<u>**Original Research Article**</u>

Fingerprint Patterns in Relation to Gender and Blood Groups – A Cross Sectional Study

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Abstract

Introduction: Various mental and physical features can be used for human identification in a variety of situations. Because each person's fingerprints are distinct, they can be used to identify them. The objective of the study was to determine correlation between the fingerprint pattern, Gender and blood group.

Materials and Method: The study was conducted on 100 subjects [50 males and 50 females] in the age group of 18-65 years in the time period of 2 months having different blood groups The Fingerprints were taken of all ten fingers and observed by magnifying glass and its characteristics features were recorded and blood groups of the individuals were noted.

Results: Amongst ABO blood group, the most common blood group was O (46%), followed by B (31%), A (14%) and AB (4%). Rh + ve were the most common Rhesus factor (95%). The loop was the most common pattern (60%), followed by whorl (32%) and arch (8%). Loops were higher in Males (56%) compared to females (44%). whorls and arches in females were 54%, 52%, and in males were 46%, 47.5% were found more in females. Highest frequency of Loops was seen in O positive blood group followed by B positive

Conclusion: The present study confirms that loop was the most common fingerprint pattern and its frequency was more in O positive blood group & in males

Keywords: Fingerprint pattern, ABO blood group, Gender, Loops, Whorls, arches

Introduction

Dactylography, also known as dermatoglyphics, has long been acknowledged as a reliable and scientific approach for anthropological, genetic, and medical research [1]. The procedure of dactylography involves making an impression of the papillary ridges on the fingertips in order to identify a person. This method of identification is absolutely accurate and error-free [2]. Identity is a collection of physical traits that define a person, whether they are functional, psychic, normal, or abnormal. A person's identifying characteristics should be noted in order to determine their identification. The most trustworthy criteria for identification are fingerprints since they are continuous and distinctive [3]. Any trace evidence, such as fingerprints or blood stains, becomes increasingly important as criminal offences expand across the nation and offenders become more cunning in their attempts to eliminate the evidence. Therefore, any correlation

with the trace evidence is crucial for future homicide inquiry.

Karl Landsteiner made the discovery of the blood group system far back in 1901. It mostly consists of the "ABO" and "Rhesus" groups. The "ABO" system is further divided into the blood group types A, B, AB, and O based on the presence of the appropriate antigen in plasma. According to the presence or absence of the "D" antigen, the "Rhesus" system is divided into Rhesus Positive (Rh +ve) and Rhesus Negative (Rh -ve) types [4]. This study was conducted to find out correlation between finger print pattern, Gender, and blood group.

Materials and Methods

This study was conducted at Dhanalakshmi Srinivasan Medical College and Hospital, Perambalur from January 2021 to February 2021. A total of 100 volunteers between 18-65 years of both sexes voluntarily participated in the study. After reading the details of this study and giving their clear consent, and after taking the Institutional ethical clearance, details of individuals such as name, sex, and blood group were noted Blood group was confirmed in all of them (50 males and 50 females) using the slide agglutination method with antiserum A, antiserum B, and antiserum D. After washing the finger

with methylated spirit, a blood sample was taken by pricking it with a sterile lancet. On a clean tile, a drop of blood from each patient was combined with antiserum A, antiserum B, and antiserum D. The presence or absence of agglutination was used to determine blood group. Each individual was instructed to thoroughly wash and dry his or her hands with soap and water to eliminate grime and oil. He/she was then instructed to press his/her fingertips on the stamp pad and then on the appropriate Performa blocks to transfer the fingerprint impression. To avoid blurring the print, care was made to avoid sliding fingers. The fingerprint patterns were investigated with a magnifying lens and classified into three fundamental patterns according to Galton's classification [5]. loops, whorls, and arches. The acquired data was statistically analysed utilising frequency distribution using the Statistical Package for Social Sciences [SPSS] version 19.

Results

The study was carried out in 100 subjects of age group 18-65 years of which 50 were males and 50 were females.

The dominant blood group in the study population was group O (48%) , followed by B (33%), A(15%) and AB (4%). Table 1

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

Blood groups	Male	Female	Total
A	7 (7%)	8 (8%)	15 (15%)
B	18 (18%)	15 (15%)	33 (33%)
AB	2 (2%)	2 (2%)	4 (4%)
O	23 (23%)	25 (25%)	48 (48%)
Total	50 (50%)	50 (50%)	100 (100%)

Rh Positive (95%) was the dominant blood group compared to Rh negative blood group (5%).when ABO-Rh blood group was considered, O positive was dominant

followed by B positive, A positive, AB positive, O negative, B negative, & A negative. AB negative blood group was not found in study population. Table 2.

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

Blood groups	Rh positive	Rh negative
A	14 (14%)	1 (1%)
B	31 (31%)	2 (2%)
AB	4 (4%)	0
O	46 (46%)	2 (2%)
Total	95 (95%)	5 (5%)

The dominant finger print pattern was Loop followed by Whorl and Arch .Table 3

Table 3: Distribution of primary fingerprint patterns among the subjects

Fingerprint pattern	Total number	Percentage (%)
Loop	600	60
Whorl	320	32
Arch	80	8
Total	1000	100

Male had higher percentage of Loops whereas females had higher percentage of Whorl and Arch. Table 4

Table 4: Distribution of fingerprint patterns according to gender

Fingerprint pattern	Male	Female	Total
Loop	336 (56%)	264 (44%)	600 (100%)
Whorl	147 (46%)	173 (54%)	320 (100%)
Arch	38 (47.5%)	42 (52.5%)	80 (100%)

Loops had the higher frequency in all the Rh +ve and Rh –ve except O –ve followed by whorl and arches. Table 5

Table 5: Distribution of fingerprints among different blood groups with Rh factors

Fingerprint pattern	A+ve	A -ve	B+ve	B -ve	AB+ve	AB-ve	O+ve	O-ve	Total
Loop	85	6	153	13	28	0	309	6	600
Whorl	35	2	144	6	10	0	114	9	320
Arches	20	2	13	1	2	0	37	5	80
Total	140	10	310	20	40	0	460	20	1000

Discussion

Fingerprint identification is the most reliable. The role of fingerprints in establishing the identity of perpetrators at crime scenes and victims of mass disasters is critical [6]. The study showed that blood group O was highest followed by B, A, and AB blood group respectively among the participants in both sexes. Similar results were reported by Bharadwaja et al [7] Sudhiksya et al [8] and Prateek and Pillai [9]. On the other hand, A. A.Mehta [10] and Desai et al [11] observed the dominance of blood group "B" followed by blood groups "O" and "A." We found that Loops and Whorls were common in O+ subjects, low in A+ and B+ blood groups and very low in A-, AB-, AB+, B- and O- individuals. Arches frequency was low in A+ and A- groups and very low in B-, B+, O- and O+ subjects. A similar study has described that Loops were found

frequently in B+ subjects and weakly in persons who have O+ blood group [12].

Conclusion

The current study is an attempt to link fingerprint patterns to an individual's gender and blood group. Fingerprint patterns can be used to predict an individual's gender and blood group. It has the potential to improve the legitimacy of fingerprints in the detection of offenders.

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