Original article:

A cross-sectional study to establish a relationship between lip prints, gender, fingerprints and blood group for the identification purpose in Pravara Institute of Medical Sciences -DU, Loni

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Abstract:

Introduction: In this advancing world there is constant need for discovering new modes of identification process. Finger printing is used since ages now to identify a personal and now recent advances include face scan, iris scan etc. there is a need of establishing a new modality which uses previously used modes and compile them together to form a new mode with higher sensitivity and specificity.

Aims & Objectives: To establish any co-existing relation between lip prints, finger prints, blood group and gender.

Methodology: It was a cross-sectional study conducted after ethical approval and prior consent from the participants. All the data were collected and compiled into Microsoft excel software. Lip prints, finger prints and ABO and Rh blood groups of each individual were recorded. Lip prints were classified, based on Suzuki's and Tsuchihashi's classification and finger prints were classified, based on Michael's and Kucken's classification.

Results: Out of 110 participants, 50 were males and 60 were females. On individual basis blood group 'O', Loop finger print and lip print type I are the most prominent in their category. Loop finger print –lip print type I – blood group 'O' is the combination occurring the most and which is immediately followed by loop finger print–lip print type I – blood group 'B' combination.

Keywords: lip prints, gender, fingerprints and blood group

Introduction:

Identification is the English word derived from the Medieval Latin word *identificare* which means the action or process of identifying someone or something or the fact of being identified. In India, various forms of documents are available to establish ones identity such as Aadhaar card, Voter ID card, Passport, and many more. But there are few mode of identification which are better than any of the above mentioned documents. Those are the mode of identification which an individual carries since their birth such as Fingerprints, lip prints, iris pattern, retina scan and many more. In this modern era where the society is growing exponentially towards the carrying capacity of the earth, there is a need for a unique mode of identification which should have a very low false positive value.

Most trusted one being the fingerprints which has dated back to ancient Babylon in the second millennium BCE.[1]A Fingerprint Bureau was established in Calcutta (Kolkata), India, in 1897, after the Council of the Governor General approved a committee report that fingerprints should be used for the classification of criminal records. Haque and Bose were Indian fingerprint experts who have been credited with the primary development of a fingerprint classification system eventually named after their supervisor, Sir Edward Richard Henry.[2]

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Cheiloscopy (from the Greek word cheilos which means lips) is the forensic investigation technique that deals with identification of humans based on lip traces.[3] The biological phenomenon of systems of furrows on the red part of human lips was first noted by anthropologists. Fisher was the first to describe it in 1902.[3, 5-6] It is possible to identify lip patterns as early as the sixth week of intrauterine life. Thereafter, lip groove patterns rarely change, resisting many afflictions.[4] A lip print is different in every living individual and does not change with time therefore it can be used as a tool in forensic investigations. A lip print may be revealed as a stratified surface trace with visible elements of lines, namely the furrows and if the lines are not clear, only the shape of lips is printed. It has been confirmed that these furrows recover after undergoing alterations like trauma, inflammation, and diseases like herpes. Also the disposition and form of the furrows does not change with environmental factors.[7]

Gender and blood group also plays an important role in identification process like blood group and Rh typing is necessary before blood transfusion in order to prevent the grave complication of transfusion reaction. Whereas gender is the first identity which one gets after an individual is born. In order to find out any previous existing relation between this modes of identity.

Aims and Objectives: -

1. To investigate and evaluate the uniqueness of lip prints and their role in personal identification.
2. Try to establish any co-existing relation between lip prints, finger prints, blood group and gender.

Methodology:

It was a prospective cross-sectional study conducted after the approval from the institutional ethical committee (IEC) and prior consent from the participants of the study. The study was conducted with the help of a well-structured questionnaire which included the related demographic data such as gender, blood group, spaces for the lip-print and fingerprints. Population group consist of 110 medical students belonging to age group 18-24yrs old who were selected by simple random sampling method by using block randomization to achieve above mentioned sample size. Study materials used were red flamed lip stick, cellophane tape, white A4 bond paper, magnifying glass, anti-A sera, anti-B sera, and anti-Rh sera for ABO blood group testing(only for those who were not knowing their blood group).

Eligibility criteria:

Inclusion criteria: -

- Participants willing to volunteer for the study.
- Ranging in the age group of 18-24.

Exclusion criteria: -

- Subjects undergoing orthodontic treatment or any abnormalities of lips.
- Any known allergies to lipsticks or ink used.
- Any hand deformities caused by injuries.

The lip print was recorded by using the tape and the lip stick. First the lipstick was applied to the participant's lip and were asked to rub it in between their lips in order to spread it properly and then glue side of the tape was applied over the lips and the prints were obtained. After that lip print was divided into parts were the central part was considered for the classifying the print according to classification given by Suzuki and Tsuchihashi. The classification given by Suzuki and Tsuchihashi used was as shown below:

- Type I – A clear cut groove running vertically across the lip
- Type I' – Partial length groove of type I
- Type II – A branched groove
- Type III – An intersected groove
- Type IV – A reticular pattern
- Type V – Undetermined.

Type I and type I' were clubbed together for ease of evaluating the results.

Thereafter finger print were obtained by using the blue ink pad and left thumb of the individual. The finger print were collected over the white paper and then it was classified based on Michael's and Kucken's classification that classified fingerprints into: -

- Loop pattern
- Arch pattern
- Whorl pattern

And the demographic data such as gender and blood group were recorded by the participants in the provided well-structured questionnaire. And as the sample size of Rh negative blood group was too small that we took only Rh positive types of blood group i.e. A, B, O and AB only. The study was conducted by double blinding method in order to rule out any bias towards the results. The data was collected by one investigator whereas the data was analysed by the other and then it was compiled. Once the data was collected, data entry was done in Microsoft excel and appropriate statistical method such as Chi^2 test was utilized to evaluate the results.

Results:

Out of 110 participants, 50 were males and 60 were females.

TABLE 1. Distribution of lip print patterns in the study group.

TYPES		MALE	MALES%	FEMALE	FEMALE %	TOTAL
TYPE I	VERTICAL	22	55	18	45	40
TYPE II	BRANCHING	14	53.84	12	46.16	26
TYPE III	INTERSECTING	6	33.33	12	66.66	18
TYPE IV	RETICULAR	0	0	4	100	4
TYPE V	IRREGULAR	8	36.36	14	63.63	22
	TOTAL	50		60		110

In the above table, illustrating the distribution of lip prints pattern shows that the most common lip print type being the vertical type in males whereas intersecting type is more common in females. Overall the most common pattern of lip print being the Type I i.e. vertical amongst the study population.

TABLE 2.Distribution of blood groups in the study group			
Blood group	MALE	FEMALE	TOTAL
A	10	22	32
B	16	14	30
O	20	22	42
AB	4	2	6
TOTAL	50	60	110

Table no 2. Illustrates the distribution of blood groups in the study population which establishes the fact that blood group O is the most prominent blood group in both males and females whereas blood groups A and O both are equally common in females who participated in the study.

3.Distribution of fingerprints in the study group.				
sr. no.	**Type of finger print Pattern**	**No. of individuals exhibiting the pattern**	**males**	**females**
1	Arch	16	6	10
2	Loop	62	28	34
3	Whorl	32	16	16
	TOTAL	110	50	60

Table no. 3 illustrates the distribution of the fingerprints pattern seen in the study group, according to the data loop pattern is the most common type of pattern found during the study whereas loop pattern is common in both males and females.

4.Distribution of blood group and lip print pattern combinations in the study group						
TYPES		BLOOD GROUP				
		A	B	O	AB	TOTAL
TYPE I	VERTICAL	4	16	20	0	40
TYPE II	BRANCHING	8	4	12	2	26
TYPE III	INTERSECTING	6	2	8	2	18
TYPE IV	RETICULAR	2	2	0	0	4
TYPE V	IRREGULAR	12	6	2	2	22
	TOTAL	32	30	42	6	110

Table no. 4 shows the relationship between blood groups and various patterns of lip prints and it suggests that combination of blood group O & lip print type I is the commonest among the various combinations of blood group and lip print pattern which is followed by combination of blood group B & lip print type I.

5.Distribution of finger and lip print pattern combinations in the study group

Finger print patterns	Lip print patterns					
	I	II	III	IV	V	TOTAL
Arch	6	6	1	1	2	16
Loop	24	13	12	1	12	62
Whorl	10	7	5	2	8	32
TOTAL	40	26	18	4	22	110

Table no. 5 shows relationship between the finger prints and the lip print pattern, it can be concluded from the table that combination of loop pattern & lip print type I is seen in majority of participants immediately followed by loop pattern & lip print type II pattern.

6. Distribution of blood group and finger print pattern.				
BLOOD GROUP	FINGERPRINTS			
	ARCH	LOOP	WHORL	TOTAL
A	4	18	10	32
B	8	16	6	30
O	4	23	15	42
AB	0	5	1	6
TOTAL	16	62	32	110

Table no.6 illustrates that loop print & blood group 'O' combination is the commonest followed by loop print & blood group 'A' combination.

7.Distribution of blood groups, finger and lip print pattern combinations in the study group					
Finger print – lip print pattern combination	Blood group Types				
	A+	B+	AB+	O+	TOTAL
Arch – Type I	0	4	0	2	6
Arch – Type II	2	3	0	1	6
Arch – Type III	0	0	0	1	1
Arch – Type IV	0	1	0	0	1
Arch – Type V	2	0	0	0	2
Loop – Type I	4	9	0	11	24
Loop – Type II	3	1	2	7	13
Loop – Type III	4	2	2	4	12
Loop – Type IV	1	0	0	0	1
Loop – Type V	6	4	1	1	12
Whorl – Type I	0	3	0	7	10
Whorl – Type II	3	0	0	4	7
Whorl – Type III	2	0	0	3	5
Whorl – Type IV	1	1	0	0	2
Whorl – Type V	4	2	1	1	8
TOTAL	32	30	6	42	110

Table no. 7 comprises of relation between all the variables i.e. blood group, Lip print and Finger print together and conclude that loop finger print –lip print type I – blood group 'O' is the combination occurring the most and which is immediately followed by loop finger print–lip print type I – blood group 'B' combination.

Discussion:

Most common blood group in Indian context is "O' blood group followed by 'B' whereas our study supported the commonest blood group 'O' followed by 'A' blood group which contradicted the second most common blood group which is 'B' from the study conducted by Agrawal A, Tiwari AK, Mehta N, et al.[8] combination of blood group 'O' & loop pattern is found most common which is consistent with study of N. Srilekha et al.[9] and in contrast with the study conducted by Bharadwaja A, et al.[10]

Our study showed that Type I lip pattern-O+ blood group combination to be predominant which is consistent with study by N. Srilekha et al.[9] and in contrast with the study of Verghese et al.[11] It was found out that lip print type I & loop finger print is the commonest in our study but which was in contrast with the study conducted by Nagasupriya et al.[12]

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Out of all the studies conducted using the variables of lip print, finger print, and blood group the only study which was found to be similar to this current study is the study done by N. Srilekha et al.[9] This study concluded that loop finger print-lip print type I-blood group 'O' is the commonest combination in comparison with the loop finger print pattern-Type IV lip print-B+ blood group and loop finger print pattern-Type I lip print -O+ blood group were predominant in the study conducted by N. Srilekha et al.[9]

Conclusion:

Fingerprints have been used since centuries for detection of the criminals in various cases and still being used and found effective in solving the cases. Other variables of the study i.e. lip prints, blood grouping are all very much important in their respective fields but from the study conducted we didn't get any proof significantly higher to establish any relation between these individual variables. Hence all the above variables cannot be used collectively as a whole to ease out any forensic investigation but instead each variables should be used individually as it's going on since centuries.

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