BIOLOGY, MEDICINE, & NATURAL PRODUCT CHEMISTRY
Volume 13, Number 1, April 2024 | Pages: 291-295 | DOI: 10.14421/biomedich.2024.131.291-295

ISSN 2089-6514 (paper)
ISSN 2540-9328 (online)

Identification of Fingerprint Pattern and Lip Print Pattern in Females of Type 2 Diabetes Mellitus as a Biomarker

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Manuscript received: 23 March, 2024. Revision accepted: 20 August, 2024. Published: 21 August, 2024.

Abstract

Diabetes mellitus (D.M.) is a chronic metabolic disorder that has increased worldwide. Fingerprints and lip prints are noninvasive procedures that are genetically used in criminal cases and to determine genetic disorders such as Diabetes mellitus type 2. Dermatoglyphics is the epidermal ridge configuration, the ridged skin on our fingertips, palms, and toes. There are three types (Whorl, et al.). Cheiloscopy, derived from the Greek word (cheilos), which means lip, is the study of crinkles and grooves that are perceptible on our lips and unique. We conducted our research with 90 females, 45 were with (DMT2), and 45 were normal females over 30 years old. The samples were collected in different Kurdistan regions (Erbil City, Qaladza Town, Koya Town, and Koya University). We collected all 10 (ten) fingerprint patterns and divided them into Whorl, loop, and arch using an ink pad. Also, lip samples were collected by using lipstick on A4 paper. According to our research, the predominant fingerprints and lip prints in females with type 2 diabetes were loops for both hands (right (31.1%) and left (28.4%)), and for lips, the print was intersected grooves (28.9%). The predominant fingerprint and lip print for normal females were also loops in both hands (right (28%) and left (25%)), and the lip print was complete vertical grooves (42.2%). The study showed no association between fingerprint pattern and diabetes mellitus type 2 and cannot be used as a biomarker for it. However, there is a clear association between lip print pattern and diabetes mellitus type 2, and it can be used as a specific biomarker.

Keywords: fingerprints; lip prints; type 2 diabetes mellitus; Henry's method of classification; type 2 diabetes prediction.

INTRODUCTION

The distinctive individuality of fingerprints, called epidermal ridges, has been recognized for over 2000 years. For about 200 years, they have been the subject of scientific inquiry (Kücken, 2004). Human fingertips' skin has ridges and troughs that form recognizable patterns. Pregnancy allows for the full development of these patterns, which remain stable throughout life. Fingerprints are copies of specific patterns. Cuts, burns, and bruises can temporarily impair fingerprint quality, but after complete healing, patterns will return (Murmu, 2009; Smail *et al.*,2019). The classification used by the FBI is based on the well-known "Henry's Classification" (Jain *et al.*,1999). A loop, whorl, and an arch were created from each of the ten fingerprint patterns (Smail *et al.*,2020; Mouneshkumar *et al.*, 2021).

Lip prints are standard lines and fissures that appear as wrinkles and grooves where the inner labial mucosa and outer skin of the human lip meet. Like fingerprints, the appearance of lip prints differs from person to person (Adamu *et al.*,2013). Two Japanese scientists named Y. Tsuchihashi and T. Suzuki noted in 1950 that the arrangement of furrows on the lip is distinct and they put out a classification system for it that is still in use today: Type I: vertically oriented, well-defined grooves across the mouth; According to Debta *et al.* (2018), Type I' grooves are straight but stop midway rather than extending the full width of the lip. Type II grooves split along their path. Type III grooves cross. Type IV grooves are reticular. Type V grooves do not fit into any of Type I to IV and cannot be distinguished morphologically. Type I' grooves are straight but only extend halfway across the lip; Type II grooves kink; Type III grooves intersect; Type IV grooves are reticular; and Type V grooves do not correspond to any of Type I through IV and cannot be distinguished morphologically (Debta *et al.*,2018). Global epidemic diabetes mellitus and impaired glucose tolerance have been attained (Saeedi *et al.*,2019). There is a clear correlation, according to numerous earlier research carried out around the globe. The study's objective is to determine how fingerprint and lip print patterns relate to type 2 diabetes and to show whether finger and lip patterns can be used as indicators for patients with diabetes.

METHODOLOGY

Cases

Ninety women over 30 were divided into two groups for the sample study: 45 patients previously diagnosed with type 2 diabetes mellitus and 45 normal individuals. Samples were randomly selected from Koya University, Erbil City, Qaladiza Town, and Koya Town for each section. Most of the patients with T2D underwent the HbA1c test, and the results were positive for some of them. This disease was genetically passed down to them from their parents, and all the diabetes cases had a level above 7.5%. A random blood sugar test was conducted, and the result was very high, ranging from 200-500 mg/dL. The study's paper was divided into three sections labeled "right, left, and lip-type," five columns were created for each hand's thumb, index, middle, ring, and little fingers. Likewise, the lip print patterns were documented.

Fingerprint procedure

The patient's hands were cleaned and dried before printing. An ink pad was applied to the fingertips with a thin layer of blue ink. On an A4 sheet, five fingertips' imprints were recorded. However, the same actions were repeated. The ink was first removed with gauze pieces and hand rubbing, then with soap and water once all fingerprints had been collected. The fingerprints were examined under a magnifying glass. Henry's method of classification, which categorizes fingertip patterns into loops, whorls, and arches, was used to study the fingertip patterns (Sathawane *et al.*,2019)

Lip print procedure

Each person was instructed to wash their lips with water and let them dry gently. After applying the dark lipstick evenly in one stroke, each person was taught to spread it the dark lipstick evenly using gentle lip motions after applying it evenly in one stroke. The lips were relaxed, and the adhesive side of the cellophane tape was then uniformly applied (Negi, 2016).

Statistical analyses

The chi-square test was applied to examine the relationship between fingerprints and obesity for both the right and left hands of females (diabetes and control groups), and the lip print patterns. Statistical analyses were performed using SPSS software version 20, and P-values < 0.05 were considered statistically significant.

RESULTS AND DISCUSSION

Table 1. General distributions of primary fingerprint patterns in all fingers of both hands.

Fingerprint patterns	Total	Percentages %
Loop	508	56.4
Whorl	328	36.4
Arch	64	7.1

Table 2. Distribution of fingerprint pattern among type2 diabetes and control of female subjects in right hands.

Type of fingerprints	Type 2 diabetes	Control	Chi-square value	P value
loop	140(31.1%)	126(28%)	1.80	**0.40**
Whorl	72(16%)	84(18.6%)		
Arch	13(2.8%)	15(3.3%)		
Total	225(100%)	225(100%)		

Significant = (P≤0.05), using Chi-Square Test.

Table 3. Distribution of fingerprint pattern among type2 diabetes and control of female subjects in left hands.

Type of fingerprints	Type 2 diabetes	Control	Chi-square value	P value
loop	128(28.4%)	114(25%)	4.13	**0.12**
Whorl	76(1.68%)	96(21%)		
Arch	21(4.6%)	15(3.3%)		
Total	225(100%)	225(100%)		

Significant = (P≤0.05), using Chi-Square Test

Table 4. Distribution of fingerprint pattern in different fingers among type2 diabetes and control of female subjects in right hands.

Individual figures	T2D	Control	T2D	Control	T2D	Control
	Loop	Loop	Whorl	Whorl	Arch	Arch
Thumb	26(57.7%)	28(62.2%)	18(40%)	16(35.5%)	1(2.2%)	1(2.2%)
Index	22(48.8%)	20(44.4%)	17(37.7)	18(40%)	6(13.3%)	7(15.5%)
Middle	33(73.3%)	27(60%)	10(22.2%)	15(33.3%)	2(4.4%)	3(6.6%)
Ring	24(53.3%)	16(35.5%)	19(42.2%)	27(60%)	2(4.4%)	2(4.4%)
Little	35(77.7%)	35(77.7%)	8(17.7%)	8(17.7%)	2(4.4%)	2(4.4%)
Total	140(31.1%)	126(28%)	72(16%)	84(18.6%)	13(2.8%)	15(3.3%)
Chi square	1.63		1.62		0.13	
P value	0.80		0.80		0.99	

Significant = (P≤0.05), using Chi-Square Test

Figure 1. Lip pattern types.

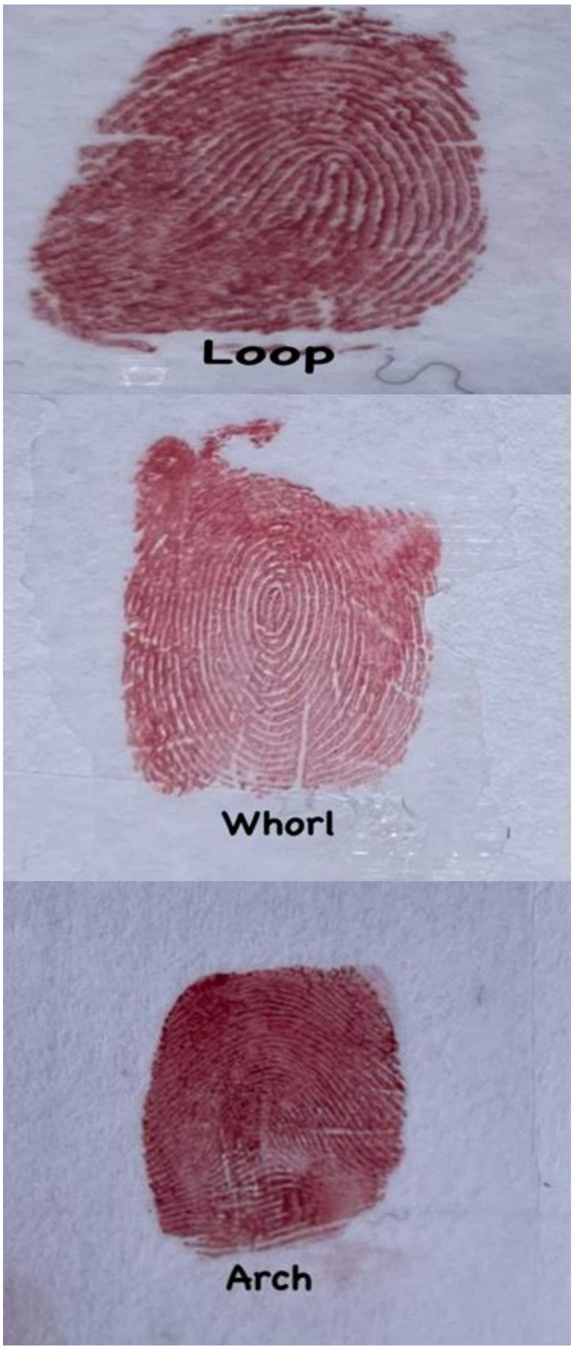

Figure 2. Type of fingerprint patterns.

There have been lip prints since the beginning of human history. Unlike fingerprints, lips also include furrows that fall into multiple groups for identification purposes. However, compared to fingerprints, palm prints, and fingerprints, lip prints are less common because they lack distinctive features used for identification (Reddy *et al.*,2013). These lip prints and fingerprints are currently used as markers for predicting type 2 diabetes (Sathawane *et al.*,2019). This study examined the relationship between lip print and fingerprint analysis with type 2 diabetes mellitus, with 90 randomly selected samples taken from Erbil, Qaladiza, and Koya City. In the control group, the most common fingerprint type was Loop (56.4%), followed by Whorl (36.4%) and Arch (7.1%) (Table 1). When considering only the right and left hands of females, the most common fingerprint type in the right hand of control cases was Loop (28%), followed by Whorl (18.6%) and Arch (3.3%) (Table 3:2). In diabetes cases, the percentages changed to Loop (31.1%), Whorl (16%), and Arch (2.8%) (Table 2).

On the left hand, the percentage of fingerprint types for control cases was Loop (2.5%), Whorl (21%), and Arch (3.3%), while for diabetes cases it was Loop (28.4%), Whorl (1.68), and Arch (4.6%) (Table 3). When analyzing the right-hand patterns of patients and controls, it was found that while the percentage of Whorl and Arch patterns was higher in the normal group, the percentage of Loop patterns was higher in the diabetic group. On the left hand, the Whorl pattern was more common and the Loop and Arch patterns had higher percentages among diabetes participants. However, our investigation found that these results were not statistically significant. In their study, Umana *et al.* (2013) discovered that Loop and Whorl were the main patterns in healthy people in their investigation of the Nigerian T2DM community. In contrast, people with diabetes showed a predominance of the Arch type. However, the results lacked statistical significance (Umana *et al.*, 2013)

In the current study, male individuals displayed branching, straight, intersected, reticular, and undifferentiated patterns, with decreasing frequency. In contrast, female subjects displayed branched, straight, intersected, and reticular patterns, but no undifferentiated patterns. Both participants with diabetes and those with hypertension shared the same findings. In control cases, the highest percentage according to our study was Complete vertical grooves (42.2%), followed by Branched grooves (31.1%) (Table 6). We did not gather any data in control cases for the partial vertical groove and undifferentiated groove types (Saeedi *et al.*, 2019). The prevalent trends in the controls in both types of investigation were Intersecting grooves (11.1%) and Reticular grooves (15.6%). In diabetes cases, the data were as follows: the highest percentage was Intersected grooves (28.9%), followed by Branched grooves (22.8%), Undifferentiated grooves (17.8), Completed vertical grooves (15.6%), Reticular grooves (11.1%), and Partial vertical grooves (4.4%). Table 6 shows that the intersected type of lip print was significantly higher in individuals with diabetes (28.9%) compared to the control group (11.1%). These results suggest that individuals with intersecting lip patterns have an increased risk of type 2 diabetes. On the other hand, individuals with finished vertical grooves and branched patterns are less likely to develop the disease (Manjusha *et al.*, 2017). According to our study, these results were statistically significant.

CONCLUSION

There was no association found between fingerprints patterns and type 2 diabetes mellitus. Thus, we cannot utilize them as a biomarker. However, the findings were different. We discovered a distinct relationship between lip print patterns and type 2 diabetes mellitus. Therefore, lip prints can be a biomarker for detecting type 2 diabetes mellitus.

Competing Interests: The authors declare that there are no competing interests.

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