GENDER SPECIFIC CORRELATION BETWEEN LIP PRINT, FINGERPRINT AND BLOOD GROUPS AMONG ADULTS AGED 20-30 YEARS ATTENDING A TERTIARY HEALTH CARE CENTRE

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ABSTRACT

A cross-sectional study was conducted to determine gender specific correlation between lip print, finger print and blood group among 120 adult clinical cases in a tertiary hospital in Kathmandu. Lip prints were collected using lipstick and cellophane sheet. Thumb print was collected using commercially available ink pad and white paper and analyzed using hand held magnifying lens. Blood group was noted at the time of recording lip and thumb print. A statistically significant association of gender with fingerprint (p=<0.001) and lip print (p=0.001) was found. A strong co-existing relation have been found between gender and the loop fingerprint-lip print type I'-blood group O and arch fingerprint–lip print type I'– blood group 'O'.

KEYWORDS

Blood group, fingerprint, forensic dentistry, gender determination, lip print

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INTRODUCTION

Study of various demographic features including fingerprints (dactyloscopy), lip prints (Cheiloscopy), palatal rugae prints (rugoscopy), tongue prints, anthropometry and DNA analysis have been used for the specific identification of individual and gender in forensic medicine.[1-9] Both the dactyloscopic and cheiloscopic morphological patterns are governed genetically and are unique to individual.[2,4,6,10-18] Despite the advent of advanced techniques such as DNA fingerprinting, cheiloscopic and dactyloscopic analysis are most widely practiced in forensic medicine for identification and gender determination because of their simplicity, accuracy and cost effectiveness.[3,10] Analysis of lip print may not only have importance in forensic medicine but also as a genetic marker and a diagnostic tool.[11]

The various dactyloscopic patterns are loop, whorl, arch, composite and other pattern.[5] The characteristic cheiloscopic pattern appear as unique reticular, vertical, intersected, branched and partial vertical pattern[14,11,5] that have been further classified as type I (clear vertical groove), type I' (partial vertical groove), type II (branched groove), type III (intersected groove), type IV (reticular pattern) and type V (undetermined) based on their characteristic morphological pattern.[5,7,10,11,14,19,20] Blood groups (O, A, B, AB) of individual have special correlation with other identification markers including fingerprints and lip prints that can be more useful in identification of an individual and establishment of facts in legal issues.[5, 22]

Earlier studies show an association between lip print and thumb prints alone in relation to gender in Nepali population.[24, 25] However, there is paucity of literature on the co-relation between gender with cheiloscopy, dactyloscopy and blood groups. Therefore, present study aimed to assess the distribution and predominance pattern of lip and fingerprints and blood groups among the gender groups; and to evaluate the possible co-relationship and compare the reliability of those parameters in gender identification in Nepali population.

MATERIALS AND METHODS

This cross-sectional study was conducted after ethical approval and prior consent of 120 adult clinical cases (60 male and 60 female) belonging to the age group of 20 to 28 (mean 22.58±1.87) years selected randomly in Nepal Medical College Hospital, Kathmandu during the month of September 2020 to February 2021.

Lip print: The lips were cleaned with wet wipes. Lipstick was applied with applicator from central to the lateral part of lips in a single stroke. The subjects were then asked to clutch both the lips to ensure that the lipstick application would be uniform. Lip prints were transferred to cellophane sheet after a gap of 2 minutes. White bond paper was used for final transfer of records for analysis by gently pressing the cellophane sheet over the bond paper. The lip impression patterns were studied classified and recorded using magnifying lens with light. Lip prints obtained were classified into different categories according to Suzuki and Tsuchihashi where only the central part of the print was considered for the classifying the print.[34]

Thumb print: The individual were asked to wash the hand and apply sanitizer. The imprint of left thumb impression was taken using blue ink pad and analyzed through magnifying lens. The interpretation of loop, whorl, arch and composite type dactyloscopic impression was done according to Michael and Kucken classification.[14,31-34,39]

Blood group: The blood group was asked to patients and recorded at the time of collection of lip and thumb impression along with other records.

Data analysis: Data entered, coded, and edited using Microsoft Excel 2010. The data transferred to SPSS version 16 for further analysis. Frequency statistics and cross tabulations was done. Chi square test, independent t-test and regression test were used for statistical analysis. The level of significance was set at 5%.

RESULTS

Distribution of fingerprint: The distribution of fingerprint patterns observed in the study population with respect to gender is illustrated in Fig. 1. It is evident that all the three patterns of fingerprints were observed in both male and female participants. The general distribution of fingerprint patterns in the given population was in the order of loops type (44.2%) followed by arch (30.8%) and whorl pattern (25%). The gender wise distribution of fingerprints revealed that the males showed a higher incidence of loop (58.3%) where females showed the arch (55%) type. The whorl type of fingerprint was found more in male (35%) compared to female (15%). Statistically significant association was found between gender and fingerprint (p-value<0.001).

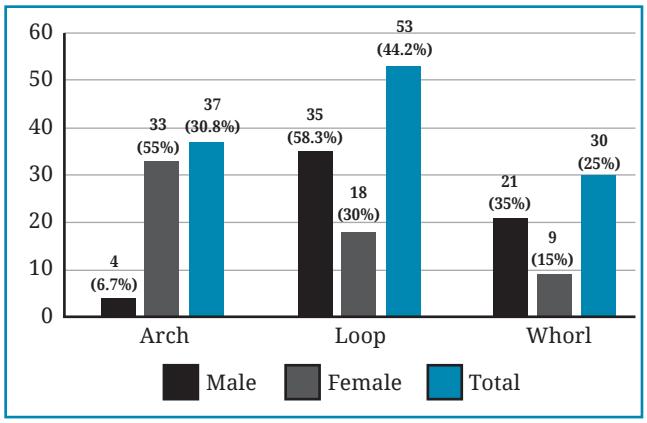

Fig. 1: Distribution of fingerprint patterns in study group

Distribution of lip print: Fig. 2 shows the distribution of lip prints pattern where the type I' was the most common (37.5%) lip print pattern followed gradually by type II (21.7%), type I (16.7%), type V (9.2%), type IV (9.2%) and type III (5.7%) among the study population. After the analysis of lip print pattern, it revealed that no two lip print patterns matched with each other. Most of the female participants showed type I' (41.7%) lip prints followed gradually by type II (26.7%), type I (23.3%), type V (5%) and type III (3.3%).

None of the female participants showed type IV lip print. Similarly, the male participants showed the highest incidence of type I' lip print (33.3%) followed gradually by type IV (18.3%), type II (16.8%), type V (13.3%) and type III (8.3%), The intersected (type III) type of lip print pattern was found in limited (5.7%) number of both female (8.3%) and male (3.3%) participants. The reticular type (type IV) of lip pattern was found only in some male (18.3%) participants. Type V lip prints were found more in females (13.3%) as compared to female (5%) participants. Statistically significant association was found between gender and fingerprint (p-value<0.001).

Distribution of blood groups: There was a higher distribution of blood group O (59.2%) followed gradually by B (19.2%), A (14.1%) and AB (7.5%) in the study population (Fig. 3).

Table 1: Distribution of blood group and finger print pattern.

Finger print pattern		Blood group				Total
		A	AB	B	O	
Arch	N (%)	1 (2.7)	1 (2.7)	11 (29.7)	24 (64.9)	37 (100.0)
Loop	N (%)	9 (17.0)	4 (7.5)	5 (9.4)	35 (66.0)	53 (100.0)
Whorl	N (%)	7 (23.3)	4 (13.3)	7 (23.3)	12 (40.0)	30 (100.0)
Total	N (%)	17 (14.2)	9 (7.5)	23 (19.2)	71 (59.2)	120 (100.0)

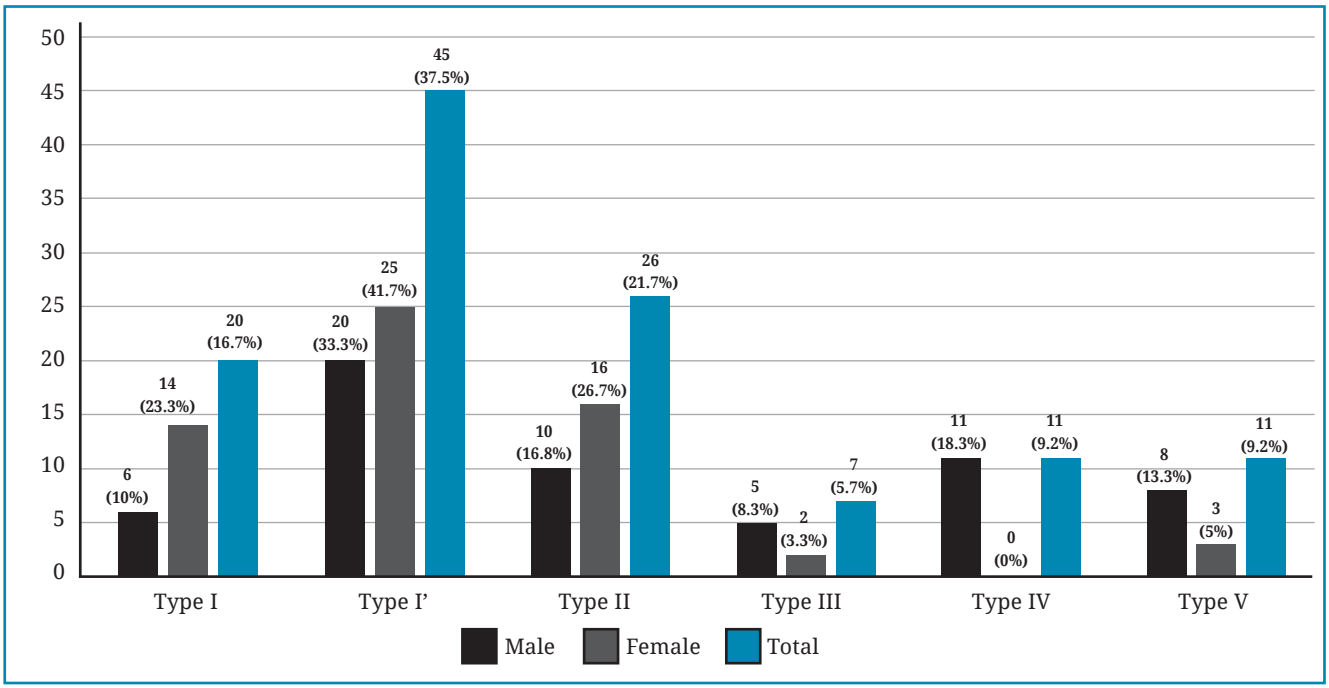

Fig. 2: Distribution of lip print patterns in the study group

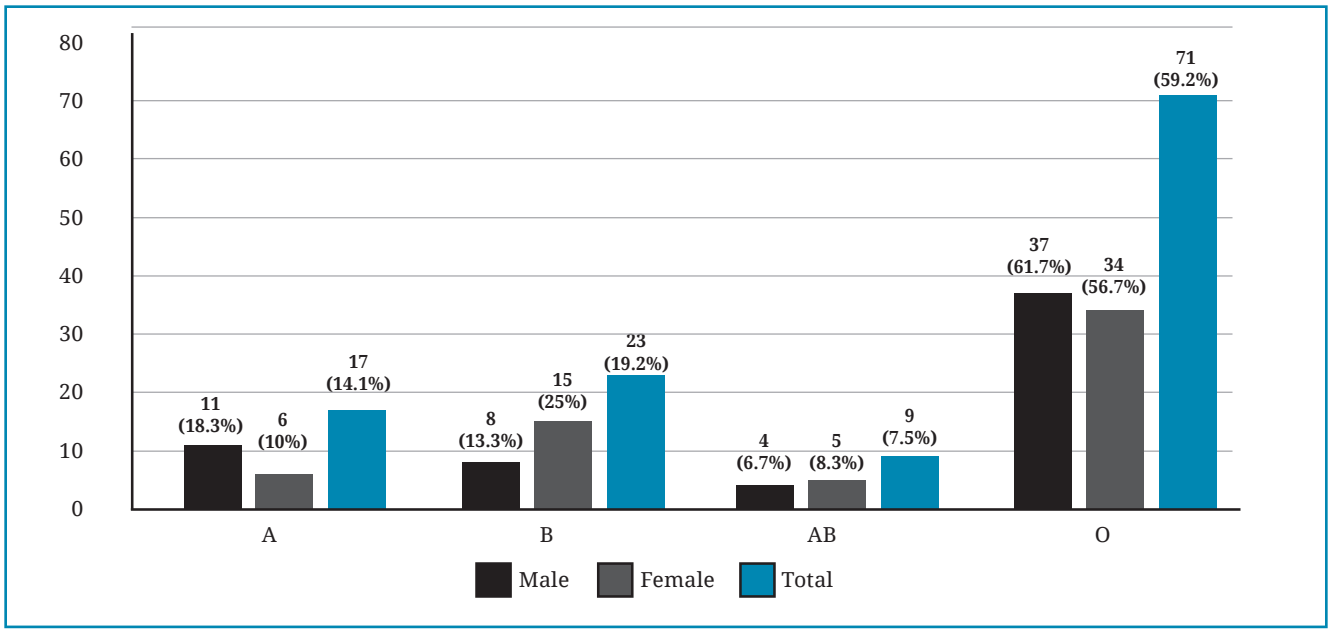

Fig. 3: Distribution of blood groups

There was similar predominant distribution of O blood group among both males (61.7%) and females (56.7%). Only 4 (6.7%) male and 5 (8.3%) female showed AB blood groups. There was no statistically significant association between gender and blood group (p-value 0.28).

Distribution of blood group and finger print: Present study revealed that loop print and blood group 'O' combination pattern was found more common followed by loop print and blood group 'A' combination (Table 1). The whorl type of finger print pattern was found in equal number (23.3%) of participants having blood group A and B. It has also been recorded that only one study subject with blood group A showed pattern of arch finger print.

Distribution of Blood group and Lip Print Patterns: Table 2 illustrates the relationship between the blood groups and lip print patterns. It is evident from the Table 2 that the frequency of Type I, Type I', Type II, Type III, Type IV and Type V lip prints was more among O blood group. The combination of blood group O and lip print type I' was the most frequent followed by blood group O and lip print type I and others.

Distribution of finger print and lip print patterns: The distribution of finger print and lip print patterns has been illustrated in table 3. It can be concluded from the table that the combination of loop pattern of fingerprint and lip print type I' is observed in majority of study population followed immediately by arch pattern and lip print type I' pattern. Among total whorl finger print pattern, 40% occurred with lip print type II. Out of a total loop finger print pattern only 7.5% of study population had combination of whorl pattern with lip print type III.

Distribution of blood group, finger print and lip print pattern: Distribution of blood group, finger print and lip print pattern has been

Table 2: Distribution of blood group and lip print patterns

Type of lip print pattern		Blood group				Total
		A	AB	B	O	
Type I	N (%)	0 (0)	1 (5.0)	7 (35.0)	12 (60.0)	20 (100.0)
Type I'	N (%)	8 (17.8)	3 (6.7)	6 (13.3)	28 (62.2)	45 (100.0)
Type II	N (%)	3 (11.5)	4 (15.4)	8 (30.8)	11 (42.3)	26 (100.0)
Type III	N (%)	1 (14.3)	0 (0)	0 (0)	6 (85.7)	7 (100.0)
Type IV	N (%)	3 (27.3)	0 (0)	0 (0)	8 (72.7)	11 (100.0)
Type V	N (%)	2 (18.2)	1 (9.1)	2 (18.2)	6 (54.5)	11 (100.0)
Total	N (%)	17 (14.2)	9 (7.5)	23 (19.2)	71 (59.2)	120 (100.0)

Table 3: Relationship between the finger prints and the lip print pattern.

Finger print		Lip print pattern						Total
		Type I	Type I'	Type II	Type III	Type IV	Type V	
Arch	N (%)	11 (29.7)	15 (40.5)	7 (18.9)	1 (2.7)	0 (0.0)	3 (8.1)	37 (100)
Loop	N (%)	7 (13.2)	18 (34.0)	7 (13.2)	4 (7.5)	10 (18.9)	7 (13.2)	53 (100)
Whorl	N (%)	2 (6.7)	12 (40.0)	12 (40.0)	2 (6.7)	1(3.3)	1 (3.3)	30 (100)
Total	N (%)	20 (16.7)	45 (37.5)	2 (21.7)	7 (5.8)	11 (9.2)	11 (9.2)	120 (100)

Table 4: Distribution of blood group, finger print and lip print pattern

Fingerprint and lip print combination pattern		Blood group				Total
		A	AB	B	O	
Arch-Type I	N (%)	0 (0.0)	1 (9.1)	6 (54.5)	4 (36.4)	11 (100)
Arch-Type I'	N (%)	1 (6.7)	0 (0.0)	3 (20.0)	11 (73.3)	15 (100)
Arch-Type II	N (%)	0 (0.0)	0 (0.0)	1 (14.3)	6 (85.7)	7 (100)
Arch-Type III	N (%)	0 (0.0)	0 (0.0)	0 (0.0)	1 (100)	1 (100)
Arch-Type IV	N (%)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Arch-Type V	N (%)	0 (0.0)	0 (0.0)	1(33.3)	2 (66.7)	3 (100)
Loop-Type I	N (%)	0 (0.0)	0 (0.0)	1 (14.3)	6 (85.7)	7 (100)
Loop-Type I'	N (%)	3 (16.7)	2 (11.1)	1 (5.6)	12 (66.7)	18 (100)
Loop-Type II	N (%)	1 (14.3)	1 (14.3)	2 (28.6)	3 (42.8)	7 (100)
Loop-Type III	N (%)	0 (0.0)	0 (0.0)	0 (0.0)	4 (100)	4 (100)
Loop-Type IV	N (%)	3 (30.3)	0 (0.0)	0 (0.0)	7 (70.0)	10 (100)
Loop-Type V	N (%)	2 (28.6)	1 (14.3)	1 (14.3)	3 (42.9)	7 (100)
Whorl-Type I	N (%)	0 (0.0)	0 (0.0)	0 (0.0)	2 (100)	2 (100)
Whorl-Type I'	N (%)	4 (33.3)	1 (8.3)	2 (16.7)	5 (41.7)	12 (100)
Whorl-Type II	N (%)	2 (16.7)	3 (25.0)	5 (41.7)	2 (16.7)	12 (100)
Whorl-Type III	N (%)	1 (50.0)	0 (0.0)	0 (0.0)	1 (50.0)	2 (100)
Whorl-Type IV	N (%)	0 (0.0)	0 (0.0)	0 (0.0)	1 (100)	1 (100)
Whorl-Type V	N (%)	0 (0.0)	0 (0.0)	0 (0.0)	1 (100)	1 (100)
Total		17	9	23	71	120

illustrated in Table 4. It is evident from the table that the most common occurrence was found to be the loop fingerprint –lip print type I' – blood group 'O' followed by arch finger print– lip print type I' – blood group 'O' combination. If the resulting outcome of lip print type I and type I' were merged together then the position of first commonest combination and second most common combination would also same.

Gender specific correlation between finger print, lip print and blood group: The gender specific correlation between fingerprint, lip print and blood groups has been illustrated in Table 5. Table 5 shows the gender specific correlation between fingerprint, lip print and blood group among the study participants. Statistically significant association was found between gender and fingerprint (p-value<0.001) and between gender and lip print (p-value 0.001). However, there was no statistically significant association between gender and blood group (p-value 0.28).

DISCUSSION

The participants in the present study were selected between the age group of 20 to 28 years to rule out any chance of developmental

Table 5: Gender specific correlation between fingerprint, lip print and blood group

Group	Chi square value	df	p-value
Finger print	32.98	3	<0.001*
Lip print	19.69	5	0.001*
Blood group	3.84	3	0.28

Chi square test, p-value<0.05 statistically significant*

or other errors in the interpretation of sex and race of an individual related to a specific age. Present study revealed that the loops were the predominant (58.3%) fingerprints in male compared to arch (55%) type in females. The whorl type of fingerprint was found more in male (35%) compared to female (15%). The findings partially agreed with the findings of earlier researches where a higher distribution of loop type fingerprints was recorded in both male and females.[31,39] Earlier research found a higher distribution of loop pattern followed by whorl and arch type of fingerprints.[2,14] The finding was consistent with the universal observation[2]. Loop fingerprints were also found predominant in total population, Egyptian and Malaysian population as well.[32,35] Present study revealed that the females showed the arch (55%) type of fingerprints as the most common one that was against finding of earlier study.[39] The whorl type of fingerprint was found more in male (35%) compared to female (15%) that corroborates with the earlier study.[31, 35]

Current study revealed a statistically significant association between gender and fingerprint (p-value<0.001) and between gender and lip print (p-value 0.001) but none with blood groups. The finger prints have been used for centuries for identification of individual and detection of criminals.[34] In our study, the males and females were accurately identified based on the fingerprint and lip print pattern (P < 0.001) that corroborates with the findings of earlier research.[32]

Current study revealed that no two lip print patterns matched with each other establishing the uniqueness of lip prints and was supported by earlier research.[13] In our study, all types of lip print patterns including the predominance (37.5%) of type I' (partial or incomplete vertical length groove of type I) were observed in both males and females in various ranges except that no females showed the type IV (reticular) lip print pattern. Earlier researcher also found the predominance of lip print type I' in females.[8,13,32,38] A statistically significant difference of latent lip prints between males and females has also been recorded.[25] A study conducted in BPKHIS Dharan found a most prevalent (37.3%) vertical pattern of lip print in females while the intersected lip pattern was most prevalent in males.[39] In another study, it was recorded that type I and type I' were the most dominant pattern in both male and female population.[13,15] A great degree of inconsistency in the observation of lip print patterns and statistically significant difference with the different lip print patterns analyzed in males and females has also been observed by earlier researchers.[2,8] The varied presentation of lip prints may be attributed to the difference in sampling methods and inclusion of diverse population groups with varied ethnicity. Present study revealed that the combination of loop pattern of fingerprint and lip print type I' was observed in majority of study population followed immediately by a combination of arch pattern and lip print type I' pattern. The study found a statistically significant association between gender and fingerprint (p-value<0.001) and between gender and lip print (p-value 0.001) in contrast to some of the earlier findings.[2] Earlier studies also recorded statistically significant correlation between lip and fingerprint patterns for gender determination.[22] A combination of Type II lip print pattern and loop pattern of fingerprints were also found as the predominant patterns of lip print and fingerprint combination in both males and females.[1] However, no statistically significant correlation of fingerprint and lip print for gender has also been recorded.[2]A positive correlation between lip prints and finger prints have been recorded but the inconsistency in findings of various studies might be attributed to smaller sample size.[30,35] Present study revealed that blood group O was found to be of the highest percentage among study population. The loop finger print–lip print type I'– blood group 'O' combination was the most common occurrence followed by arch finger print–lip print type I'–blood group 'O' combination which differs from the earlier study in India where the lip print type I (not I') was the commonest combination. [34] However, gender identification was inconclusive on the basis of ABO blood group pattern in the current study.[33-36]

In an earlier study conducted in India, blood

group 'O', loop finger print and lip print type I are the most prominent on individual basis.[34] Loop finger print –lip print type I – blood group 'O' was the combination occurring the most and which was immediately followed by loop finger print–lip print type I – blood group 'B' combination.[34] A study recorded a possible association between distribution of fingerprint patterns, blood group and gender.[31] However, the combination of those cheiloscopic and dactyloscopic parameters and blood groups revealed no specific correlation with gender in this study which in accordance with some earlier studies.[13, 34, 37] It can be concluded that the fingerprint and lip print can be used individually as they have been used for centuries but cannot be used collectively in a forensic investigation including gender determination.[34] The finding corroborates with the earlier studies.[34] Because of the purposive sampling comprising heterogenous mixed population of clinical cases in hospital, correlation of blood groups with that of gender could not be established. To conclude, present study revealed that lip prints, fingerprints, and ABO blood groups had their own specifications but the correlation of those three parameters did not show any significance in gender identification which was in accordance with earlier findings.[1]

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