

Study of fingerprint pattern in patients with diabetes mellitus in a tertiary care centre

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Abstract:

Background: Studies are being done to identify the potential early biomarkers of diabetes. Dermatoglyphics feature are genetically determined. Therefore the present study intends to evaluate the relationship between Dermatoglyphic patterns and type-II Diabetes Mellitus.

Objective: To compare the dermatoglyphic features of normal individuals and patients with Type-II Diabetes Mellitus.

Methodology: Data collection was done by Indian Ink method. For this a total of 112 subjects were participated of which 56 were diabetic (28 males and 28 females) and 56 healthy individuals as control (28 males and 28 females). Dermatoglyphics patterns i.e. 'atd', 'tda' and 'dat' angles of the right and left hands of diabetic and control group were measured. The mean 'dat' angle in right hand of both the sexes (male and female) of diabetics was found to be significantly narrow as compared to that of the controls.

Result: From the statistical analysis of the data, there is a statistically significant difference in 'dat' angle of right hand of diabetic and control with p value < 0.05 .

Conclusion: From the study, there is a statistically significant difference in 'dat' angle of right hand of diabetic and control with p value < 0.05 .

Keywords: Dermatoglyphics, Triradii, Type-II Diabetes Mellitus

I. Introduction

Diabetes is a global disease and is increasing in occurrence. The prevalence of diabetes for all age-groups worldwide was estimated to be 2.8% in 2000 and to be 4.4% in 2030 (Wild et al., 2004), as such, investigators are looking for new methods for predicting its occurrence later in life and so as to take preventive measure in others to reduce its onset. WHO projects that diabetes will be the 7th leading cause of death in 2030 (WHO, 2011). This has intensified the quest for further scientific understanding of the aetiology and pathogenesis of the disease; with the ultimate aim of improving its management. Studies are continuously being done in various fields of medicine to identify the potential early biomarkers of diabetes. Among Diabetes Mellitus, Type-II Diabetes Mellitus is more common and it is genetically influenced. Fingerprints being genetically determined may serve as one of such biomarkers. Personal identification is becoming increasingly important not only in legal medicine but also in criminal investigation and identification; fingerprints are widely used for this. They are natural visible markers resulting from the thermodynamic processes during the early stages of human embryo. Dermatoglyphics is a branch of science that deals with the study of ridge patterns on finger tips, palm, sole and toes (Cummins and Midlo, 1961). During the first trimester of pregnancy, dermatoglyphic traits are formed under genetic control early in development but may be affected by environmental factors^[1]. Since Dermatoglyphics feature are genetically determined and the idea of using it as a diagnostic aid and supportive evidence in the diagnosis of genetic disorders have now become a reality. Therefore the present study intends to evaluate the relationship between Dermatoglyphic patterns and type-II Diabetes Mellitus. If significant correlation exist between them it will be possible to identify the person at high risks of developing Diabetes Mellitus.

II. Objectives

To compare the dermatoglyphic features of normal individuals and patients with Type II Diabetes Mellitus.

III. Methodology

3.1 Study design: Case-control study

3.2 Study subjects and study setting: Type-II diabetes mellitus patients coming to general medicine wards.

3.3 Case definition: Criteria for the present study are adult patients > 20 years of age, diagnosed with type 2 diabetes mellitus for at least 3 months.

- 3.4 Control definition: Criteria for the present study were adult non diabetic persons > 20 years of age with no other co morbidities.
- 3.5 Exclusion criteria: 1) Patients having amputated fingers, injuries on palm or fingers
2) Family history ruled out.
- 3.6 Sample size: 112; 56 cases (28 males and 28 females) and 56 controls (28 males and 28 females).
- 3.7 Sampling method: Random sampling
- 3.8 Data collection and analysis: The dermatoglyphic patterns commonly studied are the flexion creases of the palm and dermal patterns such as fingerprint and palmer patterns. According to Henry's system of fingerprint classification, a triradius is a point from which ridge system courses in three different directions at an angle of about 120°. The four digital triradii near the distal border of the palm one proximal to each finger except the thumb, named a, b, c, d from index to little finger respectively and an axial triradius 't' commonly placed over the fourth metacarpal near the base of the palm provide the landmarks for palmer patterns. The 'atd' angle is obtained by joining a digital triradius 'a' to axial triradius 't' and to the digital triradius 'd' [2]. After written informed consents were obtained, fingerprints of all digits and print of the palm of the right and left hand of each individual were taken by applying a small quantity of ink over the palmer aspect of hand and fingers. The hands were washed with soap and water. A small daub of camel duplicating ink was squeezed out on a sponge onto a thin film for the direct inking of the fingers. The palm was carefully and uniformly smeared with the inked sponge to cover the whole area of the palm which was printed for the examination. The palm was then placed on a white sheet placed which was placed on a hard surface and some pressure was applied. This method enabled to record the complete imprints of the palm, including the palmer surface of all the five digits in one attempt. Care was given not to apply pressure on finger and avoiding overlapping of the impressions. With the help of magnifying glass, finger print pattern were noted. Triradii points on the palm were then marked. Using protractor, 'atd', 'dat' and 'tda' angles were measured. Data was analyzed statistically using z test.



Figure 1: Dermatoglyphic pattern of an individual with 'atd', 'tda' and 'dat' angles of right hand.

- 3.9 Ethical issues and Confidentiality: The study was approved by the Institutional Ethics Committee on 01.06.2014. The details of the study were explained to all participants and written informed consent was obtained. The confidentiality of all the data will be maintained and it will be used only for the purpose of research.

IV. Results:

The angles of right and left hands of cases and controls were compared.

Table.1

ANGLES	CASE		CONTROL		Z-value	P-value
	STANDARD MEAN	STANDARD DEVIATION	STANDARD MEAN	STANDARD DEVIATION		
atd(left)	40.375	4.006	41.25	3.64	1.2102	0.2262
tda(left)	57.67	3.38	56.41071	3.92	1.8115	0.0712
dat(left)	81.67	4.41	82.1428	3.82	0.6069	0.5486
atd(right)	40.85	3.62	40.678	3.43	0.2574	0.8026
tda(right)	58	4.07	56.464	4.26	1.9513	0.0512
dat(right)	80.875	4.75	82.678	4.37	3.0926	0.0020

V. Discussion:

The hospital based case control study on fingerprint pattern in patients with Type-II Diabetes Mellitus was conducted and suggested that there is statistically significant difference in 'dat' angle of right hand of

diabetic and control with p value <0.05. There is no significant difference in any other angles of diabetes and control (p value > 0.05)

It was based on a study 'Dermatoglyphics: An Economical Tool for Prediction of Diabetes Mellitus' done by Mukesh Mittal, B S Lala, SAIMS Medical College, Indore. There was statistically significant difference in 'atd' angle and 'tda' angle of diabetic and control group (p value < 0.05). There is no statistically significant difference in other angles of diabetic and control group (p value > 0.05)^[3].

Similar study was conducted by Ravindranath et al and Vadgaonkar et al. The study showed that the 'tda' angle was significantly narrower in both the hands of diabetic compared to control population in both sexes.

VI. Conclusion:

From the study, there is a statistically significant difference in 'dat' angle of right hand of diabetic and control with p value < 0.05.

It can be concluded that with the help of this finding, in clinical medicine dermatoglyphics can be used to predict the phenotype of a possible future illness and hence it allows us to adopt more preventive measures for future generations. Dermatoglyphic investigation is very cost effective and requires no hospitalization.

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