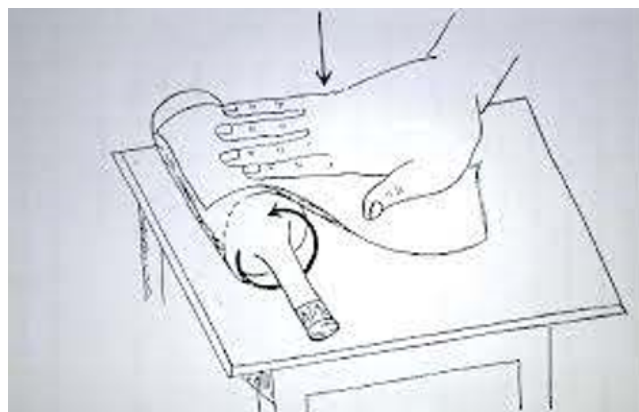
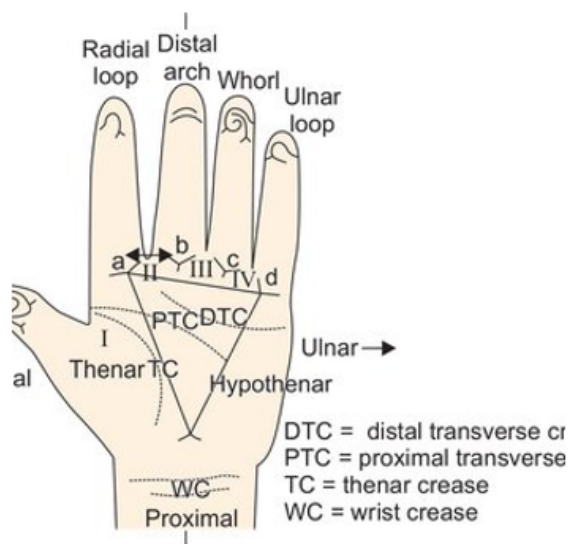**Fig. 1:** Showing the technique used in taking a print

Fig. 2:

134.23, which is found to be not differ significantly along with the above said comparative difference was additionally not significant in Table 1.

It was revealed that 43 percent was the absolute finger ridge count for the diabetic group with a range of 100 to 200 and the same is 45 percent for the control group with a range of 200 to 300. The difference which was found for their mean value is 211.48 for the experimental group i.e. the diabetic patient group and 196.43 for the other group

Fig. 3: Non significant type c line in case of diabetic patient.

i.e. the control group.

The point mean values of the patient with 'atd' of the right was revealed to be 43.92 and the same for the control group was revealed to be 39.41 and these two values were fond to be differed significantly with p<0.01. While we went for correlation regarding with sex wise, in case of females the mean values for left angle was found to be 41.68 in case of the experimental group i.e. the diabeteic group and 38.96 for the control group and a significant difference was found with p<0.001. on the other hand the angle distribution for the right side was in the range under 60 to 69 which constitutes about 46 percent when get contrasted with the other group thai is the control group. On the left side this was inverted on correlation with angle 'tda', both the groups i.e. experimental and control group revealed significant difference with p<0.01 over the right side. Distribution range on the right side was revealed to be 70-79 which is found to be 48% in case of experimental group i.e. diabeteic patient group, when get contrasted with 80-89 which constitutes about 66 percent in the other group

Table 2: Distribution of absolute Finger Ridge Count in both the sexes i.e. in male and female with the experimental and the control group.

	Male		Female	
	Diabetic	Control	Diabetic	Control
Mean ± SD	211.48 ± 54.48	196.43±41.38	192.76 ± 43.49	220.87 ±54.24
P	> 0.05	> 0.05	> 0.05	> 0.05
Significant or Not significant	Not Significant.	Not Significant.	Not Significant.	Not Significant.

Table 3: Frequency distribution ofRight and Left (A-B) Ridge Count between case and control group along with sex distribution

	Rt. (a-b) ridge count				Lt. (a-b) ridge count			
	Male		Female		Male		Female	
	Diabetic	Control	Diabetic	Control	Diabetic	Control	Diabetic	Control
Mean ± Standard deviation	38.7±42	37.3±4.32	37.9±4.24	36.9±4.29	38.4±3.12	38.2±3.29	37.4±43	35.5±4.2
P	> 0.05	> 0.05	> 0.05	> 0.05	> 0.05	> 0.05	> 0.05	> 0.05
Significant	Not Significant	Not Significant	Not Significant	Not Significant	Not Significant	Not Significant	Not Significant	Not Significant

Table 4: Frequency distribution of palmer between the two case and control group

Pattern Frequency			
Area	Type	Right	Left
	Diabetic	8	9
Thenar/I1	Control	9	10
	SignificanceX^2=0.063	df=1	P>0.05 NS
	Diabetic	4	4
I_2	Control	6	5
	Significance X^2=0.053	df=1	P>0.05 NS
	Diabetic	33	25
I_3	Control	32	12
	Significance X^2=1.642	df=1	P>0.05 NS
	Diabetic	22	24
I_4	Control	26	28
	Significance X^2=0.009	df=1	P>0.05 NS
	Diabetic	18	13
Hypothenar	Control	13	13
	Significance X^2=0.428	df=1	P>0.05 NS

P-Value Significance Of Palmer NS = Not Significant I1 = I Palmer area I2 = II Palmer area I3 = III Palmer area

Table 5: Frequency distribution of Angles between two groups i.e. diabetic and control group

Angles		Mean ± SD				P-Value		Significance	
		Diabetic		Control					
		Rt	Lt	Rt	Lt	Rt Hand	Lt Hand	Rt Hand	Lt Hand
'atd'	Male	43.32 ± 5.39	38.75 ± 4.42	38.84 ± 5.37	40.81±5.39	>0.05	> 0.05	NS	Ns
	Female	44.52 ± 5.63	44.61± 5.52	44.71±4.18	37.12±3.39	> 0.05	<0.001	NS	Sig.
	Total	43.92±5.51	41.68±4.97	41.77±9.55	38.96±4.39	< 0.01	> 0.05	Sig.	NS
'tad'	Male	57.43±5.63	46.31±4.86	58.26±5.32	55.62±6.32	> 0.05	> 0.05	NS	Ns
	Female	56.37±5.49	52.42±6.16	56.39±6.01	59.42±6.03	> 0.05	< 0.01	NS	Sig.
	Total	56.90±5.56	49.36±5.51	57.32±5.66	57.52±6.17	> 0.05	> 0.05	NS	NS
'tda'	Male	79.05±4.43	82.88±5.04	82.24±5.52	81.39±4.39	> 0.05	> 0.05	NS	NS
	Female	78.56±4.50	81.52±4.67	84.43±5.34	81.49±4.57	<0.001	> 0.05	HS	NS
Total	78.80 ±4.46	82.2 ±4.85	83.33±5.43	81.44±4.48	< 0.01	> 0.05	Sig.	NS

P-Value Significance of Angles

Table 6: Digital Pattern Frequency of Finger Tip Pattern Distribution among different region with respect to the experimental as well as control group.

Digit	Type	Whorl	Loop	Arch	Whorl	Loop	Arch	Whorl	Loop	Arch
I	Diabetic group	53	38	8	28	22	3	28	19	6
	Control group	46	47	6	12	6	-	37	44	6
	Value of Significance	$X^2=1.654$	df=2	P>0.05 NS	$X^2=0.653$	df=1	P>0.05 NS	$X^2=2.212$	df=2	P>0.05 NS
II	Diabetic group	48	49	6	25	24	4	29	26	3
	Control group	42	52	7	7	11	-	37	44	7
	Value of Significance	$X^2=0.632$	df=2	P>0.05 NS	$X^2=0.732$	df=1	P>0.05 NS	$X^2=0.643$	df=2	P>0.05 NS
III	Diabetic group	32	61	10	13	33	7	20	29	4
	Control group	26	71	6	8	10	-	19	62	6
	Value of Significance	$X^2=2.341$	df=2	P>0.05 NS	$X^2=1.325$	df=1	P>0.05 NS	$X^2=3.365$	df=2	P>0.05 NS
IV	Diabetic group	61	40	2	23	29	-	39	12	2
	Control group	62	39	2	2	6	-	51	34	2
	Value of Significance	$X^2=0.037$	df=2	P>0.05 NS	$X^2=2.873$	df=1	P>0.05 NS	$X^2=3.359$	df=2	P>0.05 NS
V	Diabetic group	18	82	3	7	44	-	2	39	3
	Control group	21	78	4	3	15	-	19	64	4
	Value of Significance	$X^2=0.531$	df=2	P>0.05 NS	$X^2=0.032$	df=1	P>0.05 NS	$X^2=0.018$	df=2	P>0.05 NS
Total	Diabetic group	210	268	25	10	148	12	19	121	14
	Control group	195	287	21	38	44	-	159	244	21
	Value of Significance	$X^2=1.533$	df=2	P>0.05 NS	$X^2=3.458$	df=1	P>0.05 NS	$X^2=6.358$	df=2	P>0.05 Sig

P-Value Significance of Digital Pattern Frequency of Finger Tip Pattern Distribution

i.e. the control group.

The highest didtribution pattern for whorl, loop and the arch was found in the second, fourth and the fifth finger, although along with above said they were available with respect to fourth, fifth and third finger in the other group too, i.e. in the control group. 41% patients were found in case of experimental group and 52% was found in case of control group with respect to whorl spiral and in case of symmetrical whorl 41% constitutes for the experimental group and 57% for the control group present more towards with respect to fourth finger along with it loop whorl with two fold was revealed to be present with respect to first finger in case of experimental group which constitutes about 23% and 16% for the control group and in case of fifth finger for loop ulnar was found to be 80% for the experimental group and 76% for the control group, along with it loop radial was present more in case of second finger for experimental group for 8% and 7% for the control group. This contrast between the two groups i.e. for experimental as well as control group were revealed to be statistically significant.

In case of the experimental group i.e. for diabetic patient the rate of recurrence for whorl, arches and the loop were found to be 47.2%, 5.2% and 48% and with respect to contrast with the control group, in which it was found to be 37.6%, 4.35% and 57.7% respectively and individually. These difference among the different variables was found to be significant with p <0.05, on the other hand these all were found to be insignificant when all the fingers were compared individually as single different entity and shown in Table 6.

2% of remnant design was revealed to be present in the thenar area in the experimental group patient only. The design of two loop was found to be present in the I4 region in both the groups i.e. the experimental group and the control group ie. For the experimental group it was found to be 8% and for the control group it was found to be 2%. In the I3 area loop design was mostly found in 53 percent cases of the experimental group and in the I4 area which constitutes about 50%.

It was noticed that c – line was not present in case of ulnar, radial and proximal varities. It was noticed that the design of c line proximal is found not to be present in case

of diabetic group i.e. the experimental group, on the other hand it was found to be significant in the other group i.e. the control group on the left side and constitute about only 10 percent. On the left side it was found that the c line was missing in the control group 12% as shown in fig.3, while it was seen to be available on both the sides in the control group i.e. on right side in 6% cases and on the left side in 14% of the cases. And in diabetic patients it is found that more radial tendency pattern was present as compared to the control group, but when seen in the ulnar group the ulnar tendency finding found to be turned

4. Discussion

The greek meaning of the word, dermatoglyphics is derma, which further means glyphae and skin, glyphae means cutting. Dermatoglyphics is verymuch remarkable field, which has the tendency and totally gets influenced by different genetic varities, as found in syndactyly, down's condition. Diabetes is in the other words is multifactorial illness which has it hereditary tendency. Hereditary features of dermatoglyphic acclimates to the framework of polygenic.[6]

In this current examination it is revealed that total finger ridge count was found to be more in case of the diabetic patient i.e. the experimental group when compared to the control group, another study done by Julian L et al reveals the same.[7] And the mean absolute finger ridge count is found to be more in male patients and less in case of female patient, our result is in relevance of the result given by Vera M et al.[8]

a-b number of ridge inclined was found to be not significant in case of the experimental group patient, our study this result is in favour of the result given by Ojha P et al.[9] which reveals that p<0.001 in their study. In case of the diabetic patient it was found that, there is rising of whorls along with arches and a reduction with respect to loops was not significant. The results of our study was found to be unsurprising with the consequences of Li Yanhua and Zia et al, they revealed increase in number of whorls along with arches along with lower in loop number in the selected patients.[10,11] It is found that the recurrence of the palmar design in case of both the groups is found to be insignificant statistically, that was in favour of the result given by Dam PK et al[12] our study revealed that there is decrease in pattern of recurrence in the I4 zone in case of male patient that are having diabetes, this observation was in favour of the results given by Zeigler et al[13] the design of c line looked for ulnar, proximal, radial classes. All of the above said three combinations tha are barring from the radial one was found and revealed to be lesser in the group of patients, those shows relevance with the results of examination of the study being conducted by Pathan FKJ et al.[14] It was found that on both the sides in case of diabetic patient the proximal variety was found to be not present on the other hand in case of the second group i.e. the control group it is present on the left side only.[15]

It was found that on the both sides in case of male and female patients 'atd' purposes of the patients were found to be more in or present study and it was found to have relevance with the results of Barta et al.[16] The angle 'tad' on the best right side fall under the range of 60 to 69 which constitutes about 46 percent out of all the cases in the diabetic patient, but in case of the second group i.e. the control group they fall in range of 50 to 59 i.e.46 percent on the left side. In case of diabetic females left 'tad' points was found to be significantly differentiated i.e. p>0.01 as compared to he normal or healthy females.

'tda' angle among the compared groups on the right side present with a contrast that is significant i.e.p<0.01 on the other hand bet the male as well as the female group, distinction present on the left side revealed to be insignificant in all the groups. So both the angle i.e. 'tda' and 'tad' that seen in current study were not examined by some other researcher. The findings of this investigation might be normally twisted by the dermatoglyphic irregularities which were related with ordinary people who were inclined to develop diabetes sometime in future.

5. Conclusion

The dermatoglyphic highlights of the current study might be utilized as an interesting diagnostic instrument to make a temporary conclusion and to distinguish the people who are in risk, yet it needs more broad investigations in an enormous number of patients.

6. Conflicts of Interest

All contributing authors declare no conflicts of interest.

7. Source of Funding

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