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A Study of Dactylography and Cheiloscopy Patterns and Their Relationship with ABO Blood Groups

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Abstract

Background: *Establishing a person's identity is a very important process in civil and criminal cases. Dental, fingerprint and DNA comparisons are probably the most common techniques allowing fast and secure identification processes. However, in certain circumstances related to the scene of the crime or due to lack of experienced personnel, these techniques might be unavailable; so there is still an increasing need for reliable alternative methods of establishing identity.*

Aim: *To study correlation between lip print pattern, finger print pattern and ABO blood group.*

Materials and Methods: The study group consisted of 141 males and 105 females who were aged between 20–40 years. 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. The results were statistically analyzed by using Chi–square test.

Results: *Complete vertical lip print, loop finger print pattern, O+ blood group were predominant among individual groups. O+ blood group-type I lip print combination, loop finger print pattern-type IV lip print pattern combination, O+ blood group-loop finger print pattern combination and both B+ blood group-loop finger print pattern- type IV lip print pattern combination and O+ blood group-loop finger print pattern-type I lip print pattern were predominant.*

Conclusion*: Though lip prints, finger prints and blood groups had their own specificities, correlation of the three parameters did not show any significance.*

Key words- *Cheiloscopy, Blood groups, Dactylography, Personal identification.*

INTRODUCTION

Personal identification is becoming increasingly important not only in legal medicine but also in criminal investigation, identification and Genetic Research [1]. A wide range of methods are available for this purpose out of which, the best and most often used is fingerprints. Dactylography also known as finger prints has been successful in field of Forensic science to identify individuals for both civil and criminal purposes. An alternative method of identification is cheiloscopy, which is the study of the grooves and furrows present on the red part of the human lips. This biological phenomenon was first noted by anthropologists. R. Fischer was the first to describe it in 1902. Lip prints are unique as finger prints and do not change during the life of a person.[2] It has been verified that they recover after undergoing alterations like trauma, inflammation and diseases like herpes and that the disposition and form of the furrows does not vary with environmental factors. The lip prints of parents and children and those of siblings have shown some similarities. It has also been suggested that variations in patterns among males and females could help in sex determination. In 1967, Santos was the first person to classify lip grooves. He divided them into four types namely: [3]1.Straight line 2.Curved line 3.Angled line 4.Sine-shaped curve Suzuki and Tsuchihashi, in 1970, devised a classification method of lip prints, which is as follows:[4] Type 1 - A clear-cut groove running vertically across the lip Type 2 - Partial-length groove of Type I,Type 3 - A branched groove Type 4 - An intersected groove, Type 5 -A reticular pattern Type 6 -Other pattern.

MATERIALS AND METHODS

The study sample included 246 individuals, of which 141 were males and 105 were females, who were aged between 20 – 40 years. Red and brown coloured lip stick, cellophane tape, white A3 sized paper, blue inked stamp pad, and magnifying lens were the materials which were used. The glued portion of the cellophane tape was used to obtain the impression of the lip on to which lipstick was applied. This record was immediately transferred on to paper by gently sticking the cellophane tape. Exclusion criteria for lip prints: Subjects undergoing orthodontic treatment, congenital lip abnormalities, inflammation of or trauma to lips, hypersensitivity to lipsticks. Here the stamp pad of CAMLIN Company of size of 157 x 96 mm was used to take the finger prints. The palm and fingers of both the hands were smeared and pressed firmly on a durable plain paper laid down on a pressure pad which consisted of ten different blocks for ten fingers of both right and left hand. The finger prints were of both rolled and plane pattern. Primary patterns (Loops, whorls and Arches) were observed along with the total ridge counting with the help of a powerful hand lens. Exclusion criteria for finger prints: Subjects with syndromes and permanent scars on their fingers or thumbs, with any hand deformities caused by injuries were excluded.

The name, age, sex and the blood group of the candidate were noted down. If the blood group wasn't known then the blood group was identified

using antiserum A, B and D. For analysis, each lip print was topographically divided into six areas, and only the central portion of the lower lip was considered. For recording finger prints were examined by using magnifying glass, classified, and analyzed. Lip prints were classified based on classification given by Suzuki and Tsuchihashi and finger prints were classified, based on Michael's and Kucken's classification. The results were statistically analyzed by using Chi–square test.

STATISTICAL METHODOLOGY

This study was done using Software Package for Social Service (SPSS). The frequency of each lip print type was tabulated and the percentage of each type was calculated. The chi square ($\chi 2$) test was applied to see whether there was any association between the lip print types and blood groups. It is calculated as: $\chi 2 = \Sigma$ (Observed frequencies – Expected frequencies) 2

Expected frequencies Where, Σ denotes summation "p" value is probability role at 0.05 level of significance for corresponding degree of freedom. $p<0.05$ is significant, $p>0.05$ is not significant

RESULTS

Within individual groups: Complete vertical (34.48%) [Table-1] loop finger print pattern (66.77%) [Table-2] and O+ blood group (44%) [Table-2] were the most common parameters which were seen.

Inter-group comparison between two groups: O+ blood group-Type 1 lip print combination (15.44%), loop finger print pattern- Type 5 lip print pattern combination (25.9%), O+ blood group-loop finger print pattern combination were predominant (73.50%). Statistical analysis showed no significance [Table1-4].

Inter-group comparison between three groups: Both B+ blood group-loop finger print pattern-Type IV lip print pattern combination and O+ blood group-loop finger print pattern-Type 1 lip print pattern combination (67.07%) were predominant [Table-8].

Gender: In both males and females, O+ blood group, loop finger print pattern were predominant. Females exhibited Type 1 lip print pattern, whereas males showed both Type 2 and 5 patterns predominantly [Table-1-7].

Table-1 Distribution of Blood groups according to Gender.

Blood groups	Male		Female		Total	
A	38	26.95%	28	26.67%	66	26.82%
B	24	7.02%	24	22.86%	48	19.52%
AB	12	8.51%	12	11.43%	24	9.75%
O	67	47.52%	41	39.04%	108	43.91%
Total	141		105		246	

Table-2 Showing Distribution of subjects according to Rh factor of their Blood Group

Blood groups	Rh +positive		Rh -negative	
A	63	28%	3	14.28%
B	42	18.67%	6	28.57%
AB	21	9.34%	3	14.28%
O	99	44%	9	42.85%
Total	225	91.47%	21	8.53%

Table-3 Showing Distribution of Primary Finger print patterns of all the fingers in both the hands

Ridge Pattern	Total numbers	Percentage%
Loops	1629	66.77%
Whorl	670	27.45%
Arches	141	5.78%
Total	2440	100%

Table-4 Showing the number of the finger print patterns among Males and Females

Finger print patterns	Male			Female			Total
	Left	Right	Total	Right	Left	Total	
Loops	471 (30.74%)	435 (28.39%)	906 (59.13%)	306 (19.97%)	320 (20.88%)	626 (40.8%)	1532
Whorl	171 (23.39%)	216 (29.55%)	387 (52.94%)	188 (25.71%)	156 (21.34%)	344 (47.05%)	731
Arches	63 (35.59%)	54 (30.51%)	117 (66.10%)	21 (11.86%)	39 (22.03%)	60 (33.89%)	177
Total	705 (28.89%)	705 (28.89%)	1410 (57.78%)	515 (21.11%)	515 (21.11%)	1030 (42.22%)	2440

Table-5 Showing Distribution of Fingerprint Patterns among A, B, AB, O blood groups with Rh factors

Finger print patterns	Blood group A		Blood group B		Blood group AB		Blood group O	
	Rh+ve	Rh-ve	Rh+ve	Rh-ve	Rh+ve	Rh-ve	Rh+ve	Rh-ve
Total loops	366 (60%)	24 (48%)	278 (70.55%)	37 (56.06%)	137 (66.18%)	15 (45.45%)	760 (73.50%)	12 (26.08%)
Total whorls	192 (31.47%)	18 (36%)	86 (21.82%)	17 (25.75%)	61 (29.46%)	12 (36.36%)	258 (24.95%)	26 (56.52%)
Total arches	52 (8.52%)	8 (!6%)	30 (7.61%)	12 (18.18%)	9 (4.34%)	6 (18.18%)	16 (1.54%)	8 (17.39%)
Total	610	50	394	66	207	33	1034	46

[Table-6]: Distribution of lip print patterns in the study group

Sr. no	Type of lip print Pattern	No.of individuals exhibiting the pattern	Females (n=105)	Males (n=141)
1	Type -1Complete verticle	84(30.48%)	64(52.38%)	20(14.18%)
2	Type-2 Incomplete verticle	42(8.13%)	20(9.52%)	22(7.09%)
3	Type -3Branched	29(10.97%)	10(9.52%)	19(12.05%)
4	Type 4Intersecting	21(18.29%)	15(21.90%)	6(15.6%)
5	Type-5Reticular	61(23.98%)	26(22.85%)	35(24.82%)
6	Type-6Undetermined	9(8.13%)	6(11.42%)	3(5.62%)

[Table no -7] Distribution of blood group and lip print pattern combinations in the study group (n = 246)

Blood group Types	Lip print Patterns					
	Type-1	Type-2	Type-3	Type-4	Type-5	Type-6
A+ve	20(8.13%)	12(4.87%)	3(1.22%)	5(2.03%)	23(9.34%)	0(0%)
A-ve	1(0.40%)	0(0%)	1(0.40%)	1(0.40%)	0(0%)	0(0%)
B+ve	10(4.06%)	9(3.65%)	15(6.09%)	3(1.22%)	2(0.81%)	3(1.22%)
B-ve	3(1.22%)	1(0.40%)	0(0%)	0(0%)	2(0.81%)	0(0%)
AB+ve	8(3.25%)	2(0.81%)	5(2.03%)	0(0%)	4(1.62%)	2(0.81%)
AB-ve	1(0.40%)	0(0%)	0(0%)	1(0.40%)	1(0.40%)	0(0%)
O+ve	38(15.44%)	17(6.91%)	5(2.03%)	10(4.06%)	27(10.97%)	2(0.81%)
O-ve	3(1.22%)	1(0.40%)	0(0%)	1(0.40%)	2(0.81%)	2(0.81%)

[Table-8]: Distribution of blood groups, finger and lip print pattern combinations in the study group (n = 246)

Finger print – lip print pattern combination	Blood group Types							
	A+ve	A-ve	B+ve	B-ve	AB+ve	AB-ve	O+ve	O-ve
Arch- Type-1	115(46.7%)	14(5.6%)	70 (28.%)	12 (4.87%)	40 (16.26%)	5 (2.03%)	165 (67.07%)	12 (4.87%)
Arch- Type-2	60(24.39%)	0(0%)	32 (13%)	1 (0.41%)	24 (9.75%)	0 (0%)	123 (50%)	0 (0%)
Arch -Type-3	34(13.82%)	2(0.82%)	28(11.38%)	4(1.62%)	22(8.94%)	2(0.82%)	65(26.42%)	1(0.41%)
Arch -Type-4	45(18.29%)	2(0.82%)	24(9.75%)	5(2.03%)	20(8.13%)	3(1.22%)	43(17.47%)	4(1.62%)
Arch -Type-5	17(6.92%)	0(0%)	10(4.06%)	0(0%)	5(2.03%)	0(0%)	34(13.82%)	0(0%)
Arch -Type-6	15(6.09%)	5(2.03%)	7(2.84%)	5(2.03%)	10(4.06%)	2(0.82%)	18(7.31%)	4(1.62%)
Loop- Type-1	80(32.52%)	9(3.65%)	46(18.69%)	12(4.87%)	6(2.43%)	5(2.03%)	124(50.40%)	8(3.25%)
Loop -Type-2	60(24.39%)	4(1.62%)	32(13%)	7(2.84%)	14(5.69%)	4(1.62%)	125(50.81%)	3(1.22%)
Loop -Type-3	40(16.26%)	0(0%)	27(10.97%)	0(0%)	12(4.87%)	0(0%)	74(30.08%)	0(0%)
Loop- Type-4	30(12.19%)	3(1.22%)	15(6.09%)	0(0%)	13(5.28%)	0(0%)	35(14.22%)	2(0.82%)
Loop- Type-5	17(6.92%)	0(0%)	20(8.13%)	2(0.82%)	2(0.82%)	0(0%)	27(10.97%)	0(0%)
Loop- Type-6	15(6.09%)	2(0.82%)	7(2.84%)	0(0%)	4(1.62%)	1(0.41%)	35(14.22%)	0(0%)
Whorl -Type-1	22(8.94%)	3(1.22%)	32(13%)	6(2.43%)	14(5.69%)	3(1.22%)	32(13%)	3(1.22%)
Whorl -Type-2	20(8.13%)	4(1.62%)	14(5.69%)	2(0.82%)	7(2.84%)	3(1.22%)	42(17.07%)	4(1.62%)
Whorl -Type-3	13(5.28%)	0(0%)	8(3.25%)	3(1.22%)	6(2.43%)	2(0.82%)	36(14.63%)	1(0.41%)
Whorl- Type-4	14(5.69%)	0(0%)	15(6.09%)	0(0%)	2(0.82%)	0(0%)	24(9.75%)	1(0.41%)
Whorl -Type-5	10(4.06%)	2(0.82%)	5(2.03%)	4(1.62%)	2(0.82%)	1(0.41%)	20(8.13%)	2(0.82%)
Whorl -Type-6	3(1.22%)	0(0%)	2(0.82%)	3(1.22%)	4(1.62%)()	2(0.82%)	12(4.87%)	1(0.41%)

Fig no -1 Showing lip prints among Male ,Female and Twins subjects

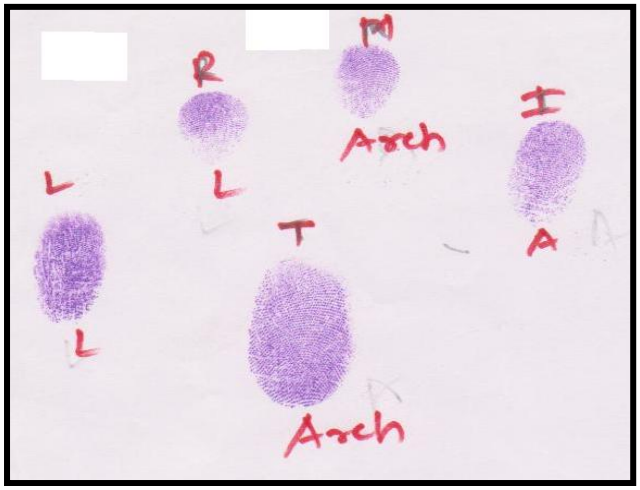

Fig .2 Showing patterns of Fingerprints

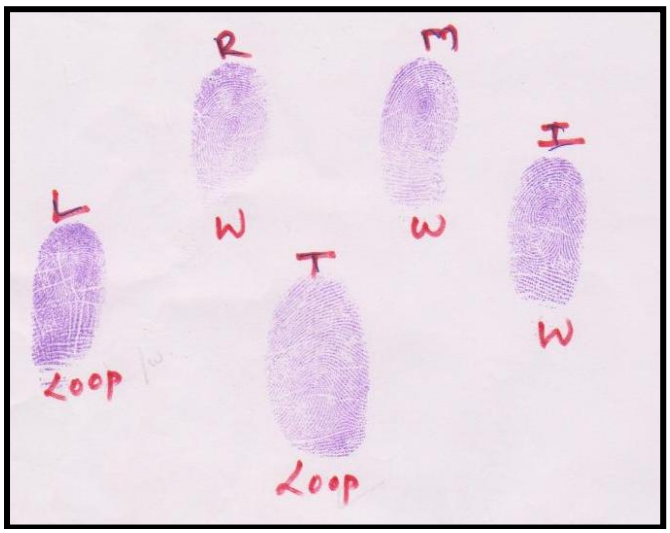

Fig .3 Showing patterns of Fingerprints

Fig 2 and 3 showing pattern of finger prints

L – Loop

A – Arch

W – Whorl

R – Ring finger

M – Middle finger

I – Index finger

T – Thumb

L – Little finger

DISCUSSION

Human identification is a mainstay of civilization and the identification of unknown individual always has been of paramount importance to society. The traditional methods for personal identification include anthropometry, fingerprints, sex determination, estimation of age, measurement of height, identification with a specific individual, and differentiation by blood groups.[1] . There are many other methods of personal identification other than those traditional methods. Lip Print Pattern and Radiographic configuration of Frontal Sinus are one among the other methods, which can be used as an aid in personal identification because of their Uniqueness. These two methods of identification can be compared with the validity of dactyloscopic examination as said by J. Kasprzak [5].

Lip prints can be a useful adjunct to fingerprints in the identification process. In most of the countries across the globe, efficient machinery is already in place for the detection, recording and matching of fingerprints of a suspect. Similar equipment can

be employed for lip prints and fingerprint experts can be trained to perform identification exercises. This can greatly enhance the apprehension of suspects and their conviction in the courts of law. Saraswathi et al., [14] found that intersecting pattern of lip print was more common in both males and females. Sharma et al., [6] concluded that Type 1 and Type 2' lip patterns were most commonly seen in females and that Type 5 was seen most commonly in males. In contrast to the above studies, our study showed Type 1 to be predominant in females and Types 2 and 5 to be predominant in males. It was observed that both B+ blood group-loop finger print pattern-Type IV lip print pattern and O+ blood group-loop finger print pattern-Type I lip print pattern (6 out of 54 each, 11.1%) were predominant findings of study done by Piyush A et al., [7] Combination of O+ and loop was more prevalent in our study, followed by combination of B+ and loop, which was reverse of the results which were obtained in studies done by Bhavana et al., [12] and Bharadwaja et al., [8]. Type IV lip pattern -loop type combination was common, whereas in the study done by Nagasupriya et al., [13], Type II lip pattern-loop type combination was more common. The current study showed Type I lip pattern-O+ blood group combination to be predominant, which was not inconsistent with findings of Telagi et al., [9] and Verghese et al., [10].

The review of literature revealed no study which was conducted, which had correlated the lip prints, finger prints and blood groups. Verma et al., [11] correlated lip print patterns with respect to gender, ABO blood groups and Intercommissural Distance (ICD) and found no correlation of lip print pattern with other variables.

CONCLUSION

The present study compared the types of lip prints and finger prints with the ABO and Rh blood groups of the subjects. It was found that there was no correlation in the total subject population. Therefore we should not predict the blood group by her/his lips print and finger prints. Lip print patterns were found to be unique even in twins. It can be said that the lip print and finger print pattern can be used as additional weapons for personal identification because of their uniqueness.

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