

# Correlation between Finger Print, and Blood Group amongst Gender- A Prospective Study.

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## ABSTRACT

**Background:** Identification or identity helps us to determine the individuality of person, living or dead. Establishing the identity is of immense importance in forensic medicine. **Aim:** The aim of this study was to determine the correlation between finger print, gender, and blood group. **Methods:** A total of 100 subjects participated in the study (M=F) in the age range of 18 to 25 years. The sample was collected by simple random sampling. The finger print was analyzed by using powerful magnifying hand lens, ink pad and white chart paper. **Results:** The prevalence of blood groups as observed in our study for A, B, AB and O groups were 25, 33, 39, 3 for males and 23, 35, 39, 3 for females respectively. The prevalence of thumbprint amongst the gender was highest for Loops and least for arches. **Conclusion:** Our study reiterates that if fingerprint patterns and blood groups are studied with a larger sample size and with a multi-centric study, it may help in prediction of blood groups based on fingerprint pattern available.

**Keywords:** Blood Group, Fingerprints, Forensic, Identity.

## INTRODUCTION

Through antique of scientific research, the hand is recognized as a powerful tool in the diagnosis of psychological, medical, and genetic conditions. Harold Cummins in 1926 coined the term dermatoglyphics, which deals with the epidermal ridges on the non-hairy part of palm, fingers, toes, and soles. It is accepted universally that, the configurations of ridge pattern are determined by heredity and environmental influence.<sup>[1]</sup> The individual specific patterns of the arrangements and distribution of the papillary or epidermal ridges on the fingertips are absolutely constant and persistent throughout life, from infancy to old age, and that the patterns of two hands do not resemble each other. Even the fingerprints of twins are not similar.<sup>[2]</sup>

The epidermal ridges once formed remain permanent throughout the life of an individual except, in their dimensions, to proportionate the growth of an individual postnatally.<sup>4</sup> Finger prints are nowadays used for many purposes including Aadhar. Fingerprint is the effective method of identification for Aadhar card in general population. Fingerprints

collected at a crime scene can be used to identify suspects, victims and other persons who touched the surface, fingerprint scans can be used to validate electronic registration also.<sup>[3,4]</sup>

Blood group systems were discovered way back in 1900 by Karl Landsteiner. Total 19 major groups have been identified which vary in their frequency of spreading various races of mankind. Clinically, only 'ABO' and 'Rhesus' groups are of major importance. 'ABO' system is further differentiated as A, B, AB, O blood group types according to presence of corresponding antigen in plasma. Yet another biological record that remains unchanged throughout the life time of an individual is the blood group. Determining the blood group of a person from the samples obtained at the site of crime, helps identify a person. Landsteiner classified blood groups under the ABO blood group system.<sup>[5-7]</sup>

The aim of this study was to determine the correlation between finger print, gender, and blood group.

## MATERIALS AND METHODS

The study was conducted at Indira Gandhi Institute of Medical Sciences, Sheikhpura, Patna between August 2018 to January 2019. A total of 100 subjects participated in the study comprising of

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equal number of males and females. The sample was collected by simple random sampling. The age of subjects ranged from 18 to 25 years who reported for blood group analysis and voluntarily consented to participate in this study. After taking consent from the subjects, the prints from the left thumb finger were taken on Pre-designed proforma containing participant name, age, gender, and blood groups of the subjects. The procedure for blood collection and finger prints were explained to each subjects.

Collection of the finger prints

Fingerprints were analyzed by using powerful magnifying hand lens, ink pad and white chart paper. All subjects were asked to wash their hands thoroughly and then asked to press their left thumb fingertip on the ink pad and then to the paper to transfer the fingerprint impression. The same method was followed for all the participants. Individual with any hand deformity were not included in the study.

#### Assessment of the finger prints

The fingerprint patterns were identified based on the appearance of ridge lines. The gender and age of all subjects were noted and the fingerprint patterns were identified as loop, whorls, and arches and mixed based on the appearance of the ridge lines with the help of a magnifying lens. In order to classify the finger prints, the classification scheme proposed by Galton was used depending upon their primary pattern.<sup>[8]</sup>

1. Loops
2. Whorls
3. Arches
4. Mixed or Composite

## RESULTS

A total number of 100 subjects participated in this study, with 50% males and 50% females. [Figure 1]

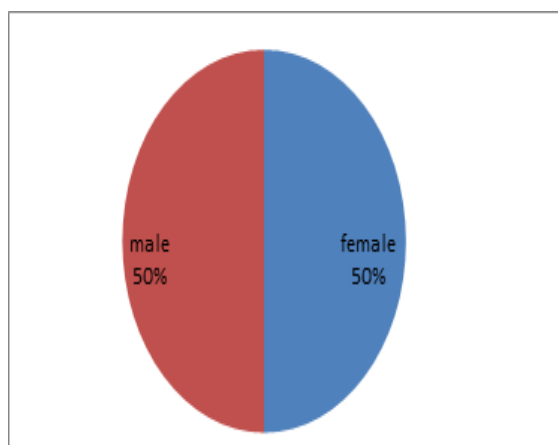


Figure 1: Distribution of subjects

The prevalence of blood groups as observed in our study for A, B, AB and O groups were 25, 33, 39, 3 for males and 23,35,39,3 for females respectively. [Figure 2].

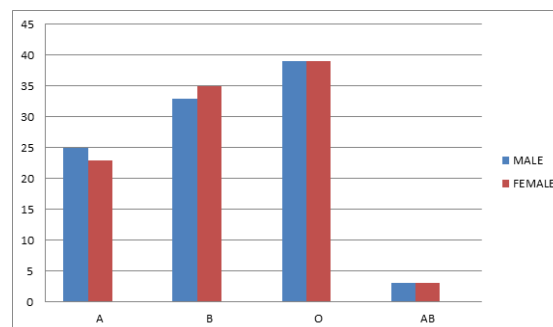


Figure 2: Prevalence of blood group

[Figure 3] shows that, patterns found to be predominant amongst the gender.

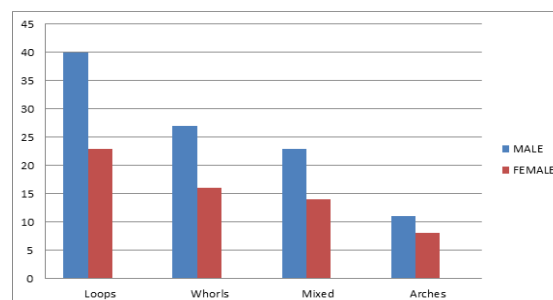


Figure 3: Gender wise distribution of thumb print

[Figure 4] shows prevalence of finger print patterns in different blood groups. Total no of loops found in left thumb finger were 43, similarly numbers of whorls were 31, numbers of mixed were 19 and arches were 8.

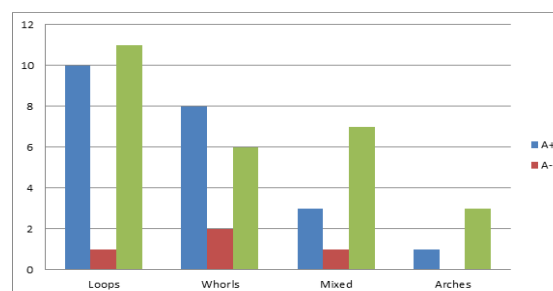


Figure 4: Prevalence of finger pattern among blood group

## DISCUSSION

The identification by fingerprint is the most reliable. The role of finger prints is of vital importance in establishing the identity of culprits at scene of crime and in the victims of mass disaster.<sup>[9]</sup>

The present study reveals that total no of loops found in left thumb finger were 40, numbers of whorls were 27, and numbers of mixed were 23 and arches were 11. Similar study done by Sam et al., thumbprint pattern analysis showed that, loops were the most common pattern (57.1%), followed by whorls (30.35%), composite (6.35%) whereas arches

were present in a smaller percentage (6.2%) of the study group.<sup>[10]</sup>

It is also evident from the study that loop was the most frequently observed pattern of fingerprint followed by whorls, mixed and arches in both gender. Similar study conducted in south Indian population by Gangadhar et al. and Nithin et al.<sup>[11,12]</sup> The findings proved that, finger print patterns were found to be predominant among females than males and which does not coincide with the study conducted in New Zealand which revealed abundant whorls (55.6%) than loops (43.6%) in males and much higher frequency of whorls (65.6%) and lower frequency of loops (33.7%) in females.<sup>[13]</sup>

Most of the subject in our study belonged to blood group "O" followed by "B", "A" and "AB" blood groups. Similar results were reported by Bharadwaja et al. and Prateek et al.<sup>[14]</sup> On the other hand, in contrary to this study, Mehta et al.<sup>[15]</sup> and Desai et al.<sup>[16]</sup> observed the dominance of blood group "B" followed by blood groups "O" and "A." The frequency of blood group "AB" was least in their study.

This study showed that the loops were of high frequency in O+ve group and least in A- group. Whorls were of high frequency in O+ve and least in A-ve. The frequency of mixed was also high in B+ve and least in A- and AB-. Arches were of high frequency in O+ve and least in A+ve and O-ve. These observations were different from the findings of Hamid et al.<sup>[17]</sup> who reported only 3 patterns among which loops were of high frequency in B+ve and least in AB-ves. The frequency of whorls was also high in B+ve. Arches were of high frequency in B group and least in AB group. In the present study, loop pattern was observed highest number 43 in different blood groups. The whorls 31 and mixed 19 were moderate and arches 8 was the least pattern observed. This findings match with the results of Bharadwaja et al. and Mehta et al. However, in the present study, arches were more common in blood group O+ (4%), B+ (3%) and least in A+ (0.6%) and O- (0.6%) which does not correlate with Aarushi et al.<sup>[18]</sup> where none of arches were reported. This study highlights that blood group A were found to be the most common in males, blood group O was the most commonly seen blood group in females and the study also reveals that frequency of loops, followed by whorls, mixed and arches were greater in females as compared to males.

## CONCLUSION

The purpose of this study was to correlate the relationship between various patterns of fingerprints and "ABO" blood groups and "Rh" blood types amongst gender in north Indian population. Although we know that fingerprints are never alike and they never change from birth till death, this study is an attempt made to associate fingerprints with sex, different blood groups, and Rh blood types

which may in-turn enhance the authenticity of fingerprints in identification and forensic medicine and also can be used for possible prediction of certain diseases.

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