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**ORIGINAL ARTICLE**

# To Assess the Relation between Fingerprint Patterns and Blood Groups

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## ABSTRACT

**Introduction:** One of the greatest ways to identify a person is through their unique fingerprint pattern. They were already in place during the fetal stage and will never alter course or alignment over an individual's lifetime. The ABO and Rh blood types are being explored for the present inquiry, among other patterns of blood grouping. This study included a theoretical effort to link fingerprint patterns to gender and blood grouping.

**Objectives:** It is necessary to examine the fingerprint patterns of people who have certain ABO and Rh blood types to discover Finding any correlation between ABO and Rh blood classes and finger-print patterns

**Materials and Methods:** This study, conducted at the Peoples University of Medical and Health Sciences for Women Shaheed Benazir Abad, Sindh Pakistan, featured around 200 MBBS and BDS students with various blood types. Loops, whorls, and arches were the three types of fingerprints that were got from all the fingers.

**Results:** Following the 'whorling' and 'arches' patterns, the 'loop' pattern was the most common. People with an 'O positive' blood type had the highest number of 'loop' varieties.

**Conclusion:** It was shown that fingerprint morphology and blood type were linked in an existing investigation. Several interesting correlations between blood type distribution patterns and the distribution of human fingerprints were discovered.

## INTRODUCTION

There are little crimsons known as friction ridges on the palms and soles of the feet. There is an imprint of a fingerprint on all the friction ridges. The uniqueness of fingerprints stems from their permanent feature that can never be copied by anyone else for the rest of their lives. An individual's fingerprint is one of the body's most important, precise, and unique features.[1] 1 It is impossible to have identical fingerprints. One in 64,000 million persons has the same fingerprints as another person.[2] Fingerprints, lip prints, footprints, DNA testing, and iris scanning can all be used to verify a person's identification. Primary ridge growth occurs over the basement membrane and is visible in histological foetal preparations during the 12th to 16th week of embryonic development; it is finished by the 24th week.[3] Because of genetic and environmental influences, fingerprints are subjected to stress and strain throughout fetal development.[4] For the fingerprint pattern, the Locard principle of exchange theory dictates. Chemical substances and their metabolites can be detected and exploited for forensics in fingerprint secretions. Dactyloscopy, commonly known as fingerprint identification, is studying the impressions of the established friction skin ridges to determine the identity of a person. The palmar surface and digits can be examined to see if the imprints are consistent.[5] For catching criminals using bank checks, cash, passports, and other methods of identification, dactylography plays a critical role. Unintentional newborn baby trading and the perception of nameless corpses are important from a medical and legal perspective. The blood group system was discovered by Karl Landsteiner in 1901. Antigens on the surface of the red blood cell determine a blood type, which can be either present or missing. The ABO and the Rh methods are the most important. A, B, AB, and O variants of the ABO blood grouping are also dependent on the presence of plasma antigens. The D antigen is used to classify Rhesus strains as positive (Rh+ve) or negative (Rh-ve) in the Rhesus system.[6] The genetics of blood groups is confounded by the presence of gene linkage to other individuals. People with the 'O' blood type are more likely to develop duodenal ulcers, while those with the 'A' blood type are more likely to get stomach cancer. Compared to the general population of other blood types, its prevalence is greater.[7,8] Fingerprint patterns and blood types have been linked in previous investigations using dermatoglyphics.[5,9] There are so many advantages to using fingerprints to identify people, thus this study was conducted in an effort to evaluate various types of fingerprints and their correlation with an individual's sex and blood group.

## MATERIALS AND METHODS

Members of the Institutional Ethical Committee of the Peoples University of Medical and Health Sciences for Women Shaheed Benazir Abad, Sindh Pakistan, have given their approval. Over 200 medical and dentistry students (54 men and 146 women) of all sexes and all ages took part in this study, which was done in the Anatomy Department. The candidates signed a written agreement to take part in the study. The dermatoglyphics were taken using the ink method recommended by Cummins. Loops, whorls, and arches were spotted with the use of a powerful hand lens. Blood type information has also been recorded for later study. Antiserum A, B, and D were employed to categorize the blood group if the type was unknown. Each finger was given a number on the fingerprint slip, for example, the right thumb received the numeral 1 and the left little finger received the numeral 10. Subjects are instructed to wash and dry their hands to eliminate grime and oil. Besides the fingerprints, the proforma gathered information on the participants' ages, genders, and other demographics. A magnifying lens was used to study the different fingerprints.

**Criteria for inclusion:** Prints that are transparent and clear, as well as those that have provided informed consent, will be included.

**Criteria for exclusion:** Any evidence of finger-tip illness or injury that would have altered the fingerprint pattern, such as Hansen's disease, lacerations on the fingers, or smeared prints. Analyses were conducted using descriptive statistics to tabulate and present the findings.

## RESULTS

There were 54 men and 146 women among the 200 participants in this research. The distribution of blood types by gender is seen in Table 1. O blood type was followed by B, A, and AB, with 91.5% of the participants being Rh-Positive. Table 2 shows the distribution of individuals based on their Rh factor blood group. 183 In all, 17 of the 200 participants were Rh+. Most Rh+ subjects belonged to blood groups O, B, A, and AB, with the rest belonging to blood groups B, A, and C. The blood groups O, A, B, and AB made up most of the 17 Rh-subjects. Table 3 shows the distribution of fingerprint patterns by gender for all fingers. There were 1089

loops in all of the digits (54.5 % ). The number of whorls in both hands was 577 (28.8%) and the number of arches was 334 (28.6%). (16.7 %). This graph shows the dominance of loops, whorls, and arches, and the order in which they appear. Table 4 shows the ABO blood group fingerprint pattern dispersion. In addition, the Rh+ blood groups O and B have the highest number of loops. However, loops are more common among Rh persons with blood group O.

Table 1: Distribution of blood groups according to gender

| Blood group | Male (54) | Female (146) | Total (200) |
|---|---|---|---|
| A | 13 (6.5%) | 30 (15%) | 43 (21.5%) |
| B | 15 (7.5%) | 36 (18%) | 51 (25.5%) |
| AB | 4 (12%) | 9 (4.5%) | 13 (6.5%) |
| O | 22 (11%) | 71 (35.5%) | 93 (46.5%) |
| Total | 54 (27%) | 146 (73%) | 200 |

Table 2: Distribution according to Rh factor of blood group

| Blood group | Rh positive | Rh negative | Total |
|---|---|---|---|
| A | 39 | 4 | 43 |
| B | 47 | 4 | 51 |
| AB | 12 | 1 | 13 |
| O | 85 | 8 | 93 |
| Total | 183 (91.5%) | 17 (8.5%) | 200 |

Table 3: Distribution of fingerprint patterns according to gender

| Finger Print pattern | Male (%) | Female (%) | Total |
|---|---|---|---|
| Loop | 255 (12.75%) | 834 (41.7%) | 1089 (54.5%) |
| Whorl | 183 (9.15%) | 394 (19.7%) | 577 (28.8%) |
| Arch | 102 (5.1%) | 232 (11.6%) | 334 (16.7%) |
| Total | 540 | 1460 | 2000 |

Table 4: Distribution of fingerprint patterns amongst A, B, AB, O blood groups with Rh factors

| FP Pattern | A+ | A- | B+ | B- | AB+ | AB- | O+ | O- |
|---|---|---|---|---|---|---|---|---|
| LOOP | 207 | 26 | 240 | 21 | 85 | 5 | 460 | 45 |
| WHORL | 126 | 6 | 150 | 11 | 19 | 3 | 243 | 19 |
| ARCH | 57 | 8 | 80 | 8 | 16 | 2 | 147 | 16 |

Table 5: Comparison of the distribution of primary fingerprint pattern

| Fingerprint pattern | Bhavana et al.[10]11 | Rastogi et. al.[11]12 | Narayana et al[3]3 | Present study |
|---|---|---|---|---|
| LOOP | 58.9% | 60.95% | 56.6% | 54.45% |
| WHORL | 29/6% | 32.55% | 33.7% | 28.85% |
| ARCH | 11.5% | 6.5% | 9.7% | 16.7% |

## DISCUSSION

The imprints made by the epidermis in the flexor compartment of the digit are known as fingerprints. To begin with, Chinese citizens were used to legally signing papers using their fingerprints. Three thousand years ago, the first demographics were performed. In India, Herschel was identified by the use of fingerprinting. [,9] The fingerprint patterns employed in this study include loops, whorls, and arches. Table 5 displays the results of a comparison of fingerprint patterns. A link between fingerprint patterns and blood types has been found in the current investigation. Rh blood types have larger loops, medium whorls, and tiny arches in those with ABO blood types. The broad dispersion pattern of the major fingerprint was the same. Similar findings have been made by Kshirsagar et al. and Bharadwaja et al.[5] The loop pattern was found to be more prevalent in all blood types studied in this investigation. Research by Bhardwaj et al[5], Prateek et al[11], and Gowda & Rao shows high loop frequency, medium whorls, and low arches in the ABO and Rh blood types.

## CONCLUSION

During the current investigation, we compared fingerprint patterns with an individual's gender and blood type. We know fingerprints are unique and will not change from birth to death, but this study attempted to relate fingerprints to gender and blood type, which may help improve the accuracy of fingerprint recognition and the identification of the guilty party when employed in criminal investigations. In this investigation, loops and arches were the most often seen patterns. It was determined that AB negative blood was the rarest, with O positive being the most common. Rh-positive blood types are more common than Rh-negative blood groups. Whorls and arches came in second and loop third in both genders. We may infer from this study that studying fingerprints could be able to determine a person's gender and blood type. This might aid in the victim's identification in forensic medicine.

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