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RESEARCH ARTICLE

DERMATOGLYPHIC PATTERNS AMONG TYPE-2DIABETIC ADULTS IN NORTH INDIAN POPULATION

Shrivastava Roshani[1]*., Singh Taruna[2]., Singh Amita[3]., Singh Prabhakar[4]., Bezbaruah NK[5] and Mishra Anshu[6]

[1,5,6] Department of Anatomy, IIMS & R, Hospital, Integral University, Lucknow (UP)
[2,4]Department of Pharmacology, S.S. Medical College, Rewa, (MP) – 486001
[3]Department of OBST. & Gynecology NSCB Medical College, Jabalpur, (MP)

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ABSTRACT

Dermatoglyphics is the study of epidermal ridges and their configurations. The appearance of it is genetically determined in every individual; as the diabetes mellitus has also a genetic background. ***Aims & objectives:*** the aim of study is to determine the specific dermatoglyphic findings in type-2 diabetics and to know any positive co- relation of dermatoglyphic pattern with type-2 diabetes. ***Material & Methods:*** The study was conducted in Department of Anatomy, IIMS &R, Hospital, Lucknow; 100 type-2 diabetic patients were enrolled in the study. To record the fingertip patterns, *Modified Purvis-Smith ink* method was applied. ***Results:*** The *WHORLS* are most common ($p \leq 0.000$, Extremely Significant) finger print pattern in both right (52.07% males; 53.19% females) and left (51.32% males; 51.48% females) hands in both sexes followed by loops and arches. In specific distribution, ***among males*** *Plane whorls* are most common pattern in both right hand (42.60%) and left hand (46.03%) followed by; *ulnar loops* in right (40.75%) and left hand (42.26 %). ***Among females*** *Ulnar Loop* is most common pattern in both right (39.14%) and left hand (40.42%) followed by; *Plain Whorl* in both right (38.29%) and left hand (35.31%). **Conclusion:** In our study, the whorls are most common pattern in both right and left hands of both sexes in diabetic subjects followed by loops in both hands of both sexes. However; there are several studies that show opposite results to our study. Hence there is need to carry out further studies and larger samples should be examined in detail to further validate the findings of this study and come to definitive conclusion.

INTRODUCTION

Diabetes mellitus is a metabolic disorder characterized by hyperglycemia resulting from defects in insulin secretion, action or both. Based on etiopathogenic categories, it is classified as Type 1 and Type 2 diabetes mellitus. In Type 1 there is absolute deficiency of insulin secretion. In Type 2 there is a combination of resistance to insulin action and inadequate compensatory insulin secretary response.[1] T2DM is a typical polygenic multi-factorial disease and is to date ascertained to be significantly associated with about 47 gene loci dispersed among the autosomal and X chromosomes as per genome wide association studies. Dermatoglyphics is the study of epidermal ridges and their configurations. The term dermatoglyphics (derived from ancient Greek word; derma = "skin," glyph = "carving") is the scientific study of fingerprints.[2] According to Henry's classification the dermatoglyphic patterns can be mainly recognized in to 3 forms, those are named as arch, whorl and loop.[3]

Epidermal ridges exhibit a complex inheritance patterns, characterized by polygenes with multi-factorial mechanisms under play.[4] They are also called as the "poor man's karyotype" since they represent the genetic makeup of an individual, the possible mode of inheritance of digital patterns are most likely occurs due to involvement of 7 (or more) independent genes.[5] The study of dermatoglyphics has proved to be very useful in predicting the hereditary diseases in patients.[2] Epidermal ridge pattern shows significant findings in patients of diseases with a strong or partial genetic background.[6] As the diabetes mellitus has also a strong genetic background; hence this study was conducted to find out certain specific dermatoglyphic findings and to know any positive co-relation of dermatoglyphic patterns with type-2 diabetes.

MATERIALS AND METHODS

This study was conducted in the Department of Anatomy during January 2015 to December 2015. Total 100 type-2 diabetic patients were enrolled in the study, the patients were collected from OPD, Department of Medicine, IMS and

Research, Hospital, Lucknow To record the fingertip patterns, *Modified Purvis-Smith ink* method was applied (Ulnar loop, radial loop, whorl, plane arch, tented arch).[7] Fingers were impregnated in to ink pad and are pressed on A4 papers, the counting was done using a hand lens and clear prints were classified into digital patterns such as arches, loops, whorls and composite. Each fingerprint was independently scored. The data were analyzed by using the *Microsoft Office Excel sheet 2007.*

Table No – 2 Frequency and distribution of finger print patterns among diabetic subjects

S.N.	Group wise distribution of Finger print Patterns	Diabetic Subjects					
		Right hands			Left hands		
		Males (n=265)	Females (n=235)	Total (n=500)	Males (n=265)	Females (n=235)	Total (n=500)
1.	Arches	15 (5.66%)	16 (6.80%)	31 (6.20%)	9 (3.39%)	12 (5.10%)	21 (4.2%)
2.	Loops	112 (42.26%)	94 (40.0%)	206 (41.20%)	117 (44.15%)	102 (43.40%)	219 (43.8%)
3.	Whorls	138 (52.07%)	125 (53.19)	263 (52.60)	139 (51.32%)	121 (51.48%)	260 (52.0%)
	Grand total	265 (100%)	235 (100%)	500 (100%)	265 (100%)	235 (100%)	500 (100%)

Above table showed, that the *whorls* are most common pattern in both right (52.07% in males and 53.19% in females) and left hand (51.32% in males and 51.48% in females), followed by *loops* in right hand (42.26% in males and 40.0% in females) and left hand (44.15% in males and 43.40% in females) and *arches* in right hand (5.66% in males and 6.80% in females) and left hand (3.39% in males and 5.10% in females).

RESULTS

In present study, total 100 diabetic's subjects were enrolled; out of which maximum 29% were belong to 50-59 years of age group followed by 27% 60-69 yrs; 21% 40-49yrs; 16% in 30-39 yrs and minimum 07% were belong to ≥70 years of age. Of total 53% were males and 47% were females. Out of 100 diabetic's, 25% subjects have family history of diabetes; in which mothers was most common (10%) sufferer. In this study the *whorls* are most common pattern in both right (52.07% in males and 53.19% in females) and left hand (51.32% in males and 51.48% in females) in both sexes followed by *loops,* in right hand (42.26% in males and 40.0% in females) and left hand (40.42%) followed by; *Plain Whorl* in both right (38.29%) and left hand (35.31%); *Double loop whorls* in both right (8.51%) and left hand (8.51%); and *Plain arch* in right hand (4.68%) and *Central pocket loop whorls* in left hand.

In specific distribution, *among males* patients; *Plane whorls* are most common pattern in both right hand (42.60%) and left hand (46.03%) followed by; *ulnar loops* in right (40.75%) and left hand (42.26 %); *Plain arch* (3.39%) in right hand and *Central pocket loop whorls* (4.52%) in left hand; and *Double loop whorls* (2.64%) in right hand and *Plain arch* (3.01%) in left hands. *Among females; Ulnar Loop* is most common pattern in both right (39.14%) and left hand (40.42%) followed

DISCUSSION

Epidermal ridges are formed early in the intrauterine life within the 1st trimester of pregnancy, fully formed at around the 18th week of gestation and remain unchanged thereafter.

Table No – 3 Distribution of Specific Finger print patterns among diabetic subjects

S.N.	Specific distribution of Finger print Pattern	Diabetic Subjects					
		Right hand			Left hand		
		Male (n=265)	Female (n=235)	Total (n=500)	Male (n=265)	Female (n=235)	Grand Total (n=500)
1.	Plain arch	9 (3.39%)	11 (4.68%)	20 (4.0%)	8 (3.01%)	10 (4.25%)	18 (3.6%)
2.	Tented arch	6 (2.26%)	5 (2.12%)	11 (2.20%)	1 (0.37%)	2 (0.85%)	3 (0.6%)
3.	Ulnar Loop	108 (40.75)	92 (39.14%)	200 (40.0%)	112 (42.26%)	95 (40.42%)	207 (41.4%)
4.	Radial Loop	4 (1.50%)	2 (0.85%)	6 (1.20%)	5 (1.88%)	7 (2.97%)	12 (2.4%)
5.	Plain Whorl	123 (46.41%)	90 (38.29%)	213 (42.60%)	122 (46.03%)	83 (35.31%)	205 (41.0%)
6.	Central pocket loop Whorls	6 (2.26%)	10 (4.25%)	16 (3.20%)	12 (4.52)	17 (7.23%)	29 (5.8%)
7.	Double loop Whorls	7 (2.64%)	20 (8.51%)	27 (5.40%)	4 (1.50%)	20 (8.51%)	24 (4.8%)
8.	Accidental Whorls	2 (0.75%)	5 (2.12%)	7 (1.40%)	1 (0.37%)	1 (0.42%)	2 (0.4%)

Above table showed, that the *Plane whorls* are most common pattern in both right hand (42.60% in males and 38.29% in females) and left hand (46.03% in males and 35.31%). Followed by *Ulnar loops* in right hand (40.75% in males and 39.14% in females) and left hand (42.26 % in males and 40.42% in females) and plane *arches* in right hand ((3.39% in males and 4.68% in females) and left hand (3.01% in males and (4.25% in female). In specific distribution, *Plain whorl* is most common both right and left hands of both males and females followed by *Ulnar loop.*

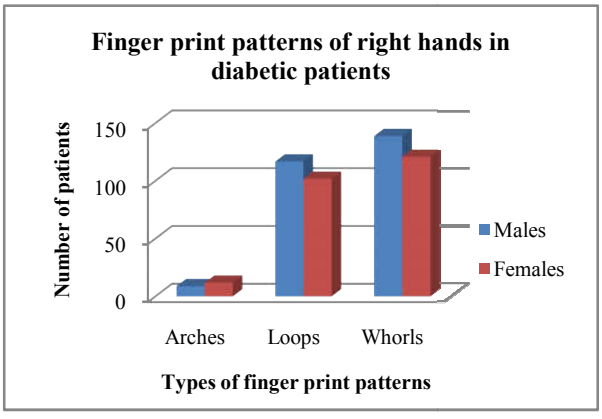

Figure No. 1 Finger print patterns of right hand in diabetic patients

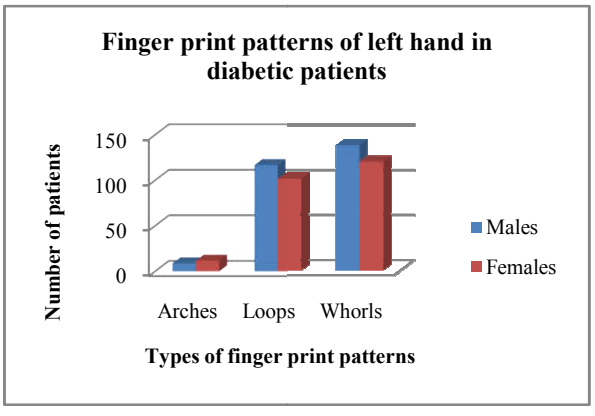

Figure No. 2 Finger print patterns of left hand in diabetic patients

They have been shown to exhibit complex inheritance patterns, which is polygenic and multi-factorial in nature.[4] They may be affected by environmental and genetic factors in utero.[8, 9] The study of dermatoglyphics has proved to be very useful in predicting the hereditary diseases in patients.[2] Wide spread interest in the subject developed only after it was found by *Cummins*, that many patients with chromosomal abnormality shows considerable abnormal ridge patterns.[10]

In present study, whorls are significantly most common pattern in both right and left hand compare to loops. This was similar to *Feroz khan, et al (2013)*[11] *and Sant et al (1983)*[12]*,* in which frequency of whorls is significantly increased in diabetic subjects and dissimilar to *Karim, et al (2014)*[13] in which whorls decreased and loops are most common patterns in diabetic subjects. The result of our study was also dissimilar to the results of *Ravindranath et al (1995)*[14]*and Verbov et al (1973)*[15] *study* which found a decreased frequency of whorls in diabetic females. The results of our study also similar to *Sengupta, et al (1996)*[16] in which the frequency of whorls was increased in diabetic males. *In our study Plain whorls* were ($p \leq 0.000$), extremely significant in both right and left hands of diabetic females.

In the present study *loop* pattern follow after whorls in both right and left hands of both sexes, this was similar to *Feroz khan et al (2013)*[11] in which frequency of *loops* is significantly decreased in diabetic subjects and *Sant et al (1983)* [12] study in which frequency of loops (ulnar and radial loops) is decreased in both sexes of diabetic subjects and apposite to *Ravindranath et al (1995)* [14] study in which *loops (ulnar loops)* were found more frequently in both sexes of diabetic subjects compare to whorls. In the present study arches were found more in females compare to males in both right and left hand, this is similar to *Pramila et al (2011)*[17]study in which higher incidence of arches pattern were find in female diabetics. The result of *Sengupta et al (1996)* [16] studies is opposite to the result of our study in which *arches* were found more in diabetic males.

CONCLUSION

In our study the whorls are most common finger print pattern in right and left hand of both sex followed by Loops, (especially ulnar loop) and arches in right and left hands of both sexes. In specific distribution, *Plain whorl* is most common in both hands of males followed by *ulnar loop* and plane arches in right hands and *Central pocket loop whorls* in left hands. However *ulnar loops* were most common patterns in both hands of females followed by *Plain whorl* and *Double loop whorls*. However; there are several studies that show opposite results to our study; hence there is need to carry out further studies and larger samples should be examined in detail to further validate the findings of this study and come to definitive conclusion.

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