

A Study of Finger Prints Pattern in Relation to ABO, RH Blood Groups among Medical Students of AJK Medical College, Muzaffarabad (AJK)

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ABSTRACT

Objective: To find out the relation of pattern of finger prints with blood groups among medical students.

Study Design: Cross sectional study.

Place and Duration of Study: This study was conducted at Azad Jammu Kashmir Medical College Muzaffarabad (AJK) in the department of Forensic Medicine & Toxicology from Feb, 2013 to March, 2013.

Materials and Method: A total of 200 medical students of 1st year and 2nd year MBBS of AJK Medical College Muzaffarabad with known blood groups were included in the study. Finger prints were taken by stamp pad method.

Results: Loops are the most common while arches are the least common occurring finger prints. Loops are predominant in blood group B and lowest in blood group AB and percentage of loops were highest in Rh-positive individuals and lowest in Rh- negative individuals.

Conclusion: There is an association between distribution of finger print pattern and blood groups.

Key words: Finger prints, Blood groups, Whorls, Loops, Arches.

INTRODUCTION

Identification means determination of individuality of a person. It may be complete (Absolute) or incomplete (partial).¹

There are different parameters of identification both in living as well as in dead that defines the individual. Such as speech, Gait, Handwriting, iris colors, finger prints, DNA profiling etc. Biometric technologies that is based on one's individual for human identification has gained a key role now a days. Fingerprints have been found on ancient Babylonian clay tablets, seals, and pottery.^{2,3,4,5} They have also been found on the walls of Egyptian tombs and on Minoan, Greek, and Chinese pottery, as well as on bricks and tiles from ancient Babylon and Rome. Some of these fingerprints were deposited unintentionally by the potters and masons as a natural consequence of their work, and others were made in the process of adding decoration. However, on some pottery, fingerprints have been impressed so deeply into the clay that they were possibly intended to serve as an identifying mark by the maker. Fingerprints were used as signatures in ancient Babylon in the second millennium BCE. In order to protect against forgery, parties to a legal contract would impress their fingerprints into a clay tablet on which the contract had been written.

The skin of the balls of finger and thumbs is covered with characteristic ridges. The ridges pattern depends upon cornified layer of epidermis as well as dermal papillae. The characteristic pattern of ridges are

differentiated in their primitive forms during third & fourth months of fetal life.⁶

Finger prints are constant and individualistic and forms the more reliable criteria for identification.⁷ Even the finger prints of twins are not similar. Finger prints are classified into three primary patterns.⁸

i. Loops. ii. Whorls. iii. Arches.

Finger prints follow the Locard's principle of exchange. The secretions in the finger prints contain residues, various chemicals and their metabolites which can be detected and used for Forensic purpose. If they are found on scene of occurrence, then the suspects, can be easily identified. Human fingerprints are detailed, unique, difficult to alter, and durable over the life of an individual making them suitable as long-term markers of human identity and may be employed by police or other authorities to identify individuals who wish to conceal their identity, or to identify people who are incapacitated or deceased and thus unable to identify themselves, as in the aftermath of a natural disaster. Fingerprint analysis, in use since the early 20th century, has led to many crimes being solved.⁹ This means that many criminals consider [gloves](#) essential.^{10,11}

Deliberate impressions of fingerprints may be formed by ink or other substances transferred from the peaks of friction ridges on the skin to a relatively smooth surface such as a fingerprint card.¹²

Blood itself is an extremely important entity in the medico legal practice which alone or along with other trace evidences can play a clinching role to unfold different chemical problems. Blood groups system was discovered by Karl Landsteiner in 1901.¹³ There are

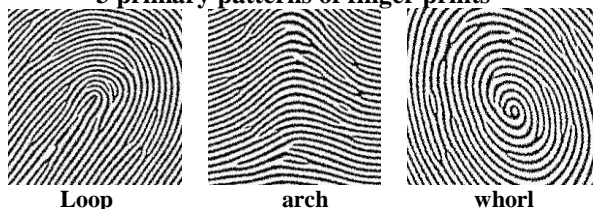
several quite distinct and unrelated types of differences between the bloods of different individuals. There are due to

- (1) Red cell antigens responsible for ABO, MN, RH etc.
- (2) Blood proteins such as haptoglobins, Ge, Gmetc.
- (3) Polymorphic enzymes
- (4) White cell antigens.

The red cell antigens are identified by simple objective tests of which ABO and Rh system are for major importance. The genetics of blood groups has proved that specific disease are common in particular blood groups eg duodenal ulcer in "O" and gastric ulcer in "A" blood groups.¹⁴

Regarding blood groups systems and finger prints extensive research work has been carried out but to co-relate between these two few studies has been carried out.

3 primary patterns of finger prints



MATERIALS AND METHODS

This study was conducted in 2013 in the department of Forensic Medicine & Toxicology at AJK Medical College Muzaffarabad. Two hundred MBBS Medical students were taken out/Ofwhich 70 were males and 130 were females. All the students were healthy with known blood groups and their age ranges from 19 to 21 years. Consent was taken from study subjects. Each subject was asked to wash the hands thoroughly with soap and after dry them was asked to press the fingers on the stamp pad and then to the paper sheet to transfer the finger print impression. The same method was repeated for all the finger of both hands. The paper sheet was coded with Name, Age, sex, blood group. Finger prints were analyzed with the help of magnifying lens and were identified as Lops, Whorls and Arches based on the appearance of ridge lines.

RESULTS

Table No.4: Distribution of pattern of finger prints among subjects of A,B,AB,O and Rh blood groups:→(n=2000).

Type of finger prints	Blood Group "A"		Blood Group "B"		Blood Group "AB"		Blood Group "O"		Total
	Rh+ve	Rh-ve	Rh+ve	Rh-ve	Rh+ve	Rh-ve	Rh+ve	Rh-ve	
Whorl	69 (21.56%)	06 (30%)	22 (3.09%)	03 (30%)	54 (33.75%)	06 (60%)	145 (20.13%)	15 (30%)	320
Loops	230 (71.87%)	10 (50%)	635 (89.43%)	05 (50%)	97 (60.62%)	03 (30%)	515 (71.52%)	30 (60%)	1525
Arches	21 (6.56%)	04 (20%)	53 (7.46%)	02 (20%)	09 (5.62%)	01 (10%)	60 (8.33%)	05 (10%)	155
Total	320	20	710	10	160	10	720	50	2000

The study was conducted on 200 subjects out of which 130 were females and 70 were males.

Table No.1: Distribution of cases according to sex and blood groups.

Sex	Blood Groups				Total %
	A%	B%	AB%	O%	
Male	12 (6%)	25 (12.5%)	6 (3%)	27 (13.5%)	70 (35%)
Female	23 (11.5%)	52 (26%)	10 (5%)	45 (22.5%)	130 (65%)
Total	35 (17.5%)	77 (38.5%)	16 (8%)	72 (36%)	200 (100%)

Majority of the subjects 77 (38.5%) in the study belonged to blood group B followed by blood group O, A and AB which were 72 (36%), 35 (17.5%) and 16 (8%) respectively.

Table No.2: Distribution of cases according to Rh factor of blood groups.

Blood Group	Rh- Positive	Rh- Negative
A	32 (16%)	2 (1%)
B	71 (35.5%)	1 (0.5%)
AB	16 (8%)	1 (0.5%)
O	72 (36%)	5 (2.5%)
Total	191 (95.5%)	9 (4.5%)

Maximum 191 (95.5%) subjects in the study were Rh positive out of which 72 (36%) belonged to blood group O, 71 (35.5%) belonged to blood group B, 32 (16%) belonged to blood group A and 16 (8%) belonged to AB. Among Rh negative individuals 5 (2.5%) belonged to blood group O, 2 (1%) belonged to blood group A and 1 (0.5%) belonged to blood group B and 1(0.5%) belonged to blood group AB.

Table No.3: General distribution of primary finger prints pattern in all fingers of both hands:→(n=2000).

Pattern	Number	Percentage
Loops	1525	76.25%
Whorls	320	16%
Arches	155	7.75%
Total	2000	(100%)
Pattern	Number	Percentage

Frequency of Loops (76.25%) is highest in all blood groups followed by Whorls (16%) and Arches (7.75%) in ABO blood groups.

Frequency of Loops was highest in both the Rh positive and Rh negative subjects of ABO blood groups followed by Whorls and Arches except blood group AB where the frequency of Whorls in Rh-negative individuals were more.

Incidence of Loops varies between 30% (AB negative) to 60% (O-negative) blood groups. Blood group B showed highest Loops (89.43%) in Rh+ve while blood group O shows highest Loops (60%) in Rh-ve subjects. Moderate frequency of Whorls ranging between 33.75% (AB positive) to 3.09% (B positive) and 60% (AB negative) to 30% (in A,B,O negative) Were observed.

Arches were lowest ranging between 8.33% (O positive) to 5.62% (AB positive) and 20% (A and B negatives) to 10% (AB & O negatives)

Table No.5: Distribution of various finger print patterns in A,B,AB and O blood groups.

Blood Group	Whorls (%)	Arches (%)	Loops (%)	Total (%)
A	75 (22%)	25 (7.35%)	240 (70.5%)	340 (100%)
B	25 (3.47%)	55 (7.63%)	640 (88.88%)	720 (100%)
AB	60 (35%)	10 (5.86%)	100 (58.82%)	170 (100%)
O	160 (20.77%)	65 (8.44%)	545 (70.77%)	770 (100%)

It was observed that percentage of whorls was highest in blood group AB(35%) and lowest in B blood group(3,47%). Also percentage of Arches in blood group O was highest (8.44%) as compared to lowest in AB blood group (5.86%). Similarly percentage of Loops was highest in B blood group (88.88%) and lowest in AB blood group.(58.8%).

Table No.6: Pattern of finger prints in Rh-positive and Rh-negative blood groups.

Blood Group	Whorl (%)	Arches (%)	Loops (%)	Total (%)
Rh +ve	290 (15.18%)	143 (7.48%)	1477 (77.32%)	1910 (100%)
Rh -ve	30 (33.33%)	12 (13.33%)	48 (53.33%)	90 (100%)
Total	320	155	1525	(2000)

It was observed that in Rh positive blood group 15.18% were total Whorls, 7.48% were total Arches and 77.32% were total Loops. Also in Rh negative blood group it was observed that 33.33% were Whorls, 13.33% were Arches and 53.33% were total Loops.

DISCUSSION

Finger prints are classified and filed so that they can be retrieved when needed. Single finger files of known criminals are kept in a limited number only. Consequently sometimes it is impossible to make identification from finger print files on the basis of a single print found at the scene of a crime.

The present study reveals that there was an association between distribution of finger print pattern and blood groups. The general distribution pattern of primary finger prints was of the same order in individuals with A,B,AB and O blood group that is frequency of loops, moderate of Whorls and low of Arches. The same findings were seen in Rh positive and Rh negative individuals of ABO blood groups (15,16,17).

Females (65%) outnumbered males (35%) in this study, the male female ratio being 1:1.9. Majority of cases 77(38.5%) in the study belong to blood group B followed by O,A and AB which were 72 (36%), 35 (17.5%) and 16 (8%) respectively. Which was contrary to the findings of Bharadwaja A who observed higher percentage of blood group O, followed by B,A and AB (18).

In our study percentage of Loops were highest in blood group B (88.88%) and lowest in blood group AB (58.82%) which correlates with the findings of Mahajan et al (1986) and Kshirsagar et al (2001) and contrary to the findings with Amit A Mehta (2011) where Loops were highest in blood group O.

In our study percentage of Arches in blood group O (8.44%) as compared to lowest in blood group AB (5.86%) which co-relates with the findings of Bharadwaja et al (2004) who observed lowest percentage of Arches in AB blood group. However Mahajan et al (1986) and Kshirsagar et al (2001) observed highest percentage of Arches in AB blood group (15.46%) and lowest in B blood group (6.15%).

The percentage of Whorls were highest in blood group AB (35%) and lowest in blood group B (3.47%) in our study which were similar to the findings of Bharadwaja et al (2004) who observed higher percentage of Whorls in AB blood group and lower percentage in A blood group. However Mahajan et al (1986) and Kshirsagar et al (2001) observed higher percentage of Whorls in blood group O and lowest percentage in AB blood groups.

Also in our study percentage of Whorls were highest in Rh -ve blood group (33.33%) and lower in Rh +ve blood group (15.18%) which co-relates with the findings of Kshirsagar et al (2003) and Bharadwaja et al (2004) and contrary to the findings with Mehta AA (2011). Where Whorls were highest in Rh +ve and lowest in Rh -ve blood groups.

Percentage of Arches were highest in Rh -ve (13.33%) and lowest in Rh +ve blood group in our study which co-relates to the findings with Mehta AA (2011) and Bharadwaja et al (2004).

Also in our study percentage of Loops were highest in Rh +ve blood group (77.32%) and lowest in Rh -ve blood group (53.33%) which co-relates with the findings of Mehta AA (2011), Bharadwaja et al (2004) and Kshirsagar et al (2001).

CONCLUSION

- Whorls were highest in blood group AB and the difference was significant with blood group B.
- Arches were highest in blood group O and the difference was significant with blood group AB.
- Loops were highest in blood group B and the difference was significant with AB blood group.
- Loops were highest in Rh +ve blood groups as compared to in Rh -ve blood groups and the difference was statistically significant.

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