

Association of palmar finger print patterns in ABO Blood Group System

Ravindrakumar Boddeti¹, Dr. Vimal Modi²,

¹PhD Research Scholar, Department of Anatomy, Index Medical College, Hospital & Research Centre, Indore (MP) Malwanchal University.

²Professor and Head, Department of Anatomy, Index Medical College, Hospital & Research Centre, Indore (MP) Malwanchal University.

Corresponding Author: Ravindrakumar Boddeti

ABSTRACT

Background: Fingerprint (dermatoglyphic) evidence is undoubtedly the most reliable and acceptable evidence till date in the court of law. Due to the immense potential of fingerprint as an effective method of identification an attempt has been made in the present work to analyze their correlation with gender and blood group of an individual.

Materials and methods: This are a Prospective, Observational and case-control study conducted in the Department of Anatomy and Medicine, Index Medical College over a period of 2 Years. All healthy individuals 18-65 years of age both Gender. 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.

Results: Of the 800 samples, 487 were males and 313 females, which correspond to 60.87% 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 42% (n =336) of total followed by age group 23–25 years having 31.62% (n = 253) in this group and 26.3% were 17-19 years. In our study, the most of subjects had „O“ Blood Group 36.62% (n =293) and least were AB Blood Group 13.2% (n = 106). The most of subjects had Rh Positive 85.75% (n =686) and least were Negative 14.2% (n = 114).

Conclusion: The existing study observed that there is correlation between the morphology of fingerprint pattern and the type of blood group. The human finger print distributions of various types also revealed few peculiarities in relation to the different blood groups.

Keywords: Fingerprints, Loops, Whorls, Blood, Groups.

INTRODUCTION

The skin covers the anterior surface of human hand and planter surface of the human foot is different in the texture and appearance than the one which covers the rest of the human body. This skin on the palmer and planter surface is continuously wrinkled with narrow minute ridges known as friction ridges.^[1]

A friction ridge is a raised portion of the epidermis on the digits or on the palmer and plantar skin, consisting of one or more connected ridge units of friction ridge skin.^[2] A finger print is an impression of the friction ridges on all parts. The dermal carvings or finger prints appear for the first time on the human fingers, palm, soles and toes from 12th to 16th week of embryonic development and their formation gets completed by the 14th week i.e. about the 6th fetal month. The ridges thus, formed during the fetal period do not change their course or alignment throughout the life of an individual, until destroyed by decomposition of the skin after death.^[3]

Two person having identical fingerprint is about one in 64 thousand millions. A reliable personal identification is critical in the subject of forensics as is faced with many situations like civil, criminal, commercial and latest in financial transaction frauds, where the question of identification becomes a matter of paramount importance.^[4] Fingerprint may be deposited in natural secretions from the eccrine glands present in friction ridge skin or they may be made by ink or other contaminants transferred from the peaks of friction skin ridges to a relatively smooth surface.^[5]

Dermatoglyphics is study of pattern of fine ridges on fingers, palms and soles. The term dermatoglyphics was coined by Cummins.^[6] The term coined by Cummins and Mildo (1943). It includes anthropologic, genetic and Egypt logic study of finger prints.^[7]

Fingerprint is a multifactor trait. Large number of genes plays their role along with environmental influence. Monozygotic twins have close resemblance in dermatoglyphic pattern showing common genetic factors and least differences showing influences of other factors. Actually, there is large number of genes determining the ridge pattern. Chromosomal aberrations affect these genes and produce variations in dermatoglyphic pattern in various chromosomal syndromes. There are three basic dermatoglyphic patterns; whorl, loop and arch. Whorl pattern has two deltas, Loop has one delta and Arch has one central or no delta at all. Loop pattern is further classified into Radial and Ulnar loop depending on the side to which loop opens.^[8]

The ABO blood groups were discovered by Karl Landsteiner in 1901. Blood group system was discovered way back in 1901 by Karl Landsteiner. Total 19 major groups have been identified which vary in their frequency of distribution amongst various races of mankind. Clinically, only 'ABO' and 'Rhesus' groups are of major importance. 'ABO' system is further classified as A, B, AB, O blood group types according to presence of corresponding antigen in plasma. 'Rhesus'

system is classified into ‘Rh +ve’ and ‘Rh – ve’ according to the presence or absence of ‘D’ antigen.^[9] Further studies on the ABO blood group system, by the other workers, suggested that the blood groups were inherited. But, the exact manner of inheritance of the ABO blood group was revealed by Bernstein (1924).^[10]

The human beings have been using fingerprint as a means of identification for a long time but in this study, we have made an effort to take a step further to “study a relationship between pattern of fingerprint, gender and ABO blood group”, so that one can get an idea about the expected blood group and gender from the study of fingerprint pattern and vice versa.

MATERIALS AND METHODS

This is a Prospective, Observational and case-control study conducted in the Department of Anatomy and Medicine, Index Medical College over a period of 2 Years. All healthy individuals 18-65 years of age both Gender. 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. Finally data were evaluated and analysed by Chi square (χ^2) testor Fisher Exact testusing SPSS 23.

RESULTS

Table 1: Distribution of Gender of subjects

Gender	Frequency	Percentage
Male	487	60.875
Female	313	39.125
Total	800	100

In table 1, of the 800 samples, 487 were males and 313 females, which correspond to 60.87% of male and the rest female.

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

Age group	Frequency	Percentage
17-19 years	211	26.375
20-22 years	336	42
23-25 years	253	31.625
Total	800	100

In this study, the maximum number of subjects were in the age group of 20-22 years which were 42% (n =336) of total followed by age group 23–25 years having 31.62% (n = 253) in this group and 26.3% were 17-19 years in table 2.

Table 3: Distribution of the Blood Group of subjects

Blood Group	Frequency	Percentage
A	192	24
B	209	26.125
AB	106	13.25
O	293	36.625
Total	800	100

In our study, the most of subjects had „O“ Blood Group 36.62% (n =293) and least were AB Blood Group 13.2% (n = 106) in table 3.

Table 4: Distribution of the Rh Type of blood donors

Rh Type	Donor	Percentage
Positive	686	85.75
Negative	114	14.25
Total	800	100

In table 4, the most of subjects had Rh Positive 85.75% (n =686) and least were Negative 14.2% (n = 114).

DISCUSSION

Finger-prints are the impressions produced by the epidermis at the flexor compartment of the digit. Chinese people were initially practiced using fingerprints to sign the documents legally. The dermatographics was first ever carried out 3000 years ago. Her schel used finger printing in India for personal identification. ^[11] Loops, whorls and arches are the common fingerprint patterns used in this analysis. Table 5 shows a comparative study of fingerprint pattern distribution.

The present study reveals a correlation between the fingerprint pattern distribution and blood groups. In persons with ABO, Rh blood types, i.e. more loop size, medium whorls, and small arches. The primary fingerprint 'general distribution pattern was of the same order. Kshirsagar et al¹³ and Bharadwaja have found similar findings.

The present study showed that in all blood groups the loop pattern was more common. Different research carried out by Bhardwaj Prateek and Gowda & Rao showing high loop frequency, medium whorls and low arches in blood groups of ABO & Rh.

Our outcomes uncover the most elevated rate of loops in the center and little finger in all blood groups, while the whorls are usually found in ring fingers in all blood groups. The frequencies of whorls are likewise most elevated in forefinger and thumb in all blood groups aside from in blood bunch "O" where loops are as often as possible present.^[12] From this investigation, they can infer that circulation of essential pattern of the fingerprint isn't identified with sexual orientation and ABO and Rh blood gathering, yet its conveyance is identified with singular digits of two hands.^[13]

Loops are the regular and arches are extraordinary fingerprints. Loops were most noteworthy in B blood gathering and least in AB blood gathering. Whorls most elevated in An and least in B blood gathering. Arches were most elevated in AB and least in B.^[14] Loops higher in female and most reduced in male, whorls most noteworthy in male and least in female and arches most elevated in male and most reduced in the female.^[15] Loops were most noteworthy in Rh-positive and least in Rh-negative. Whorls most elevated in Rh-negative and least in Rh-positive. Arches were most noteworthy in Rh-positive and least in Rh-negative.^[16]

CONCLUSION

We tried to examine and compare fingerprint patterns with an individual's gender and blood group in the current study. Although we recognize that fingerprints are never the same and in no way alter from beginning to death, an strive used to be made in this study to link fingerprints with gender and blood type, which in impact can also augment the accuracy of finger-prints in recognition and revelation of culprit. Loops were maximum frequently found pattern in the present study, & arches were the last. Blood group O positive was the most frequent and it was found that AB negative was the rarest. By contrast to Rh negative blood groups, Rh positive blood groups are more likely. In both genders loops were the more frequent pursued by whorls and arches. According to this analysis, we can conclude that gender prediction and blood groups of a person may be possible with the study of fingerprints methods. This may help in forensic medicine to identify the victim.

REFERENCES

1. Bharadwaja A, Saraswat PK, Agrawal SK, Banerji P, Bharadwaj S. Pattern of fingerprints in different ABO blood groups. *J Forensic Med Toxicol.* 2004;(2):49–52.
2. Bharadwaja A, Saraswat PK, Aggarwal SK, Banerji P, Bharadwaja S. Pattern of fingerprints in different ABO blood groups. *J Indian Acad Forensic Med.* 2004;26(1):6–9.
3. Bhavana D, Ruchi J, Prakash T. Study of fingerprint patterns in relationship with blood group and gender- a statistical review. *Res J Forensic Sci.* 2013;1(1):15–17.
4. Rastogi P, Pillai KR (2005) A study of fingerprints in relation to gender and blood group. *J Indian Acad Forensic Med* 32: 11-4.
5. Bhavana D, Ruchi J, Prakash T, Kalyan JL (2013) Study of Fingerprint Patterns in Relationship with Blood group and Gender Statistical Review. *Res J Forensic Sci* 1: 15-7.
6. Raloti SK, Shah KA, Patel VC, Menat AK, Mori RN, et al. (2013) An Effort To Determine Blood Group And Gender From Pattern Of Finger Prints. *Nat J Com Med* 4: 158-60.
7. Pillay VV (2009) Textbook of Forensic Medicine and Toxicology. 15th ed. Paras Medical Publishers Hyderabad 53-94.
8. Umraniya YN, Modi HH, Prajapati HK (2013) Study of Correlation of Finger Print Patterns in Different ABO, Rh Blood Groups. *Int J Sci Res* 2: 337-9.
9. Shrestha DB, Gupta VP, Chaurasia PS, Shrestha S, Chaudhary S, Aryal L, et al. Study of Correlation between Different Fingerprint Patterns, Blood Groups, and Social Behavior among Medical Students (Nepalese Citizens). *The Pacific J Sci and Technology.* Nov 2016;17(2):288-92.
10. Sangam MR, Babu AR, Krupadanam K, Anasuya K. Finger print pattern in different blood groups. *J Indian Acad Forensic Med.* 2011;33(4): 343-45.
11. Desai B, Jaiswal R, Tiwari P, Kalyan JL. Study of fingerprint patterns in relationship with blood group and Gender – a statistical review. *Res J Forensic Sci.* 2013;1(1):15-7.
12. Ameer Y, Zafar R, Abbasi AMH, Rasheed MA, Habib H, Salahuddin T, Warriach SA, Tariq A, Ahmed T (2014) Finger prints pattern variation in diabetic patients. *PJMHS* 8(1):162
13. Bala A, Deswal A, Sarmah PC, Khandalwal B, Tamang BK (2015) Palmar dermatoglyphics patterns in diabetes mellitus and diabetic with hypertension patients in Gangtok region. *Int J Adv Res* 3(4):1117–1125
14. Joshi S, Garg D, Bajaj P, Jindal V (2016) Efficacy of fingerprint to determine gender and blood group. *J Dent Oral Care Med* 2(1):103.
15. Karim JK, Mohammed AL, Saleem A (2014) Dermatoglyphics study of fingerprints pattern's variations of a group of type II diabetic mellitus patients in erbil City. *Zanco J Pure Appl Sci* 26(4):11–16

16. Dalvi A, Kumar Pulipaka H (2018) Determination of blood group using Image processing. Int J Sci Eng Res 9:24–27