



STUDY OF FINGER PRINT PATTERN IN DIFFERENT BLOOD GROUPS AMONG INDIAN POPULATION

Forensic Medicine

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ABSTRACT

Background: Among the various comparative data techniques, establishing identification through fingerprints is documented and regarded as the utmost contribution to the criminal investigation. Through its significant features, the science of fingerprint provides an exceptional service in solving the crimes and it is also useful in other fields where establishing identification is of major importance.

Objective: This study aimed to establish a likely correlation between fingerprint pattern and the ABO blood group.

Methods: The present cross-sectional study was carried out on 500 subjects of Indian origin aged above 18 years, who were selected randomly using a convenience sampling technique.

Results: Fingerprint pattern analysis showed that loops were the most common pattern in the study amounting to 54% followed by whorls registering 39% and arches were present in a smaller percentage (7%) in the study group. The incidence of loops and whorls was maximum in the O blood group and arches were more common with blood group B.

Conclusion: The fingerprint pattern and ABO blood group showed a significant correlation. The distribution of the different pattern of fingerprints in individual finger also showed some peculiarities concerning the ABO blood group.

KEYWORDS

ABO blood group, Fingerprint print pattern, Identification.

INTRODUCTION

Personal identification using fingerprints is hailed as the greatest boon to the criminal investigation. The study of fingerprints as a method of identification is also known as Dactylography or Dactyloscopy and at present, it is also known as the Henry – Galton system of identification.¹ The fingerprint patterns are unique and permanent in individuals. The pattern of fingerprint differs even in identical twins.²

Alike fingerprints, blood is often found as trace evidence in most of the crime scenes and hence has a pivotal role in crime scene investigation. In forensic practice, the ABO and Rh blood group system has been of primary importance, since the record of this blood group system is ubiquitous. There have been several studies conducted in the past aimed at studying the distribution of fingerprint pattern in various races and correlating it with many hereditary diseases, chromosomal abnormalities and also those disorders whose genetic basis is not clear.^{3,4} Researchers have equally shown their interest in analyzing the association of ABO and Rh blood group system with various medical disorders. Thus, fingerprint pattern and blood group have been widely but distinctly studied. Hence the present study was carried out to study the correlation between them to serve the course of positive identification.

MATERIALS AND METHODS

500 subjects of Indian origin aged above 18 years were selected. Subjects with conditions that cause permanent loss of fingerprint pattern and those with recent blood transfusion and those suffering from diseases that alter the blood group were excluded from the study.

The convenience sampling technique was adopted. Informed written consent was obtained from study participants. The data obtained were analyzed statistically using SPSS (Statistical Programme for Social Sciences, version 16.0) computer software package. Descriptive statistics, contingency co-efficient test was applied and a p-value <0.05 was considered significant.

RESULTS

The majority of the subjects belonged to blood group O (34%) followed by blood group B (32%), blood group A (26.6%) and blood group AB (7.4%). Fingerprint pattern analysis showed that loops were the most common pattern in the study amounting to 54% followed by whorls registering 39% and arches were present in a smaller percentage (7%) in the study group. Statistically, a significant association was found between fingerprint pattern and the ABO blood group. The incidence of loops and whorls was highest in the O blood group and arches were more common with blood group B (Figure 1).

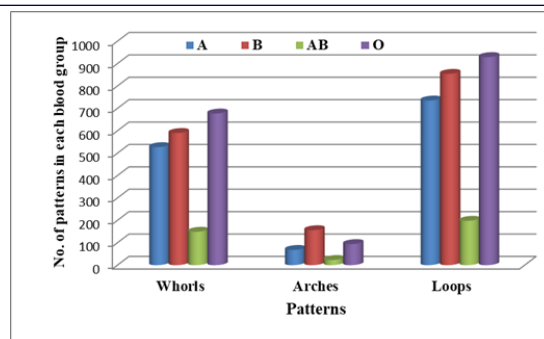


Figure 1: Distribution of various fingertip patterns in ABO blood group

High frequency of loops was observed in the little and middle finger in all the blood groups. Whorls were predominant in ring finger and thumb among all the blood groups. Arches were high in the index and middle finger (Table no 1).

Table 1: Distribution of various fingerprint patterns in different fingers in ABO blood group

Blood group	Pattern	Fingers				
		Thumb	Index	Middle	Ring	Little
O	Loops	163 48%	157 46.2%	219 64.4%	122 35.9%	268 78.8%
	Whorls	165 48.5%	141 41.5%	93 27.4%	213 62.6%	65 19.2%
	Arches	12 3.5%	42 12.3%	28 8.2%	5 1.5%	7 2%
B	Loops	149 46.6%	146 45.6%	209 65.3%	136 42.5%	214 66.9%
	Whorls	149 46.6%	116 36.3%	72 22.5%	169 52.8%	84 26.2%
	Arches	22 6.8%	58 18.1%	39 12.2%	15 4.7%	22 6.9%
A	Loops	131 49.2%	110 41.4%	186 69.9%	106 39.8%	202 76%
	Whorls	127 47.8%	115 43.2%	67 25.2%	154 57.9%	64 24%
	Arches	8 3%	41 15.4%	13 4.9%	6 2.3%	0 0%

AB	Loops	33 44.6%	39 52.7%	50 67.6%	21 28.4%	55 74.3%
	Whorls	38 51.4%	24 32.4%	17 23%	52 70.3%	18 24.4%
	Arches	3 4%	11 14.9%	7 9.4%	1 1.3%	1 1.3%

Table 2: Showing correlation between fingerprint pattern and ABO blood group

PATTERN * BLGP Cross tabulation						
PATTERN		BLGP				Total
		A	B	AB	O	
Loop		735	854	198	929	2716
		27.1%	31.4%	7.3%	34.2%	100.0%
		527	590	149	677	1943
Whorl		27.1%	30.4%	7.7%	34.8%	100.0%
		68	156	23	94	341
Arch		19.9%	45.7%	6.7%	27.6%	100.0%
		1330	1600	370	1700	5000
Total		26.6%	32.0%	7.4%	34.0%	100.0%

Table no. 2 showing correlation between fingerprint pattern and ABO blood group, P-value was found to be less than 0.05%, hence it can be inferred that a significant association was observed between fingerprint pattern and ABO blood group.

DISCUSSION

Fingerprint and blood group are widely used as a means to identify an individual in forensic practice. In the present study, an effort was made to study the distribution of fingerprint pattern in different ABO blood group and to establish the association between the fingerprint pattern and ABO blood group.

In a study done to bring forth the correlation between the palmar dermatoglyphics and blood group, the percentage of loops were highest in blood group O and was least in blood group AB, this was comparable to the present study. Whorls were more in blood group B and AB blood group had a greater number of arches, which was not in agreement with the present study.⁵

A group of anatomists from North India have reported that the correlation between blood group A and loops is more consistent, which was in contrast with the present study. A higher incidence of whorls was noticed in the ring finger and arches were higher in the index and middle finger in subjects of the A, B and O blood group, which conforms with the present study. In contrast to the present study, individuals of the AB blood group showed a higher incidence of whorl in thumb, index and ring fingers, while middle and ring finger showed a greater number of loops.⁶

In a study carried out to evaluate the distribution of fingerprint pattern in both hands of the individuals with different ABO blood group, loops were associated more with blood group O and arches with blood group B, which was comparable to the present study. Whorls were seen more with blood group AB which was dissimilar to the present study.⁷

An Indian study on the association between blood group and fingerprint pattern inferred that the association of loops and arches was significant with blood group AB, which was in contrast with the present study. The pattern of the individual finger in different blood groups showed a significantly high frequency of loops in the middle and little finger in all the blood groups and arches were high in the index and middle finger among all the blood groups, which was in unison with the present study.⁸

In a study conducted by Manikandan S et al, loops were found to be highest in the AB blood group and the lowest in the A blood group. Arches were the maximum in A blood group and the lowest in O blood group whereas whorls were more in A blood group and the lowest in B blood group.

Limitations of the study:

The present study was carried out on a small sample size hence it is recommended to consider a greater number of subjects to increase the accuracy of the results obtained. The population considered for the present study was of Indian origin and it was not further segregated according to geographical location. Therefore, future studies can be

taken up in this regard to know the influence of regional variations. Only primary fingerprint patterns i.e loop, whorl and arch were considered for this particular study. Hence there is a scope for further research to determine the correlation between subdivisions of these three basic patterns and blood group.

CONCLUSION

The study concludes that the general distribution of primary fingerprint pattern is of the same order in individuals with A, B, AB and O blood groups i.e., high frequency of loops, moderate whorls and low arches. A significant association was found between the distribution of fingerprint patterns and the ABO blood group. Since fingerprints will remain as an essential entity in biometric-based identification systems, a relationship between fingerprint pattern and blood group presents possibility of using it as a supplementary identification data which can be used for establishing identity of the individual.

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Conflict of interest- Nil

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