



Study of digital dermatoglyphic patterns in type-2 Diabetes population

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ABSTRACT

Dermatoglyphics deals with the scientific study of arrangements of epidermal friction ridges. The advent of these friction ridges are inherently controlled in all individual, like diabetes mellitus. Present study aims to appraise the dermatoglyphics as an active and inexpensive method of screening in type-2 diabetes patients. The present study was carried among 100 persons having type-2 diabetes and 100 non-diabetic individuals of the age group above 30 years. The study population was selected from the medicine out-patient department. The fingerprint was taken by using the Ink Method and for this purpose, black color stamp pad with ink was used. There is an upsurge in the incidence of arch in type-2 diabetic patients in comparison to the non-diabetic healthy population and it is statistically significant (p-value 0.03). Whorls is the utmost frequently found fingerprint pattern in the type-2 diabetic population, which is not significant.

KEYWORDS- *Dermato- glyphics, Type-2 Diabetes, Arch, Loop, Whorl, Fingerprint, Significant.*

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INTRODUCTION

Dermatoglyphics is defined as the scientific and systematic research of epidermal ridge outlines on the finger, palm, soles, and their toes. The term dermatoglyphics was originally created by "Cumins and Midlo" in the year 1926. It was basically derived from a Greek word "Derma" which means skin and "Glyphics" meaning carving. Skin on the palmer surface of hand and planter surface of sole is not smooth rather it is lined by minute ridges patterns, which forms a different arrangement. The arrangements of friction ridges have fascinated the consideration of laypersons for the millennia. From crib to tomb, till the decomposition of body, friction ridge patterns keep on unaffected. The uniqueness of fingertip patterns remain undisturbed except the skin is busted up to a depth of around 1mm. The dermal ridge differentiation is genetically determined and influenced by environmental influences. The ridges start to emerge through the 10th week of intrauterine life and are enduringly established by the 17th week. Dermatoglyphics has enormous concern in judicial and criminal research. Aberrant dermatoglyphics patterns have been detected in different non-chromosomal inherited disorders and some other illnesses whose etiology may be characteristically influenced by genetic inheritance, either directly or indirectly. The type-2 diabetes is a comprehensive disease and its ubiquity has up-stretched intensely in the last two decades.^{4,5}

On the basis of existing inclinations, about 300 million people may develop diabetes by the end of year 2025. In despite the incidence of both the type-1 & type-2 diabetes is growing international. The frequency of emerging type-2 diabetes is increasing swiftly due to developing obesity and diminished physical activity along with a sedentary lifestyle.⁶ The initial interpretation and proper regimen are

indispensable in avoiding eternal difficulties like nephropathy, neuropathy and retinopathy. Most of the victims of disease are not symptomatic, so the initial diagnosis is tricky. Therefore, we are looking for a new method of early diagnosis of the disease. In the present research, we are in search of establishing dermatoglyphic appearances to ascertain even if any precise characters exist in the type-2 diabetes mellitus patients.⁷

MATERIAL AND METHODS

The current study was carried out in the Department of Anatomy of Government Medical College, Budaun. 100 patients having pre-diagnosed type-2 diabetes (60 male and 40 female) and similarly, 100 non-diabetic healthy individuals, having 60 males & 40 females were involved in the study. The age group of the test and control population were ranges from 30-70 years. All the study subjects were selected from the person coming to visit medicine wards OPD of the associated hospital.

Exclusion criteria

Person co-morbid with cardiac, renal, or any other life-threatening diseases and having any known family history of diabetes mellitus were excluded from study. Person having any distortion of hand, ridges concealed by any injury in hand, or friction ridge aplasia were also excluded from the study.⁸

Methods of Dermatoglyphics printing

All the study subjects were informed in detail about the research practice and a proper consent was attained to carry the research. Fingerprint was collected by the use of proper Ink Method, early labelled by "Cumins and Midlo" in 1943.⁹

Materials Required

Ink pad with black color duplicating ink, White color bond paper, Rubber roller, Magnifying lens, etc. For collecting the fingerprint, the ink was applied to the fingertip with the help of a rubber stamp ink pad, and carefully the fingerprint was taken on the white bond paper. To prevent smudging of fingerprints, a proper care was needed to avoid the gliding of fingers. Fingerprint patterns were properly collected on white bond paper and carefully observed under the magnifying lens. Further the fingerprints were categorized into Arche, Loop and Whorl according to the pattern of friction ridges.¹⁰ All the collected data were summarized, tabulated, and interpreted with the help of Microsoft office excel 2019 and SPSS version 16, and the result was compared in case and control.

RESULT

The fingerprint patterns on the palmer surface of both the hands (right & left) of 100 diabetic patients were analyzed in accord with gender and fingerprint patterns to assess significant patterns of distinguishable variance among the patients and the control group. In the present study of 100 patients of type-2 diabetes, the number of male and female were 60 and 40 respectively.

Table No.1: Percentage wise assortment of total dermatoglyphic patterns in type-2 diabetic population

Subject		Diabetic Population								
Gender		Male (N=60)			Female (N=40)			Total (N=100)		
Hand		Rt. hand (N=300)	Lt.hand (N=300)	Total (N=600)	Rt.Hand (N=200)	Lt.hand (N=200)	Total (N=400)	Rt.hand (N=500)	Lt. hand (N=500)	Total (N=1000)
Arch	No.	117	103	220	77	82	159	194	185	379
	%	39	34.33	36.66	38.5	41	39.75	38.8	37	37.9
Loop	No.	25	26	51	10	10	20	35	36	71
	%	8.33	8.66	8.5	5	5	5	7	7.2	7.1
Whorls	No.	158	171	329	113	108	221	271	279	550
	%	52.66	57	54.83	56.5	54	55.25	54.2	55.8	55

Subject		Non-Diabetic Population								
Gender		Male (N=60)			Female (N=40)			Total (N=100)		
Side		Rt. hand (N=300)	Lt.hand (N=300)	Total (N=600)	Rt.Hand (N=200)	Lt.hand (N=200)	Total (N=400)	Rt. hand (N=500)	Lt. hand (N=500)	Total (N=1000)
Arch	No.	109	104	213	64	57	121	173	161	334
	%	36.33	34.66	35.5	32	28.5	30.25	34.6	32.2	33.4
Loop	No.	23	18	41	17	19	36	40	37	77
	%	7.66	6	6.83	8.5	9.5	9	8	7.4	7.7
Whorls	No.	168	178	346	119	124	243	287	302	589
	%	56	59.33	57.66	59.5	62	60.75	57.4	60.4	58.9

Table No.2: Percentage wise assortment of total dermatoglyphic patterns in non-diabetic population.

We recognized a surge of arch and loops patterns in the fingers of right hand in male population whereas, incidence of whorls are diminished in diabetic population as compared to control. On the fingers of left

hand of males, the frequency of arch is almost similar (34.33%) whereas, incidence of loop increases (8.66%) and whorls decrease (57%) among diabetic population. The fingers of right hand of diabetic females, incidence of arch increases (38.5%) whereas the incidence of loop and the whorls are decreased (5% and 56.5% respectively). Similarly, the left hand of diabetic females has increased arch (41%) and decreased loop and whorls (5% and 54% respectively). When considering the total diabetic population (male and female), the frequency of arch is increased (37.9%) whereas the loop is almost the same (7.1%) and the whorls are decreased (55%) as compared to the non-diabetic population.

Fingertip Patterns	Diabetic		Non diabetic		Chi-sq	p-value	Remark
	No.	%	No.	%			
Arch	379	37.9	334	33.4	4.21	0.03	Significant
Loop	71	7.1	77	7.7	0.18	0.66	Not Significant
Whorls	550	55	589	58.9	2.94	0.08	Not Significant

Table No.3: Comparison of statistical difference of fingertip patterns among diabetic and non-diabetic population. The incidence of arch type of pattern shows upsurge in type 2 diabetic population in comparison of healthy individuals and it is statistically significant (p-value 0.03). There is a decrease in loop and whorls patterns in the diabetic population as compared to non-diabetic individuals and statistically it is not significant.

DISCUSSION

The dermato-glyphics as an indicative tool is remarkably accepted in various ailments, having sturdy hereditary sources. As being a genetic basis in type -2 diabetes, some dermatoglyphic disparities are to be probable in it. In the present study, the most commonly observed fingertip patterns are the whorls, in the fingers of both right and the left hand (54.2% and 55.8% respectively) of type-2 diabetic patients and this finding is similar to Sant et al (1983) and Feroz Khan et al (2013).⁹ The above finding differs from the findings of Karim et al (2014) where the most frequent fingertip patterns were loops and the least common pattern were whorls.¹¹ The result of this study also differs from the Verbov et al (1973) and Ravindra-nath et al (1995) findings where the diminished incidence of whorls was found in female diabetic patients.^{12,13} In the present study the most frequently shown pattern is arch, which is followed subsequently by the whorls in the fingers of right and left hand among both the gender whereas Loop is the least found pattern in both type-2 diabetic and non-diabetic healthy population.

CONCLUSION

In our study whorls is the most frequently observed fingerprint patterns in both male and female, followed by arch and loop. An increased incidence of whorls pattern was found in the diabetic population, which is not significant. The arch type of fingerprints is increased in both male and female diabetic populations and it is statistically significant. Loops are the least found fingerprint patterns and it is also statistically not significant.

CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest. The research received no specific grant from any funding agency in the public, community, or non-for profit sectors.

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