

Association of Palmar Fingerprint Pattern in ABO Blood Group System

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Abstract: *Introduction:* Fingerprint patterns have been normally used for identification of an individual. The fingerprint design whorl might be winding, oval, roundabout or any assortment of a loop and record for around 30%. Arches are the basic type up till now uncommon (about 5%). As blood group system and dermatoglyphics have genetic inheritance, studies have shown that there is association between finger print pattern and blood group. *Material and Methods:* This is a prospective and single centre study was conducted among 90 subjects over a period of 6 months at Department of Anatomy and Physiology, Tertiary care Teaching Hospital. Inclusion criteria: Students who were aware of their blood group and whose age ranges between 17-25 years. Exclusion criteria: Individual with any hand deformity like permanent scars on fingers which may be congenital or acquired due to trauma on fingers. Individuals suffering from any chronic skin disease, having worn fingerprints or extra or bandaged fingers. *Result:* Of the 90 samples, 56 were males and 34 females, which correspond to 62.2% of male and the rest female. In this study, the maximum number of subjects were in the age group of 20-22 years which were 40% (n =36) of total followed by age group 17-19 years having 34.4% (n = 31) in this group and 25.5% were 23-25 years. In our study, the most of subjects had 'O' Blood Group 43.3% (n =39) and least were AB Blood Group 7.7% (n = 7). It was observed that percentage of whorls was highest in B blood group (43.6%) and lowest in A blood group (37.3%). Also, percentage of arches in A blood group was highest (16.8%) as compared to lowest in O blood group (4.8%). Similarly, percentage of loops was highest in O blood group (51.80%) and lowest in AB blood group (46.0 %). *Conclusion:* The fingerprint used as a traditional, effective, and unique identification method of an individual, in future it allows researchers to investigate with various diseases other than those are raised with age but also helps to explore different antibodies or reactive process of human body in several diseases. Also, similar study helps to predict the risk of any kind of diseases in early age of an individual.

Keywords: Palmar Fingerprint Pattern, ABO Blood Group System, Dermatoglyphics.

INTRODUCTION

The study of fingerprint patterns was introduced by Dr. Harold Cummins in 1926 but it is already in use before several hundred years ago. Fingerprint patterns have been normally used for identification of an individual. Now-a-days every organization or even may Government institutes in India, use fingerprint verification to identify everyone uniquely and it also have been used as a biometric modality for gender and age identification. [1] An individual is their own key; behind this catchy principle biometrics have become an attractive alternative to traditional identification methods such as tokens or passwords. [2] Current fingerprint matching methods were started in the sixteenth century. It was Henry Fauld in 1880 who first experimentally proposed the singularity and uniqueness of fingerprint. Herschel

added to the establishment of current fingerprinting identification. [3]

In the nineteenth century Sir Francis Galton directed broad investigations and ordered the sorts of fingerprints relying on essential example as loops, whorls and arches. It was Cummins who authored the expression "Dermatoglyphics (derma $\frac{1}{4}$ skin, glyptic $\frac{1}{4}$ bends), to dermal edge arrangements on the digits, of palms and sole and furthermore demonstrated that edge design are resolved incompletely by heredity or natural impact which produce pressure and strain in their development during fetal life. [4] The fingerprint design whorl might be winding, oval, roundabout or any assortment of a loop and record for around 30%. Arches are the basic type up till now uncommon (about 5%). The fingerprint design has edges running from one side to the opposite side of the print without having any re-

bend. The term composite is utilized for mix of type example that doesn't fit into any of the above characterization. [5]

Till date, analysts or researches have generally used fingerprint details as perspectives to build up any individuals uniqueness. The ridge patterns have been comprehensively classified into five different kinds called as arch, tented arch, whorl, ulnar and radial loop. An individual can have any of the above type in any of the its fingers. [6] All things considered, dominant part of fingerprints found in populace review shows that 70 percent of the prints are loops, 20–25 percent being whorls though just 5 to 10 percent consider arch or tented arch patterns or designs. Some examinations done on twins have presumed that monozygotic or indistinguishable twins have comparable however not indistinguishable examples found. [7]

ABO blood group discovered by Karl Lansteiner (1901) can further be classified as A, B, AB and O according to the presence or absence of surface antigen on their red blood cells. Rh blood group is again classified as Rh- positive or Rh- negative on the basis of presence or absence of D antigen. [8] As blood group system and dermatoglyphics have genetic inheritance, studies have shown that there is association between finger print pattern and blood group. [9] The objectives of our study were to find out the distribution of different fingerprint patterns and blood group among and also to correlate between gender, ABO and Rh blood group with dermatoglyphic pattern.

MATERIAL AND METHODS

This is a prospective and single centre study was conducted among 90 subjects over a period of 6 months at Department of Anatomy and Physiology, Tertiary care Teaching Hospital.

Inclusion criteria: Students who were aware of their blood group and whose age ranges between 17-25 years.

Exclusion criteria: Individual with any hand deformity like permanent scars on fingers which may be congenital or acquired due to trauma on fingers. Individuals suffering from any chronic skin disease, having worn fingerprints or extra or bandaged fingers

Both genders of Subjects of all discipline with prior knowledge of their blood group were included for the study upon their consent. Subjects with permanent scars on their fingers, injury, birth defect or disease were excluded. Each subject was asked to wash his / her hands thoroughly with soap and water and dry them using a towel. Then they were asked to press their fingertip on stamp pad and then to A4 paper to transfer the fingerprint impression by rolling the fingers over fingerprint blocks prepared with other information like name, age, sex and blood group.

The participants were asked to be careful not to double roll the prints in order to avoid smudging of the print. And the patterns were observed with the help of a powerful hand lens and categorized as Loop, Whorl, Arch or Composite. The ridge lines that flew from one side, swept up in the center like a tent and then curve back on the same side where they entered was classified as Loop. Similarly, as the central core was surrounded by number of ridge lines to form a circle or spiral, that pattern was classified as Whorl. Arch was coded when the ridge lines flew from one side, rose in the middle of the pattern and flew to next side. When more than one of the above pattern was seen in the same fingerprint, it was distinguished as Composite.

RESULT

In table 1, of the 90 samples, 56 were males and 34 females, which correspond to 62.2% of male and the rest female in table 1.

Table 1: Distribution of Gender of subjects

Sex	Frequency	Percentage
Male	56	62.2
Female	34	37.8
Total	90	100

Table 2: Distribution of the number of subjects according to age group

Age group	Frequency	Percentage
17-19 years	31	34.4
20-22 years	36	40.0
23-25 years	23	25.5
Total	90	100

In this study, the maximum number of subjects were in the age group of 20-22 years which were 40% (n =36) of total followed by age group 17–19 years having 34.4% (n = 31) in this group and 25.5% were 23-25 years in table 2.

Table 3: Distribution of the Blood Group of subjects

Blood Group	Frequency	Percentage
A	19	21.1
B	25	27.7
AB	7	7.7
O	39	43.3
Total	90	100

In our study, the most of subjects had 'O' Blood Group 43.3% (n =39) and least were AB Blood Group 7.7% (n = 7) in table 3.

Table 4: Distribution of the Rh Type of blood donors

Rh Type	Donor	Percentage
Positive	79	87.7
Negative	11	12.3
Total	90	100

In table 4, the most of subjects had Rh Positive 87.7% (n =79) and least were Negative 12.3% (n = 11).

Table 5: Showing distribution of various fingertip patterns in blood groups.

Blood Group	Whorls (%)	Arches (%)	Loops (%)	Total (%)
A	71 (37.3)	32 (16.8)	87 (45.7)	190 (100)
B	166 (43.6)	31 (8.1)	183 (48.1)	380 (100)
AB	20 (40)	7 (14)	23 (46)	50 (100)
O	117 (43.3)	13 (4.8)	140 (51.8)	270 (100)

It was observed that percentage of whorls was highest in B blood group (43.6%) and lowest in A blood group (37.3%). Also, percentage of arches in A blood group was highest (16.8%) as compared to lowest in O blood group (4.8%). Similarly, percentage of loops was highest in O blood group (51.80%) and lowest in AB blood group (46.0%) in table 5.

DISCUSSION

Dermatoglyphics as a diagnostic aid used from ancient eras and now it is well established in number of diseases which have strong hereditary basis and is employed as a method for screening for abnormal anomalies. Fingerprint minutiae patterns of ridges are determined as unique through the combination of genetic and environment factors. [10] Person identification using fingerprint algorithms are well sophisticated and are being established all over the world for security and authentication. [11]

The fingerprint also used to classify gender and age group but very few manual attempts have been made to explore relationship between fingerprint patterns with blood group and common clinical diseases like hypertension, type-2 diabetes and arthritis. [12] The dermatoglyphics and its important role in the diagnosis of different diseases like hypertension, type-2 diabetes and arthritis with genetic bases. Apart from its use in predicting the diagnosis of disease; dermatoglyphics is also used in forensic medicine in individual identification, physical anthropology, human genetics and medicine. [14]

In our study chosen randomly having distinctive ABO blood groups, with the objective to a) Study the distribution of unique finger impression pattern among the subjects having diverse ABO and Rh blood group b) Correlate any relation between their characters and blood group. The data from the investigation showed that the male: female ratio was

1.2:1. Most subjects (43.3%) right now of blood group O followed by blood group A (21.1%), B (27.7%) and AB (7.7%). Rh-positive cases constitute about 87.7% of all considered cases. The general distribution of the pattern of finger showed a high recurrence of whorls was highest in B blood group (43.6%) and lowest in A blood group (37.3%). Also, percentage of arches in A blood group was highest (16.8%) as compared to lowest in O blood group (4.8%). Similarly, percentage of loops was highest in O blood group (51.80%) and lowest in AB blood group (46.0%).

Kanchan and Chattopadhyay the result shows that each fingerprint is exceptional; loops are the most normally happening fingerprint design while arches are the least normal. Guys have a higher occurrence of whorls and females have a higher frequency of loops. Loops are transcendent in blood groups A, B, AB and O in both Rh-positive and Rh-negative people except for in O pessimistic where whorls are progressively normal. They can reason that there is a relationship between the conveyance of fingerprint designs, blood gathering, and sexual orientation and along these lines expectation of sex and blood gathering of an individual is conceivable dependent on his fingerprint design. [15]

Fayrouz et al. (2011) study reveals an association between the pattern of the unique mark and ABO blood group. With ongoing advances in unique mark detecting technology and improvement in the accuracy and matching velocity of the finger impression matching algorithms, automatic personal identification

is becoming an attractive/complement to the traditional methods of identification. [16]

CONCLUSION

The fingerprint used as a traditional, effective, and unique identification method of an individual, in future it allows researchers to investigate with various diseases other than those are arised with age but also helps to explore different antibodies or reactive process of human body in several diseases. Also, similar study helps to predict the risk of any kind of diseases in early age of an individual. The analysis and classification of community based on age, blood group, fingerprint patterns and lifestyle diseases help to tackle many disease in which mankind may suffer a lot having lifestyle-based diseases like hypertension, type 2-diabetes.

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