RELATIONSHIP OF FINGERPRINT AND LIP PRINT IN RELATION TO TONGUE ROLLING AMONG STUDENTS IN UNIVERSITY OF ILORIN, NIGERIA

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ABSTRACT

Human identification is a universal process based on scientific principles, mainly involving fingerprinting. Likewise, the lip print is unique of an individual and hence beholds the potential for identification purpose. Therefore, this study was carried out to investigate the association between finger and lip print pattern in relation to tongue rolling among students. A total of 450 subjects (225 males and 225 females) selected from University of Ilorin were used for this study. Clearly obtained prints on the laptop which were magnified using the zooming tool. Finger prints were determined by observing the primary configuration (arch, ulna & radial loop and whorl) while lip prints were obtained by dividing the lip into six

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quadrants (upper quadrant [UQ] and lower quadrant [LQ]; Left& Right and middle quadrant (MQ) which were independently accessed for the predominant lip print using Suzuki and Tsuchihashi's classification (Types; I, I, II, III, IV, and V). Statistical analysis was performed using while Chi-square was used to determine the trend in the distributions. P<0.05 was taken to be significant. The result of the study showed that Type III, type IV and type II have an association with tongue rolling ability, fingerprinting and sex estimation in the URQ, UMQ, LMQ and LLQ of the lips. The association of lip prints with sex, however reveals the predominant lip print pattern of the upper lip and lower lip of both sexes as type III. The result also showed that the females had higher percentage of arches, radial loop and whorls pattern as compared to males while the males had higher percentage of ulna loops as compared to females. The differences observed in the tongue rolling ability, lip print pattern and finger print on the thumb and index fingers of both hands are associated with sex. Hence, lip printshold potential promise as a supplementary tool in personal identification of suspects orunknown identity.

KEYWORDS: Finger print, Lip print, Tongue rolling.

INTRODUCTION

The use of conventional methods such as use of fingerprints and lip prints are of paramount importance, since personal identification by other means such as DNA analysis is sophisticated and not available in rural and developing countries. The use of prints as means of personal identification is one of the common methods in forensic anthropology and the most popular prints are fingerprints (1-2).

Fingerprint in its narrow sense is an impression left by the friction ridges of human fingers.

The study of fingerprint is called dermatoglyphics and its use as means of identification is called dactyloscopy (3-5).The three basic patterns of fingerprint ridges are arch (plain and tented), loop (radial and ulna), and whorl (plain and others). An arch is a pattern where the ridges enter form one side of the finger, rise in the center forming an arc, and then exit the side of the finger and the loop is a pattern where the ridge enters from one side of a finger, form a curve and tend to exit from the same side they enter. Whereas, in the whorl pattern ridges form circularly around a central point on the finger (6).The second prints of interest are the lip prints (cheiloscopy). "Cheilos" is a Greek word meaning lip and "scopy" means to examine. Cheiloscopy is the study of lip prints. It can be defined as a method of identification of a person based on characteristic arrangement of lines appearing on the red part of the lips or as a science dealing with lines appearing on the red part of lips (7). Lip prints are important because of their uniqueness, except in monozygotic twins, and permanence (8). Different cheiloscopy studies have shown that lip print pattern exhibits a population wise dominance in India (9).

There is no evidence existing which shows the relationship between lip prints, finger prints and ability to roll tongue in literature, so the present study was conducted with the primary aim of finding if there is any relationship and also to determine the percentage distribution of lip print to right and left thumb and index prints as well as the association between lip print to right and left thumb and index prints and tongue rolling among University of Ilorin students.

MATERIALS AND METHODS

Study Sample

The study sample included 450 subjects comprising of 225 males and 225 females within ages 18 to 35 years. These subjects were randomly selected from University of Ilorin students and the study was conducted between January to June, 2019. All the subjects are young healthy male and female students who gave their consent and signed the informed consent form. Questionnaire forms were also provided for each subject so as to have a written down record of what the subject print is, and their tongue rolling ability, for appropriate identification of individual subjects with the anthropometry information obtained in other to prevent mismatch of data or information obtained. Ethical approval was gotten from the Department of Anatomy, University of Ilorin Research Ethical Committee.

Fingerprinting: An hp G3110 Scanjet Scanner (9000 x 4800 dpi resolution)was used to determine digital patterns of the fingers (Arch, ulnar loop, radial loop, and whorl). The fingers of the subjects were cleaned from dirt with a baby wipes before taking the prints and the subjects was asked to roll their thumb and finger from side to side across the surface of the scanner and to apply little pressure on the scanner for adequate contact between the fingers and the scanner to have a clear image of the print and the prints were taken twice (for each palm).

Lip printing: The subject was asked to clean his/her lip and to open the mouth slightly for even application of lip gloss over the surface of the lip. The subjects were then made to stand in a relaxed position and asked to keep the lip muscles relaxed and the jaw kept closed while the print is being taken. A clear new microscopic glass slide was placed on the relaxed lips of the subject in a single motion tilting it slightly to the right and left. The glass slide was then removed from the surface of the lip and carbon black powder was dusted on the surface of the slide that was in contact with the lips, then the excess powder was dusted by mouth blow, resulting in the production of well-developed lip prints on the slide ready for preservation and analysis. The glass slide was placed on an area provided on the questionnaire with left and right, superior and inferior sides in consideration. Finally, a strip of transparent cellophane tape was cut out with a scissors and was used to cover the print and to attach the slide to the questionnaire provided. Care was taken to avoid formation of any bubble and wrinkles on the glass slide (10). lip prints were finally obtained by dividing the lip into six quadrants (upper quadrant (UO) and lower quadrant (LO); Left& Right and middle quadrant (MQ) which were independently accessed for the predominant lip print using Suzuki and Tsuchihashi's classification (Types; I, I, II, III, IV, and V) (11).

RESULT

Sex	Tounge F	Rolling	Chi-Square Test of Association				
	No	Yes	x^{2}	P-Value	Inf		
Female	73 32.40%	152 67.60%					
Male	84 37.30%	141 62.70%	1.184	0.277	NS		
Total	157 34.90%	293 65.10%					

Table 1: Showed Tongue Rolling Ability and Test ofSex Association

Result from table 1 above showed that about 67.6% of females could roll their tongue as against 32.4% who could not roll their tongue while for the males 62.7 % could roll their tongue as against 37.3% who could not roll their tongue. Generally, there were more tongue rollers than non-tongue rollers. The ability to role the tongue was not associated with any sex (χ^2 =1.184, P=0.277) and did not vary significantly.

TOUNGE_R				LN	4Q			Ch	-Square Test Association	of	
			I	I'	II	III	IV	V	x^2	P-Value	Inf
No	Sex	Female	13 17.8%	14 19.2%	16 21.9%	12 16.4%	18 21.7%		13.919	0.008	
		Male	17 20.2%	12 14.3%	39 46.4%	7 8.3%	9 10.7%				S
	Total		30 19.1%	26 16.6%	55 35.0%	19 12.1%	27 17.2%				

 Table 2: Showed Distribution of Lip Print and Sex

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	Sex	Female	26 17.1%	25 16.4%	32 21.1%	20 13.2%	39 25.7%	10 6.6%		
Yes		Male	26 18.4%	25 17.7%	58 41.1%	7 5.0%	24 17.0%	1 0.7%	24.327 0.000	S
	Total		52 17.7%	50 17.1%	90 30.7%	27 9.2%	63 21.5%	11 3.8%		
	Sex	Female	39 17.3%	39 17.3%	48 21.3%	32 14.2%	57 25.3%	10 4.4%		
Total		Male	43 19.1%	37 16.4%	97 49.1%	14 6.2%	33 14.7%	1 0.4%	37.613 0.000	S
	Total		52 18.2%	76 16.9%	145 32.2%	46 10.2%	90 20.0%	11 2.4%		

Cont. Table 2: Showed Distribution of Lip Print and Sex

From table 2 above, distribution of non-tongue rollers in the UMQ and LMQ showed that the most frequent lip print pattern was type IV (42.5%, 24.7%) for females and type II (50.0%, 46.4%) for male while the tongue rollers had more of type IV (34.2%, 25.7%) for female and type II (46.8%, 41.4%) for male.

	TOUNGE_R		RT		Chi-Square Tes Association			
		ARCH	R. LOOP	U. LOOP	WHORL	x^{2}	P-Value	Inf
	Female Sex	30 41.1%	3 4.1%	32 43.8%	8 11.0%			
	No Male	25 29.8%	3 3.6%	34 40.5%	22 26.2%	6.309	0.098	NS
	Total	55 35.0%	6 3.8%	66 42.0%	30 19.1%			
	Female Sex	7 4.6%	12 7.9%	42 27.6%	63 41.4%	4.113	0.250	NS
	Yes Male	7 5.0%	19 13.5%	41 29.1%	54 38.3%			
	Total	14 4.8%	31 10.6%	83 28.3%	117 39.9%			
	Female	10 4.4%	15 6.7%	58 25.8%	95 42.2%			
	Total Male	18 8.0%	37 16.4%	69 30.7%	74 32.9%	80819	0.031	S
	Total	28 6.2%	52 11.6%	127 28.2%	169 37.6%			

Table 3: Showed Fingerprints in Relation to Sex

The result for Right Thumb (RT) from table 3 showed that females had 42.2% whorls pattern, 25.8% ulna loops pattern, 6.7% radial loops and 4.4% arches pattern. For the males, the whorls also had the highest percentage of 32.9%, followed by ulna loops of 30.7%, then the radial loop having 16.4% with arches pattern being the least with 8.0%. When comparing both sexes, the females had higher percentage of whorls as compared to males while the males had higher percentage of ulna loops, radial loops and arches had higher percentage in males as compared to females.

males had higher percentage of ulna loop and whorls pattern as compared to females while the females had higher percentage of arches and radial loops as compared to males. The result for the left index prints showed that females had 42.7% ulna loop pattern, followed by 27.1% whorls pattern, 17.3% arches pattern and lastly 12.9% radial loops pattern. For the males, the ulna loop also had the highest percentage of 41.8%, followed by whorls of 29.3%, then the arches pattern having 23.6% with radial loop pattern being the least with 5.3%.

TOUN	GE_R		RT			Chi-S A	Square Test of ssociation	f
		ARCH	R. LOOP	U. LOOP	WHORL	x^{2}	P-Value I	Inf
Sex	Female	19 26.0%	3 4.1%	27 37.0%	24 32.9%			
No	Male	19 22.6%	4 4.8%	36 42.9%	25 29.8%	0.682	0.878	NS
Total		38 24.2%	7 4.5%	63 40.1%	49 31.2%			
Sex	Female	37 24.3%	11 7.2%	65 42.8%	39 25.7%			
Yes	Male	30 21.3%	3 2.1%	58 41.1%	50 35.5%	6.657	0.087	NS
Total		67 22.9%	14 4.8%	123 42.0%	79 30.4%			
Sex	Female	56 24.9%	14 6.2%	92 40.9%	63 28.0%			
Total	Male	49 21.8%	7 3.1%	94 41.8%	75 33.3%	3.865	0.276	NS
Total		105 23.3%	21 4.7%	186 41.3%	138 30.7%			

The result for the right index prints from table 4 showed that females had 40.9% ulna loop pattern, followed by 28.0% whorls pattern, 24.9% arches pattern and lastly 6.2% radial loops pattern. For the males, the ulna loop also had the highest percentage of 41.8%, followed by whorls of 33.3%, then the arches pattern having 21.8% with radial loop pattern being the least with 3.1%. When comparing both sexes, the

Association of Tongue Rolling, Lip Print Pattern and Fingerprint Pattern

The present study focused on establishing the association between fingerprints, lip prints in relation to tongue rolling for sex determination and revealed that there was a statistically significant association in all quadrants of the lips except LRQ. The lip print pattern retained in the model revealed that type III was

significant in URQ, type III and IV were significant in the UMQ, type II and III were significant in the LMQ and type II was significant in the LLQ.

DISCUSSION

The traditional methods for personal identification include anthropometry, dermatoglyphic, sex determination, age estimation and measurement of height, differentiation by blood groups, DNA and odontology. Here lies the prime role of forensic odontology where cheiloscopy plays a significant evidential credit to unearth the credentials of the unidentified culprit (12). For each of the examined individuals, lip pattern is unique even in twins and family relatives. However, the use of lip prints in criminal cases was limited because the credibility of lip prints has not been firmly established in the court system (13). Even if environmental factors and pathologies affecting the lips could bring about changes in lip patterns, it has been observed that on recovery the lip prints reassume their former pattern. In fact, only those pathologies that damage the lip subtract-like burns seem to rule out the cheiloscopic study (5).

This study revealed that a higher proportion of female (67.60%) could roll their tongue while 32.40% could not and 62.70% of male could roll their tongue while 37.30% could not. Also, no significant difference was found to exist between gender and tongue rolling ability. Odokuma *et al.* (8) in their study revealed similar result and explained that tongue folding and rolling ability are traits that are products of autosomal genes possibly resulting from selective expression by natural selection.

Distribution of lip print, tongue rolling and sex from this study showed that male and female who could roll their tongue had more of type III lip print in the URQ as compared to the non-tongue rollers where the male had more of type II and the female showed more of type III. This findings is in line with Omuruka *et al.*^[9] who reported in their findings that type III of lip print is more predominant on the upper lip while type I dominated the lower lip.

Furthermore, a few reports in the literature have investigated the relationship between lip print and tongue rolling capacity, Naik and jobby^[7] revealed type IV of tongue rolling is found to be predominant in both sexes while Adamu *et al.* (2) showed type V to be dominant in both sexes. Naik, Jobby and Adamus' observations are in accordance with our findings where male and female tongue rollers showed more of type II and type IV respectively in the UMQ as compared to type IV and type II found in the male and female non-tongue rollers. Both sexes of the nontongue rollers had more of type III in the ULQ while the male tongue roller had more of type II and the female, type III. Therefore, in the upper lip of the female tongue roller, type III was predominant and type II was predominant for the male tongue roller. However, type III was dominant in the female nontongue roller and type IV was most common in the male non-tongue roller.

Type III was dominant in the LRQ of both sexes who could not roll their tongue but type II was dominant in the male tongue roller and type III was dominant in the female tongue roller. In the LMQ, type II was dominant both in male tongue roller and non-tongue roller while type IV was dominant in both female tongue roller and non-tongue roller. However, in the LLQ, type III was predominant in both sexes that roll their tongue while type II and type III were most common in male and female non-tongue rollers respectively.

The predominant finger print in the right thumb for both sexes who could roll their tongue was whorl with proportions more in female than male and this is the case for left thumb, left index and right index. However, in the right index the proportion of the male having whorl was more than female.

Type III, type IV and type II was revealed to have an association with tongue rolling ability, fingerprinting and sex estimation in the URQ, UMQ, LMQ and LLQ of the lips.

CONCLUSION

The upper and lower lips of the female tongue rollers are predominantly of type III lip print pattern while that of the male is Type II predominantly. However, the upper and lower lips of the female non-tongue rollers showed more of type III also, but the male non-tongue roller revealed more of type IV in the upper lip and type II in the lower lip.

The right thumb of both sexes who are tongue rollers had mostly whorl fingerprint while the right thumb of the non-tongue rollers had more of U. Loop finger print which was the case of both tongue rollers and non-tongue rollers in the right index, left thumb, and left index fingers in varying proportions.

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