Variations of Dermatoglyphic Features in Non Insulin Dependent Diabetes Mellitus

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Research Article

Abstract: **Background:** Man has always wondered about the significance of the peculiar arrangement of ridges on the volar aspect of palm and sole. The knowledge of dermatoglyphics is thousands of years old as evident from the stone carvings found at the edge of Kejimkoojik Lake in Nova Scotia and the walls of Neolithic burial passages found on the island of Brittany. The ancient Indian literature also describes various patterns as Chakra, Shankh and Padma. With the emergence of civilization, this interest was replaced by methodological and scientific study of these patterns.As dermatoglyphic features are strongly affected by genetic and environmental factors, the idea of using it as supportive evidence in the diagnosis of hereditary disorders becomes a reality. **Objective:** Present study intends to evaluate the relationship between dermatoglyphic features and non-insulin dependent diabetes mellitus. **Material and method:** Dermatoglyphic prints of one hundred non-insulin dependent diabetes mellitus patients (50 male and 50 females) were taken for studyand compared with equal number of prints of healthy controls (50 males and 50 females). In this study fingertip patterns, Atd angle, a-b ridge count and C line type parameters were studied. **Result:** In diabeticpatientsfrequency of whorls is significantly increased;while frequency of ulnar loops is significantly decreased in cases as compared to controls. Arches and radial loops showed no significant changes.Atd angle showed no significant difference. A-b ridge count is significantly decreased in diabetics. C line type also showed significant difference in cases and controls.

Keywords: Dermatoglyphics, non-insulin dependent diabetes mellitus.

Introduction

The skin of the fingertips, palmer surface of hand and planter surface of foot of man shows interesting features. It has ridges, which forms configurations, which are unique to every individual. Cave drawings and Petroglyph diagrams dating back thousands of years provide a record of early man's interest in hands; however the significance of this prehistoric sample was subject of broad interpretation.With the emergence of civilization, this interest was replaced by methodological and scientific study of these patterns. The word "Dermatoglyphics" is derived from Greek word "Derma" meaning skin and "Glyphae" meaning curve. The term "Dermatoglyphics" was introduced by Harold Cummins[1]. He is universally acknowledged as father of Dermatoglyphics. Each Dermatoglyphic configuration is unique. They are genetically determined and influenced by physical, topographical and environmental factors. No two persons, not even uniovular twins, show exactly similar Dermatoglyphic features. This fact has been known for the purpose of personal identification. As Dermatoglyphic features are strongly affected by genetic and environmental factors, the idea of using it as supportive evidence in the diagnosis of hereditary disorders becomes a reality. The incidence and prevalence of diabetes mellitus is on rise, more so in the developing nations. It multiplies the risk of coronary heart disease, and cerebrovascular strokes. It is the leading cause of acquired blindness. It accounts for over 25 percent cases with end stage renal failure and 50 percent of non-traumatic lower limb amputations. The relationship between family history of diabetes mellitus and subsequent development of disease is well documented, which suggest the role of heredity in the occurrence of diabetes mellitus. In diabetes mellitus,non-insulin dependent type is far more common; about 85 to 95 percent patients are of this category. It is associated with strong heredity. Diabetes mellitus and Dermatoglyphics, both are genetically influenced. So some changes in Dermatoglyphic pattern of these patients are expected. Therefore, the present study intends to evaluate the relationship between dermatoglyphic pattern, and non-insulin dependent diabetes mellitus. If significant correlations exist between them, it will be possible to identify the persons at high risk for the development of diabetes mellitus. The earliest prediction and diagnosis of patients with diabetes mellitus will definitely improve the result of treatment and prevent further complications.

Material and Method

Palm prints of one hundred patients(50 males and 50 females) diagnosed with non-insulin dependent type diabetes mellitus and one hundred prints of normal healthy persons(50 males and 50 females) as controls were obtained from OPD of govt. medical college

Solapur during the period of 2005 to 2007 on white paper by using Kores duplicating ink and cotton ball. Equal number of males and females were selected in cases and controls to avoid the byes of sex in result. Cases were diagnosed by physicianand they were taking treatment. For control group subjects above 45 years with no family history of diabetes and normal blood sugar level were selected. Epidermal ridge patterns were studied with aid of magnifyinglens. In this study four parameters were studied. These includefingertip patterns, atd angle, a-b ridge count and c-line types. Data obtained, analyzed and compared in casesand control by Z test.

Observation and Result

Table 1: Comparison of Fingertip Pattern in Diabetics and Non- diabetics

Sr. No.	Parameters	Diabetics (n=100)		Non diabetics (n= 100)		'z' Score	'p' value	Significance
		Mean	SD	Mean	SD			
1.	Ulnar Loop	2.60	2.10	5.89	2.64	9.75	< 0.05	Significant
2.	Radial Loop	0.14	0.47	0.15	0.44	0.16	> 0.05	Not Significant
3.	Whorl	5.78	2.88	2.84	2.86	7.24	< 0.05	Significant
4.	Arch	0.64	1.76	1.12	1.90	1.85	> 0.05	Not Significant

In fingertip patterns, mean ulnar loops indiabetics andnon-diabetics were 2.60 and 5.89 respectively. This difference was statistically significant ($p< 0.05$). Mean whorls in diabetics and non diabetics were 5.78 and 2.84 respectively. This difference was significant ($p<0.05$). Radial loop and arches showed no significant difference between diabetics and non-diabetics.

Table 2: Comparison of atd angle in Diabetics and Non-diabetics

Sr. No.	Parameter	Diabetics (n=100)		Non diabetics (n= 100)		'z' Score	'p' value	Significance
		Mean	SD	Mean	SD			
1.	atd Angle	77.85	8.32	78.22	7.68	0.33	> 0.05	Not Significant

Mean Atd angle in diabetics and non diabetics was 77.85 and 78.22 respectively. This differencewas not significant.

Table 3: Comparison of a-bRidge count in Diabetics and Non- diabetics

Sr. No.	Parameter	Diabetics (n=100)		Non diabetics (n= 100)		'z' Score	'p' value	Significance
		Mean	SD	Mean	SD			
1.	a-b Ridge	68.25	8.35	70.80	8.11	2.19	< 0.05	Significant

Mean a-b ridge count in diabetics was 68.25 and in non-diabetics 70.80. This difference was statistically significant ($p<0.05$).

Table 4: Comparison of C Line Type in both hands of Diabetics and Non- diabetics

Sr. No.	C line Type	Diabetics	Non-diabetics	'z' Score	'p' Value	Significance
1.	Absent	52	05	8.62	< 0.05	Significant
2.	Proximal	23	40	2.63	< 0.05	Significant
3.	Radial	79	96	3.76	< 0.05	Significant
4.	Ulnar	46	59	1.86	> 0.05	Not Significant

C line was absent in 52 hands of diabetics and only 5 hands of non-diabetics. This difference was statistically significant. C proximal was observed in 23 hands of diabetics 40 hands of non-diabeticsand difference was significant ($p<0.05$). C radial wasseen in 79 hands of diabetics and96 hands of non-diabetics. This difference was significant ($p<0.05$). C ulnar showed no significant difference.

Discussion

Man has always wondered about the significance of the peculiar arrangement of ridges on the volar aspect of palm and sole. The ancient Indian literature also describes various patterns as Chakra, Shankh and Padma. It was Grew[2] who for the first time studied the epidermal ridge patterns. He described the sweat pores, epidermal ridges, and their arrangement with drawings. Bidloo[3] gave scientific description of epidermal ridge patterns. He wrote first book with detailed drawing of finger print. Galton[4] was the first in fundamental fingerprint studies. He is the 'inventor' of dermatoglyphics. He studied morphology, classification, inheritance and racial variations. He classified the finger tip patterns into whorls, loops and arches. He scientifically demonstrated permanence of fingerprints. He has also done first twin research. Cummins[5] reported that, in mongoloids dermatoglyphics of finger tips and palm present number of characters which differ from those of racially

comparable normal controls. He published "Dermatoglyphic stigmata in mongoloid idiots".

The present study was carried out by using the Dermatoglyphics prints of 100 non-insulin dependent diabetic patients (50 males and 50 females) and 100 healthy controls(50 males and 50 females). In present study frequency of whorls was significantly increased and frequency of ulnar loop was significantly decreased in diabetic patients. These findings were similar to the finding of Santet al[6].Barta L, Regoly-Merei A, Kammerer[7] studied dermatoglyphic features in diabetes mellitus. Theyalso reported increased density of whorls on fingertips. Archesandradial loops showed no significant difference between diabetics and non-diabetics in present study, whileSantet al[6] reportedsignificant increase in the frequency of arches in females and decreased frequency of radial loops only in males. This may be due to combination of both types patient in their study. Bets LV, Dzhanibekord IV, Lebedev NB, and Kureha T Z[8] studied constitutional and dermatoglyphic characteristics of children with diabetes mellitus. They observed pattern asymmetry in children of both sexes. Examined population was characterized by reduced incidence of loop patterns and increased incidence of double delta pattern. In boys, frequency of arches and whorls was higher and frequency of loops lowers than in controls. In girls there were no arches and incidence of radial and ulnar loops was low. In present study atd angle showed no significant difference in diabetics and non-diabetics. Ziegler AG, Mathies R, Ziegel Mayer G, Baumgarh HJ,Rodewald A, Chopra V, Standl E[9] studied dermatoglyphics in type I diabetes mellitus. They reported lower a-b ridge count in diabetic's patients. Similar findings of lower a-b ridge count were noted here. In present study frequency of C absent was significantly more in diabetics and C proximal was significantly more in non-diabetics.Platilova H, Pobisova Z, Zamarazil V, Vondra K, Dvorakova L[10] studied "Dermatoglyphics –an attempt to predict diabetes.They concluded that, lacking or reduce Cline could be considered as early predicate feature. C radial was significantly more in non-diabetics as compared tonon-diabeticsand C ulnar showed no significant difference in diabetics and controls. While Santet al[6]. Found increased frequency of C abortive in diabetic females while frequency of C absent was increased and frequency of C ulnar was decreased in diabetic males. This may be due to combination of both types patient in their study.

Conclusion

In present study we found number of ulnar loops were decreased and no of whorls were increased in diabetics. A-b ridge count was lesser in diabetics. C radial and C proximal was more common in non-diabetics while C absent was observed more in diabetics.Atd angle showed no significant difference between diabetics and non-diabetics. With this result we achieved an aim of early prediction of persons who are at high risk of development of diabetes in later life.

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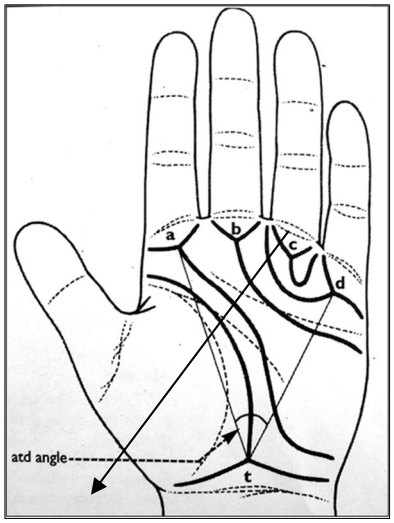
Photographs showing fingertip patterns

Arch

whorl

radial loop

ulnar loop



Atd angle C line