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ORIGINAL ARTICLE

Distribution of Fingerprint in Relation with Blood Group and Gender: A Cross-Sectional Study

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Abstract:

Fingerprints are the most widely accepted method of determining the identity of a person in the court of law. The association of blood grouping is also another important tool in identification and the association between the two may in some way aid in Forensic analysis also similar studies lack in our area. The cross-sectional study was done by direct personal investigation and chi square test used for assessing statistical significance. The present study shows most common blood group as a whole is A which (33.60%) followed by B (29.50%), least common is AB (11.47%). Gender wise A is the most common blood group. The common finger print is loop which is 62.7%, followed by whorl (32.7%) and least common is Arch (4.6%). The most common Rh factor in Loop (58.7%- Rh positive), Whorl (29.3% Rh positive), and Arch (4.5% Rh positive).

Keywords: Fingerprints, Blood group; ABO and Rh system; Forensic analysis.

Introduction:

Dactylography is unique character mainly used in personal identification. Fingerprints are composed of various fine ridges which are mainly distributed in the palmer region of hands.[1] Mainly four types of fingerprints are observed in fingers i.e. loop, whorl, arches and composite or mixed variety.[2] Fingerprints pattern has loops which are commonly found (65%),[3] whorl pattern accounts for 30%[4] of total. Arches are rare and comprises of 5% cases.[5] Blood grouping was discovered by Karl Landsteiner in 1901. Till date more than 20 different types of blood groups were identified,[6] which vary in distribution pattern in different human races. This blood grouping system is further classified into ABO and RH system; which play an important role in several biological purposes. ABO system is further classified into A, B, AB and O in presence of corresponding antigens in blood cells,[7] while antigen D forms the basis of classification of RH system into RH^+ or RH^-.[6]

Although there are a number of research works done in the aforesaid context, this study is an attempt to analyze the association of different fingerprints with ABO, RH typing, gender; and also to identify the association between gender and blood groups.

Material and methods:

The present study was a cross section study, carried out among all medical students of North Eastern Institute of Ayurveda and Homoeopathy, Shillong, Meghalaya between March 2021 to February 2022. A total of 122 students were included in this study. The data of this study were collected from the individuals by direct personal investigation.

Fingerprints were recorded from ten (10) fingers on a white paper by black ink and smudging avoided and later observed with magnifying lens and classified according to Henry system of classification. For determining blood groups samples were collected after cleansing the finger with spirit and pricking with lancet, a blood drop was taken from each individual and mixed with anti-serum A, B and D on a tile. The presence or absence of agglutination leads to the diagnosis of blood group.

The collected data were presented in different tables and diagram. Chi-square test was used for assessing statistical significance. Data were analyzed using SPSS 16.0. Necessary permission from institutional ethical committee (IEC) was taken for the study.

Results:

In the present study 122 medical students participated, out of which 57(46.7%) were males and females were 65 (53.2%).

Table-1 is showing the most common blood group as a whole is A (33.60%) followed by B (29.50%), least common is AB (11.47%). Gender wise A is the most common blood group. It is observed, in boys A blood group is followed by O (13.9%) whereas in girls it is B (17.21%) which is the second most common type. However, there is no significant association between gender and blood groups ($p > .05$).

Table-2 Showing the most common finger print is loop which is 62.7%, followed by whorl (32.7%) and least common is Arch (4.6%). Same pattern is observed in both sexes. After testing association we conclude that finger print is associated with gender ($p \leq .05$).

Table-3 showing that in people with A blood group Loop is more common finger print pattern. People with arch the blood group A

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Table 1. Distribution of blood groups according to gender.

Blood group→ Gender↓	A	B	AB	O	Total
Male (N-57)	19 (15.5%)	15 (12.2%)	6 (4.9%)	17 (13.9%)	57 (46.72%)
Female (N-65)	22 (18.03%)	21 (17.21%)	8 (6.55%)	14 (11.47%)	65 (53.27%)
Total	41 (33.60%)	36 (29.50%)	14 (11.47%)	31 (25.40%)	122 (100%)
Chi square	1.276448				
P value	0.73				

Table 2. Distribution of finger prints in relation to Gender.

Blood group→ Gender↓	Loop	Whorl	Arch	Total
Male	369 (30.24%)	185 (15.16%)	16 (1.3%)	570 (46.72%)
Female	396 (32.46%)	214 (17.54%)	40 (3.27%)	650 (53.28%)
Total	765 (62.7%)	399 (32.7%)	56 (4.6%)	1220 (100%)
Chi square	8.135			
P value	0.017			

Table 3. Table showing variation of finger print pattern according to blood group.

Blood groups→ Finger print↓	A	B	O	AB	Total
Loop	259 (21.23%)	215 (17.62%)	205 (16.80%)	86 (7.05%)	765 (62.7%)
Whorl	121 (9.92%)	134 (10.98%)	98 (8.03%)	46 (3.77%)	399 (32.7%)
Arch	30 (2.46%)	11 (0.9%)	7 (0.5%)	8 (0.7%)	56 (4.59%)
Total	410 (33.6%)	360 (29.5%)	310 (25.4%)	140 (11.48%)	1220 (100%)
Chi square	17.33				
P value	12.59				

Table 4. Table showing Variation of finger print pattern with Rh factor.

Rh factor→ Finger print↓	Rh +ve	Rh-ve	Total
Loop	717 (58.77%)	48 (3.93%)	765 (62.7%)
Whorl	358 (29.34%)	41(3.36%)	399 (32.7%)
Arch	55 (4.5%)	1 (0.08%)	56 (4.59%)
Total	1130 (92.62%)	90 (7.38%)	1220 (100%)
Chi square	8.83		
P value	5.99		

are more common. B blood group have marginally higher Whorl pattern. However statistically there is no significant association between blood group and pattern of finger print (p >.05).

Fig -1 is showing the most common Rh factor in Loop (58.7%- Rh positive, 3.93% Rh negative), followed by Whorl (29.3% Rh positive, 3.3% Rh negative), Arch (4.5% Rh positive, Rh negative 0.08%). After testing Chi-square test for independence of attributes it can be inferred that there does not exist any association between finger print and Rh factor (p>.05) (Table 4).

Discussion:

The present study indicates presence of a possible relationship between blood group and fingerprints. Gender wise A is the most common blood group among boys and girls. However in boys A blood group is followed by O (13.9%) whereas in girls it is B (17.21%) which is the second most common consistent with Patil et al (2021).[8] In case of distribution of finger prints in relation to gender it is seen that the most common finger print is loop which

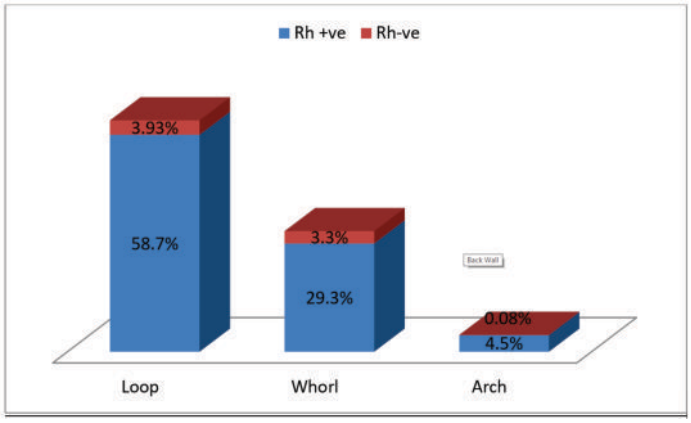

Figure 1. Variation of finger print with Rh factor.

is 62.7%, followed by whorl (32.7%) and least common is Arch (4.6%, p<0.017) similar with Sahu et al.[5]

In variation of finger print pattern according to blood group the present study shows that in people with a blood group Loop and Arch is more common finger print pattern not consistent with Sahu et al.[5] Variation of finger print pattern with Rh factor, the most common Rh factor in Loop (58.7%- Rh positive) followed by Whorl (29.3% Rh positive), Arch (4.5% Rh positive) consistent with Sahu (2016) and Smaio (2019).[5,9]

Conclusion:

The present study is a humble effort to relate the association of blood group of individuals with fingerprints as no such studies was done earlier in our area; moreover this study may also aid in some way in forensic analysis. The above study shows blood group A is common in males whereas loop and arch are common in blood group A. Rh positivity dominates the presence in all fingerprints.

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