

Study of Palmar Dermatoglyphics in Diabetes Mellitus in Rural Setting of Central India

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Abstract

The dermatoglyphics is the study of epidermal ridges present on the surface of palm, soles, finger and toe and have emerge a promising tool in screening and diagnosis of medical and genetics conditions. It is one of the low-cost and noninvasive methods used for mass screening. **Materials & methods:** This study was conducted out in 100 diabetes mellitus (DM) patients and 100 Non diabetic individuals as control. Dermatoglyphic prints of both hands of study subject were taken by using ink method as described by Cummins and Midlow. **Results:** This study observed that whorls are increased in diabetic patients both in right and left hand, this difference was found statistically significant ($p < 0.0001$, $p < 0.003$). Arches found more in control than diabetes mellitus patient and this difference is statistically significant ($p < 0.007$, $p < 0.0001$) Ulnar loop found more in control than diabetes mellitus patients and this difference found statistically significant. There was increase in 'atd' angle in patients of diabetes mellitus than controls and this was statistically significant.

Keywords: Dermatoglyphics, Diabetes Mellitus, atd angle, whorl, Ulnar loop.

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INTRODUCTION

The dermatoglyphics is the study of epidermal ridges on the surface of palm, soles, finger and toe. These epidermal ridges form well defined patterns that characterized individuals. It is useful in clinical diagnosis of hereditary diseases. In fetal life the epidermal ridge pattern formed and they remain normally unchanged throughout life and hence it could be used to indicate gene or chromosomal abnormalities [1, 2]. Over periods years of research dermatoglyphics have emerge a effective tool in diagnosis of medical and genetics conditions [3]. The dermatoglyphics can be efficiently employed with other clinical signs as a screening procedure to define indications for these laboratory procedures one of the cost-effective and noninvasive methods of screening [2, 3].

Diabetes mellitus is leading common non-communicable disease (NCD), and its epidemic proportion has placed it at forefront of public health challenges currently facing the world [7]. The World Health Organization (WHO) estimated the global

burden of diabetes at 165 million cases in 2008, and has projected that by the year 2025 there will be 299 million cases [6]. For each 24 hour near about 3,600 new cases of diabetes are diagnosed, 580 people die of diabetes-related complications, 225 people have a diabetes-related amputation 120 people with diabetes progress to end-stage renal disease, 55 people with diabetes become blind [5].

This study was conducted because the dermatoglyphics and diabetes mellitus both have genetic etiology². It is a non-invasive and cost effective method. The laboratory procedures used for hereditary diseases are expensive. Dermatoglyphics with other clinical signs can be used to define indications for further laboratory procedure.

AIMS AND OBJECTIVES

- To study the dermatoglyphic patterns in diabetes mellitus study subjects.

- To compare the dermatoglyphic patterns in diabetes mellitus with non-diabetes persons.

MATERIAL AND METHODS

It was cross-sectional non interventional study. The study was conducted in 100 subjects who were known case of diabetes mellitus and 100 Non diabetic individuals. The proposal was submitted to Institutional Ethics Committee (IEC) and clearance was obtained, Jawaharlal Nehru Medical College, Wardha, before data collection. The purpose of study explained to both cases and control in local language and written consent was obtained before to commencement of the data collection. The known cases of diabetes mellitus were enrolled from Medicine Department, Acharya Vinoba Bhave Rural Hospital, Sawangi(M), Wardha (Maharashtra) attending the medicine/ Diabetic OPD and the In-patients. The prints of non-diabetic individuals were taken from nearest village Sawangi by using ink and pad method as described by Cummins and Midlow [1-4]. A detail clinical history of cases and control were taken regarding demographic profile, details about Diabetes Mellitus, method of diagnosis, complete general and systemic examination.

Inclusion Criteria

The inclusion criterion was known cases of diabetes mellitus attending the Medicine OPD and In-patients, AVBRH Hospital. The exclusion criteria was those seriously ill patients, other metabolic disorders, patients/ Subjects who refused to give consent for the study.

Criteria for selection of controls

Age and sex matched, non-diabetic subjects without any of the above-mentioned exclusion criteria were chosen as controls from Sawangi village.

Data Collection

The details History by semi-Structured questionnaire for subjects and dermatoglyphic prints of both hands of each study subjects and control.

METHOD

The Dermatoglyphic prints were taken by using ink method described by Cummins and Midlow [8] and as per guidelines by American Association of Dermatoglyphics, Reed T. and Meier R [9].

RESULTS

Table-1: Age wise distribution of cases and control

Study subject	Age Group (in years)				Total
	31-40	41-50	51-60	>60	
DM cases	08	20	45	38	100
Control	36	36	19	08	100

The above table shows the age wise distribution of patients of diabetes mellitus and control.

The diabetes mellitus was more in patients above 50 years of age.

Table-2: Distribution fingertip pattern in both hands in patients and control

Fingertip Pattern	Right hand			Left hand		
	Patients	Control	X ² (p value)	Patients	Control	X ² (p value)
Whorls	244(46.9)	182(36.4)	11.177 (0.0001)S	204(40.8)	158(31.6)	8.768 (0.003)S
Arches	06(1.1)	20(4.0)	7.206 (0.007)S	08(1.6)	30(6.0)	12.064 (0.0001)S
Ulnar Loops	262(50.4)	290(58.0)	5.651 (0.017)S	274(54.8)	300(60.0)	2.556 (0.110)NS
Radial Loops	08(1.5)	08(1.6)	0.030 (0.863)NS	14(2.8)	12(2.4)	0.039 (0.842)NS
Total	520(100)	500(100)		500(100)	500(100)	

S- Significant NS- Non-Significant

The above table shows that whorls are increased in patients both in right and left hand; this difference was found to be statistically significant (p=0.0001, p=0.003). Arches found more in control than diabetes patient and this difference was

statistically significant (p= 0.007, p=0.0001). Ulnar loop found more in control than the diabetes patients and this difference was found statistically significant. While in Radial loop no statistical difference was observed.

Table-3: Distributions mean value of 'atd' angle in right and left hand of patients and control

Side of hand	'atd' angle (degrees)			
	Patients		Control	
	Mean	SD	Mean	SD
Right	44.24	±8.959	39.38	± 4.876
Left	44.36	± 8.162	39.74	± 5.064
Right + Left	44.32	± 8.560	39.56	± 4.970

SD- Standard deviation

In Right hand: $t = 4.770$; $p = 0.001$

In Left hand: $t = 4.811$; $p = 0.001$

Total: $t = 4.78$; $p = 0.001$

Statistically Significant

Statistically Significant

Statistically Significant

The above table is observed that average measurement of atd angle of diabetes mellitus is 44° as compared to 39° of control group. There is increase in atd angle due to shift of axial triradius, it is statistically significant. Left hand also shows increase in atd angle in patients than control. The mean value of atd angle shows statistically significant decrease in patients than the control.

DISCUSSION

The word "dermatoglyphics" was first introduced by Cummins and Midlow⁸. This word literally means skin carvings. The epidermal ridge pattern of fingers, palm and sole are permanently formed at a very early period of foetal life. Besides human being these characteristic ridge patterns are found on the volar skin of apes, monkeys and some marsupials and on the ventral surface of the tail in few genera of new world monkeys. The ridges are sufficiently elevated in apes and in man to permit the making of finger prints. Dermatoglyphics not only has characteristic patterns but the ridges are interrupted and branched in a way, which is unique for any individual. The first step in the formation of patterns is appearance of volar pads, which is visible on finger tips in 6th and 7th week of intrauterine life. They become prominent and subsequently reach their maximum size by 12th week and usually this differentiation occurs between 13th and 19th weeks, the hand developing somewhat in advance of the foot Blanka [10]. The dermatoglyphic has become a valuable tool in medico legal, anthropological and various medical genetic disorders Parikh CK [11]. This science is correlated with a variety of chromosomal and developmental defects and certain clinical disorders, which have strong genetic and hereditary background. Up till now, the dermatoglyphic features of patients suffering from a wide variety of hereditary, chromosomal and genetic diseases have been extensively studied. Out of these, only in a few diseases, the dermatoglyphic anomalies are confirmed like Trisomy 21, Trisomy 18, Turners syndrome, Klinefelter's syndrome, and Schizophrenia. The ink prints were interpreted with the help of magnifying lens and following parameters were studied: 1: Finger tip patterns: a) Arches b) Ulnar loops, c) Radial Loops d) Whorls 2: 'atd' angle

The prints were studied with the help of above parameters. The observations were taken tabulated and analyzed for statistical significance by applying 'Chi-square' test and 't' test for test of significance.

In present study show that whorls are increased in patients both in right and left hand, this difference found statistically significant ($p < 0.0001$, $p < 0.003$). Arches found more in control than DM patient and this difference is statistically significant ($p < 0.007$, $p < 0.0001$) Similar findings were observed by Igbigbi PS [1], Joshi MB [2], Julian L [12], Vera [13], Manoj Kumar [14]. Ulnar loop found more in control than DM patient and this difference found statistically significant Similar finding were observed by Manoj Kumar [14], Pramila Padmini M [15]. These findings were consistent with the results observed by Barta L [16], Udoaka ALK [17], Sheild JPH [18], Vera M [19].

Dermatoglyphic features of atd angle: There was increase in atd angle due to shift of axial triradius in diabetes patients, hence it is statistically significant. Increase in atd angle is seen in the left hand of patients than control. The mean value of atd angle shows statistically significant increase in patients than controls. atd angle of diabetic study subjects were higher in the present study, which was consistent with the findings of increase of summed "atd" angle which was observed by Sant SM [19], Barta L [20], Manoj Kumar [14], while no significant difference was seen in daibetic patients and controls by Pramila Padmini M [15], Dike Eberechi U [16], Julian L [12].

CONCLUSIONS

In present study it is concluded that the Ulnar loop frequency shows significant decrease in of diabetes patients as compared to the controls. Whorls are increased in diabetes patients. There is significant increase in 'atd' angle in patients of diabetes mellitus than the controls. There was a statistically significant difference in the dermatoglyphic patterns in diabetes mellitus patients than controls.

Conflict of Interest: Nil

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