

Analysis of Thumb Print Patterns in Relation with Blood Group among Medical Students: A Cross- Sectional Study

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Abstract

Background: Dermatoglyphics or fingerprint is defined as the systematic study of natural occurring epidermal ridges and their arrangement on palm, sole and digits. A person's fingerprint is permanent even before they are born, at about 21st week fingerprint pattern is completely developed. In 1901 Karl Landsteiner discovered Blood group system. As it is observed that dermatoglyphics and blood group typing have genetic inheritance, so we have made an effort to analyse thumb print patterns in relation with blood group. **Material & Methods:** A Descriptive cross sectional study was accomplished among 200 medical students from 1st and 2nd prof MBBS studying in SKMC Muzaffarpur. After obtaining written informed consent thumb print patterns were recorded using the violet stamp pad of camlin company size 15.9cm: 9.6cm. **Result:** Majority of subjects belongs to B (88) blood group followed by O (68), A (24) and AB (20). The majority (94%) belong to the Rh +ve blood group. Loop patterns were the most common primary thumbprint pattern followed by whorls and arches in both males & females in all blood groups. In our study we found insignificant relation between fingerprint (thumb) patterns and ABO blood group typing. **Conclusion:** Our results suggest that thumb print and ABO blood groups can only be assessed independently to establish the identity of an individual.

Keywords: Dermatoglyphics, ABO blood group typing, Thumbprint, Identity.

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Introduction

Individuals are defined by their identity in the form of physical characteristics, functional or psychic, normal or pathological. Various ways by which identity of an individual can be work out are fingerprints, bite marks, lip prints, foot prints, DNA matching, iris imaging and many more[1]. Personal identifications becomes critical in many situations like civil, criminal, commercial and latest in financial transaction frauds, to appear for all competitive exams where the identification becomes very important[2].

Harold Cummins invent the term 'Dermatoglyphics' in 1926, which is defined as the systematic study of epidermal ridges on palm, sole and digits. It is considered as most effective, reliable and easily reproduced evidence of identification[3]. Over the past many decades, dermatoglyphics is considered as one of the important tool in knowing primary queries in genetics, evolution, biology, medicine and the personal identity[4].

A person's fingerprint is permanent even before they are born, around 6-8 weeks of embryological life the volar pads are formed that will develop as fetal hand. Around 10-12 weeks the volar pad begins to recede, at 13th week skin ridges appear. At about 21st week of intrauterine life the fingerprint pattern is completed[5]. This ridge pattern are decided partly by ancestry and partly by environmental impact which produce stress and tension in their growth during fetal life. Fingerprint patterns are very unique in each individual even the fingerprints of two identical twins are different.

The chance of two persons having identical fingerprints is about one in 64 thousand millions[6].

Fingerprint matching techniques were started in 16th century. But it was Henry Fauld in 1880 who suggested the individuality and distinctiveness of fingerprint. Herschel contributed to the modern fingerprinting identification[7]. In the 19th century Sir Francis Galton conducted elaborative studies and classified the types of fingerprints depending upon primary pattern as loops whorls and arches[6].

In 1901 Karl Landsteiner discovered Blood group system. Few years' later "Rhesus" system was defined by Landsteiner and Wiener in 1937. Out of nearly 30 human blood group systems, recognized by the International Society of Blood Transfusion, clinically only "ABO" and "Rhesus" groups are of major importance. "ABO" system is further elaborated as "A", "B", "AB", and "O" blood groups on the basis of presence or absence of corresponding antigen in plasma. "Rhesus" system is classified as Rh +ve and Rh-ve on the basis of presence and absence of "D" Antigen[8]. It is studied that few diseases are common in certain blood groups e.g. gastric ulcer in blood group A, duodenal ulcer in Blood group O[9,10].

As it is observed that dermatoglyphics and blood group typing have genetic inheritance, few studies have shown connection between fingerprint pattern and blood group[11,12]. So we have made an effort to make further advance to analyse thumb print patterns in relation with blood group.

Objective

To evaluate the relationship between thumbs prints patterns and blood groups among medical student.

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Material and Methods

An organization based cross sectional descriptive study was accomplished among 200 medical students studying in 1st prof and 2nd prof MBBS at Sri Krishna Medical College. The students who had given consent for the study were only included whereas the students having either any congenital, acquired permanent scar or any disease which interferes with the finger print pattern were excluded. The study got ethical clearance from S.K.Medical college, Muzaffarpur. Methodology includes collection of fingerprint in plain white sheet of A4 size and all the details of the individual, such as name, age, sex, blood groups and blocks for both the thumb fingerprint were noted. After proper washing, cleaning and drying of both the hands the study population were asked to put their thumb impression of both hands on a given paper by using stamp pad. The entire process was supervised by the investigators. After obtaining the prints all the fingerprint

patterns were analyzed by the magnifying lens and were grouped under three basic Patterns as loops, whorls and arches according to Galton's Classification[6].

Results

This study of fingerprinting was done in Department of Anatomy, S K Medical College, Muzaffarpur. Total number of 200 students participated in this study out of which 98 were male and 102 were female.

Table 1 is showing the distribution of blood group according to gender, majority of subjects belongs to B (88) group followed by O (68), A (24) and AB (20). Blood group B shows the highest frequency in male (52) followed by O and equal frequency of A and AB. Though in female the most common group is O followed by B, A and AB.

Table 1: Distribution of blood groups of subjects according to gender

Blood Group	Male	Female	Total
A	10 (5)	14 (7)	24
AB	10 (5)	10 (5)	20
B	52 (26)	36 (18)	88
O	26 (13)	42 (21)	68
Total	98	102	200

Note: Figures in parenthesis indicate percentage

In Table 2: 188 subjects belongs to Rh positive and 12 were Rh negative. B group (86, 43%) had the highest ratio among Rh positive followed by O (58, 29%), A(24, 12%) and AB had the least frequency i.e (20, 10%).

Table 2: Distribution of blood groups of subjects according to Rh factor

Blood Group	Rh Positive (%)	Rh negative (%)
A	24 (12)	0
B	86 (43)	2 (1)
AB	20 (10)	0
O	58 (29)	10 (5)
Total	188	12

Among Rh -ve O blood group is most common i.e (10, 5%) followed by B -ve i.e (2, 1%). A negative & AB negative group were not found. In the above mentioned Table 3 : the loop had the highest ratio of 55.5% followed by Whorl i.e 30% and Arch 14.5%.

Table 3: Distribution of fingerprint pattern (both Thumbs) among the subjects

Fingerprint pattern	Total No.	Percentage
Loop	222	55.5
Whorl	120	30
Arch	58	14.5
Total	400	100

Table 4 showing the frequency of Whorl and loop were found higher in female 56.67% and 50.46% respectively in reference to male where loop was 49.54% and Whorl was 43.33%. Arch was found higher in male (58.63%) in comparison to female (41.37%).

Table 4: Distribution fingerprint (both Thumbs) pattern according to gender.

Fingerprint pattern	Male (%)	Female (%)
Loop	110(49.54)	112 (50.46)
Whorl	52 (43.33)	68 (56.67)
Arch	34 (58.63)	24(41.37)

This Table 5 shows the highest frequency of loop was found in all Rh +ve and Rh -ve blood group. B positive blood group had the highest number of all the three patterns among Rh +ve blood group. Among Rh -ve, loops were more common in O negative followed by B negative. The Arch was second highest in O negative and the least common was Whorl in O negative. A negative and AB negative were not found in our study.

Table 5: Distribution of fingerprint (both Thumbs) pattern among different blood group with Rh factor.

Finger print pattern	A+	B+	B-	AB+	O+	O-
Loop	26	92	4	22	64	14
Whorl	16	58	0	6	38	2
Arch	6	22	0	12	14	4

Discussion

This study was done on 200 Medical students, having different ABO blood groups. The aim was to study distribution of fingerprint (thumb) pattern among the subjects having different ABO and Rh blood group typing and correlate any relation between their characters and blood group.

In this study bulk of the subjects were Rh +ve (94%) most common blood group was B+ve followed by O+ve, A+ve, AB+ve. While Rh -ve was only 6% (O-ve 5% & B-ve 1%). Similar findings were reported

by A.A.Mehta and A.A.Mehta[13] and Desai et.al[14]. The similar outcome were also reported by Khalid and Qureshi[15], Ghasemi et.al[16]. On the other hand, Sudikshya KC et.al[4], Bharadwaja et.al[17]. and Prateek Pillai[18] found higher incidence of blood group "O", followed by "B", "A", and "AB" blood groups.

In present study, maximum subjects were Rh +ve (94%) in all the groups in contrast to Rh -ve (6%). This is in accordance with all the major studies so far[4,12-18].

In this study, “Loops” were most commonly obtained fingerprints 55.5%, followed by “Whorls” 30% & “arches” 14.5% in both the genders, that is in accordance to all Previous works[4,12-18]. Chi square test applied, shows that the relation between primary patterns of fingerprint and gender is statistically insignificant as $p > 0.05$.

When compared between two genders, frequency of whorl and loop were higher in females and arches were found more in male. This result is in accordance with the study of Sangam et al[19]. except for the whorl which are more in males (44%) than in females (34.4%) in their study.

In present study we found higher frequency of loop in all the blood types. Our study is in resemblance with the study of A. A. Mehta and A. A. Mehta[13], but they reported highest percentage of loops in blood group “O” (61.80%) and lowest percentage in blood group “AB” (47.27%). Deopa et al[20]. reviewed highest percentage of loops in “B” blood group (62.2%) and lowest in “A” blood group (47.9%). Fayrouz et.al[2]. reviewed high frequency of loops in thumb, index finger & ring finger in all Blood groups in Libyan medical students. In this present study we consider only both the thumbs and found higher frequency of loop in all the blood groups

In this study we found, Whorl were also more common in “B” blood group followed by Blood group “O”, “A” and “AB”, which is in resemblance with the study of A. A. Mehta and A. A. Mehta[13]. The whorls were common in Rh +ve blood group than Rh -ve Blood group. This is in resemblance with the result of Bharadwaja et.al[17]. In present study, arches are highest in blood group “B” and lowest in “A”, and in blood group “AB” it is higher than whorl. In the study of Sudikshya KC et.al[4]. incidence of arches was highest in blood group “AB” and lowest in blood group “A”.

Conclusion

This study was done to analyse and correlate fingerprint(thumb) patterns with blood group of an individual. It is universally known that fingerprints are unique for everyone and never changes from birth till death, this study is an attempt made to associate fingerprint patterns (thumb) with gender and blood groups, so that it may increase the authenticity of fingerprints in identification of individuals.

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