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Original Research Article

A study of the dermatoglyphic pattern in diabetic subjects in Kalaburagi district

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ABSTRACT

Background and Objectives: Dermatoglyphics is the scientific study of epidermal ridges and their configurations on the palmar region of hand and fingers and plantar region of foot and toes. Diabetes mellitus is a metabolic disorder characterized by hyperglycemia resulting from defect in insulin secretion, action or both. Dermatoglyphic patterns are genetically determined and can be used as supportive for diagnosis of various hereditary disorders including T2DM. This study was carried out to compare palmar dermatoglyphic pattern in T2DM and control group and compare with previous studies.
Method: A hospital based case control study was conducted 100 cases of T2DM are taken from Basaweshwar hospital Gulbarga, and another 100 persons are included as control group. The palms and fingers are smeared with ink to bring out the dermatoglyphiic patterns which were subsequently studied.
Result: There was increased number of whorls and decreased number of ulnar loops in both T2DM patients compared with normal individuals. Total finger ridge count and Absolute finger ridge count is increased in both T2DM patients and there is also increased atd angle.
Conclusion: The knowledge of dermatoglyphics in patients with T2DM and essential hypertension can be utilized to find out genetic correlation. The existence of such relation might be important for the screening programme for prevention of T2DM.

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1. Introduction

Dermatoglyphic is the scientific study of epidermal ridges and their configuration on the palmar region of hand and fingers and plantar region of foot and toes.[1] The term dermatoglyphic was coined by cummins and midlo in 1926 and was derived from Greek words 'Derma' means skin and 'glyphics' means Carvings.[2] Papillary ridges are confined to the palms and the soles and the flexor surfaces of the digits, where they form narrow parallel or curved arrays separated by narrow furrows. The epidermal ridges correspond to on underlying interlocking pattern of dermal papillae, an arrangement which helps to anchor the two layers firmly together. The pattern of dermal papillae determines the early development of epidermal ridges. This arrangement is stable throughout life, unique to the individual, and therefore significant as a means of identification.[3]

Diabetes has a strong hereditary background offspring of two Diabetic parents have an 80% lifetime risk of Diabetes.[4] The peculior pattern of the epidermal ridges serve as diagnostic tool in a number of diseases that have a strong hereditary background. DM is one such disease with a strong genetic basis.[5]

In the present study finger and palmer dermatoglyphic pattern in diabetes are compared with controls. An attempt is made to determine the significant dermatoglyphic parameter criteria in DM patients which can be used in

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Diagnosis Mellitus.

2. Materials and Methods

The present study is conducted in patients of diabetes and essential hypertension attending outpatient department (O.P.D.) of HKE Society's Basaveshwar Teaching and general Hospital, attached to M.R. Medical College Kalaburagi and students of first MBBS 2015-16 batch of department of Anatomy, M.R. Medical College, Kalaburagi.

2.1. Materials used

1. Camel black ink
2. Stamp pad
3. Bond paper
4. Magnifying lens (x5)
5. Protractor
6. Pencil and pen

2.2. Sampling procedure

Informed consent will be taken from the subjects in a prescribed format. Cummins method was used for the finger prints. Patients will be asked to wash their hands with soap and water. So as to remove any oil or dirt after that, 10 fingers are pressed upon stamp pad and impressed on a white duplicating paper, subject were asked to roll their fingers from one side of the nail to another to allow for better clarity of the impression. This was the screened with the aid of magnifying lens (5x).

2.3. Inclusion criteria

Clinically diagnosed cases of type II diabetes.

2.4. Exclusion criteria

1. Any deformities of finger, palm and infected hand.
2. Diseases causing secondary hypertension.
3. Chromosoaml abnormalities like klinefelter's syndrome, Turner's syndrome etc.
4. Deep burns of fingers and palms leading to scars.

2.5. Sample

For this study 100 patients of Type 2 diabetes mellitus are taken from Basaveshwar Teaching and general hospital at Kalaburagi and 100 normal subjects are taken from students of first MBBS 2015-16 batch of department of Anatomy, M.R. Medical College, Kalaburagi.

2.6. Type of study

1. Hospital based case control study
2. The analysis include finger print pattern and also total finger ridge count a-b- ridge count and atd angle.

2.7. Statistical analysis

In the study statistical data analyzed by SPSS 16.0 version software for quantitative data analysis, mean and Standard Deviation were calculated and for significant unpaired t-test was applied $p < 0.05$ was considered as significant

Ink was applied to palmar region of patients hand from the stamp pad and the patient was asked to press their hands on bond paper one by one and hands were pressed the observer from above and make sure that clear prints have obtained and patient is asked to lift their hands gently.

3. Results

There is statistical significant difference in right palmer dermatoglyphic patterns of UL, WHORL, ATD. Between DM group and control group. There is no statistical significant difference in right palmer dermatoglyphic patterns of RL, ARCH, A-B R. between DM group and control group. Mean UL is significantly lower in DM group as compare to control group and Mean WHORL and ATD values are significantly higher in DM group as compare to control group.

There is statistical significant difference in left palmer dermatoglyphic patterns of UL, WHORL, ATD. Between DM group and control group. There is no statistical significant difference in left palmer dermatoglyphic patterns of RL, ARCH, A-B R. between DM group and control group. Mean UL is significantly lower in DM group as compare to control group and Mean WHORL and ATD values are significantly higher in DM group as compare to control group

There is statistically very highly significant difference in palmer dermatoglyphic patterns of TFRC AND AFRC between DM group and control group. Mean TFRC and AFRC values are significantly higher in DM group as compare to control group.

4. Discussion

The association of altered dermatoglyphics pattern with T2DM was well-known as reported by several workers. In this section attempt is made to compare the observation seen in our study with previous studies conducted to compare dermatoglyphics pattern is T2DM and essential HTN.

4.1. Finger tip pattern

The present study showed increased number of whorls and decreased number of unlar loops in patients with T2DM which is in agreement with studies conducted Sant et al. (1983).[6] Rakate NS et al. (2013).[7]

4.2. The 'atd' angle

In present study atd angle was increased in both light and left palm of T2DM patients which correlates with many

Table 1: Sex wise distribution of study samples

Groups	Males		Females		Total	
	No.	%	No.	%	No.	%
Control group	60	60.0	40	40.0	100	100.0
DM group	58	58.0	42	42.0	100	100.0
Hypertension Group	63	63.0	37	37.0	100	100.0
Total	181	60.3	119	39.7	300	100.0
X^2 (chi-square) TEST P-Value	**X^2 (chi-square) = 13.17P<0.001highly significant**					

Table 2: Comparison of right palmer dermatoglyphic pattern between DM group and control group

Dermatoglyphi C Pattern	DM Group MEAN ± SD	Control Group MEAN ± SD	t- test value	P-value & significance
UL	1.42 ± 1.40	2.63 ± 1.29	t = 6.34	P=0.00, HS
RL	0.02 ± 0.14	0.05 ± 0.22	t =1.12	P=0.251, NS
WHORL	3.41 ± 1.52	2.07 ± 1.41	t =6.44	P=0.00, HS
ARCH	0.14 ± 0.47	0.25 ± 0.59	t =1.45	P=0.148, NS
ATD	39.67 ± 3.69	37.9 ± 3.58	t =3.44	P=0.001, HS
A-B R	28.63 ± 3.56	28.20 ± 4.27	t =0.774	P=0.440, NS

Table 3: Comparison of left palmer dermatoglyphic pattern between dm group and control group

Dermatoglyphi C Pattern	DM Group MEAN ± SD	Control Group MEAN ± SD	t- test value	P-value & significance
UL	1.19 ± 1.34	2.65 ± 1.38	t = 8.35	P=0.00, HS
RL	0.06 ± 0.27	0.07 ± 0.25	t =1.32	P=0.278, NS
WHORL	3.45 ± 1.55	1.94 ± 1.57	t = 8.27	P=0.00, HS
ARCH	0.27 ± 0.63	0.28 ± 0.62	t =0.45	P=0.575, NS
ATD	39.31± 3.12	37.94± 3.53	t =3.62	P=0.001, HS
A-B R	28.42 ± 3.83	28.8 ± 4.31	t =0.654	P=0.476, NS

Table 4: Comparison of palmer dermatoglyphic pattern between DM group and control group

Dermatoglyphi C Pattern	DM Group MEAN ± SD	Control Group MEAN ± SD	t- test value	P-Value & significance
TFRC	121.67 ± 22.97	108.64 ± 22.6	t =39.69	P=0.000, VHS
AFRC	244.55 ± 33.93	236.05 ± 35.74	t =33.2	P=0.000, VHS

Table 5: Comparsion of finger print pattern in Type 2 diabetes

Name of the Study	UL	RL	Whorls	Arches
Present Study (2016)	-*	X	+*	X
Sant et al (1983)	-*	X	+*	X
Rakate NS et al (2013)	-*	X	+*	X

(+) increased, (-) decreased, (x) No significant change, (*) statistically significant.

studies done previously like. Rakate NS et al.[7] Vadgaonkar Rajnigandha (2006) et al.[8]

Total finger ridge count (TFRc) and Absolute finger ridge count (AFRC).

In present study TFRC and AFRC are increased in T2DM patients compared to controls which correlates with Barta et al.[9] study, Iqbal et al. study.[10]

5. Conclusion

The dermatoglyphic patterns of 100 Type 2 diabetes mellitus are compared with 100 control group.

We observed no significant difference of sex among all 3 groups. There is increased number of whorls and decreased number of ulnar loops in type 2 DM patients. Total finger ridge count and absolute finger ridge count is increased in Type 2 diabetes mellitus patients as compared to control group. ATD angle is also increased in type 2 diabetes mellitus and essential HTN patients. The above parameters can be used as a screening method. Which has a great value in the diagnosis and prevention of T2 DM.

Table 6:

Study	Increased 'atd' angle	
	Rt	Lt
Present study (2016)	Present	Present
Rakate NS et al (2013)	Present	Present
Vadgaonkar Rajnigandha et al (2006)	Present	Present

Table 7: Comparsion of TFRC and AFRC in different studies

Study	TFRC	AFRC
Present study (2016)	Increased	Increased
Barta et al (1970)	Increased	Increased
Iqbal et al (1978)	Increased	Increased

6. Recommendations

1. In this study only palm and finger print dermatoglyphic pattern were studied.
2. A study of plantar could provide additional information.

7. Source of Funding

None.

8. Conflict of Interest

None.

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