

# The Relation Between Left Thumb Fingerprint Types with Blood Groups and Gender Among Students of Al-Kindy College of Medicine, 2019

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## Abstract

**Background:** The skin of the palms and soles is marked by a unique carved ridge which is called dermatoglyphic. Fingerprints are expected to perform some important physiological functions. Fingerprints are classified into a loop, whorl and arch. There are two systems for blood group classification known as: ABO and Rh.

**Objectives:** To study the pattern of fingerprint on the thumb of the left hand and the association between fingerprint, blood group and gender.

**Methods:** This study is a cross-sectional study. It was conducted in the department of physiology at Al-Kindy College of Medicine, Baghdad, Iraq from December 2018 to March 2019. Total of 315 persons were selected randomly for this study. After taking consent from the subjects, participants were asked to press their left thumb fingertip on the ink pad and then to Pre-designed form to transfer the fingerprint impression.

**Results:** Majority of the subjects (38.7%) in the study were of blood group O followed by blood group B, A and AB of whom Rh-positive was dominant. The distribution of fingerprint pattern is higher (59.4%) in loops followed by whorls and arches. Almost the same order was noticed in both ABO blood groups and Rh blood group, except blood group AB negative were loop and whorl had the same percentage (50.0%).

**Conclusions:** The study has revealed a significant association between blood group types and gender. This study failed to find significant association neither between fingerprint patterns and gender nor between fingerprint patterns and blood group types.

**Keywords:** Left thumb fingerprint; Blood groups; Gender

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## Introduction

The skin of the palms and soles is marked by a carved ridge. The pattern of these ridges on the fingers is called dermatoglyphics [1]. In dermato glyphs, the minute ridge patterns made an impression which has the same arrangement and the pattern of any individual remain unchanged throughout life [2]. The friction ridges of all parts of a finger made an impression known as the fingerprint. A friction ridge is a raised section of the epidermis on the digits or on the palmer and plantar skin, composed of one or more connected ridge units of friction ridge skin [3].

Dermatoglyphics is a polygenic trait with Mundelein or single gene inheritance model; however, an epigenetic contribution may play a role in its form [4,5].

Regarding the embryogenesis of dermatoglyphics, the development initiates from the 12th-16th week and accomplished by the 20th week of intrauterine life [6].

Given the unique appearance of the epidermal ridge, fingerprints are expected to perform some important functions; several functions have been proposed [7]. First, the ridge and furrow system serve to prevent slipping in a manner just as automobile tire treads, secondly as sweat pores open only on the primary ridges and not into furrows, so it is thought that small amount of sweat bathing the ridges might improve their level of friction. Also, since the ridges have extensive nerve endings, they may serve to enhance the sense of touch or to improve tactile stimulation [8]. The many functions probably indicate an evolutionary history within primates, all of which possess fingerprints that placed a premium on their ability to carry out secure grasping behavior, to perceive valuable information about the environment through the sense of touch, as well as to withstand extensive use of volar surfaces in moving apart. These peculiarities act as a means of survival to humans which reflect some ancestral adaptive response. Although the individual dermatoglyphics are variable, the diversity falls within pattern limits that classify them into a loop, whorl and arch [9].



The pattern that starts from one side, move towards the center, curve backwards and terminate on the same side is known as loop pattern. While whorls are a circular or spiral arrangement of ridges in the center, regarding arches, the ridge lines start from one side and end at the opposite end [10,11].

There are four major classifications of blood group: A, B, O, AB types, depending on the presence or absence of two agglutinogens, A and B. If both were absent, then the person will have blood group O. If only A agglutinin is present, the person will have the blood group A. If only B agglutinin is present, the person will have the blood group B. Finally, when both agglutinogens present, then the person will have blood group AB [12].

There are six common types of Rh antigens, known as Rh factors. These types are designated C, D, E, c, d, and e. The type D antigen is widely prevalent in the population and considerably more antigenic than the other Rh antigens. ARh-positive person possesses D antigen, whereas a person who does not have type D antigen is said to be Rh negative.

### Aim of study

1. To study the pattern of fingerprint on the thumb of left hand.
2. To study the association between fingerprint, blood group and gender.

### Sample and Methods

This study is a cross-sectional study. It was conducted in the department of physiology at Al-Kindy College of Medicine, Baghdad, Iraq from December 2018 to March 2019. Total of 315 subjects of 199 female and 116 males were selected randomly for this study. All Subjects were students in Al-Kindy College of medicine.

After taking consent from the subjects, the fingerprints were taken from the left thumb on pre-designed form containing gender and blood groups of participants. All participants were asked to press their left thumb fingertip on the ink pad and then to the paper to transfer the fingerprint impression. This method was applied to all the participants.

Materials used are powerful magnifying hand lens for fingerprint analysis, ink pad and white chart paper. Fingerprints were analyzed and identified with the assistance of fingerprint expert Captain Khalil Shakir.

Statistical analysis was performed with SPSS.17 for the window. Chi-square test was used to compare the qualitative data. Clustered bar figures also were used.

### Results

Out of 315 subjects, the frequencies of blood groups from highest to lowest were O 123 (39%), B 95 (30.2%), A 79 (25.1%) and AB 18 (5.7%). The frequency of Rh positive is 272 (86.3%) while Rh negative frequency is 43 (13.7%).

While the frequencies of fingerprint types in this study are loop 188 (59.7%), whorl 113 (35.9%) and arch 14 (4.4%) (Table 1).

### Discussion

The purpose of this study was to determine fingerprint patterns in relation to gender and blood groups among students of Al-Kindy College of Medicine, Baghdad, Iraq. Studies focusing on such topic have not been undertaken to this extent in this population. This will

serve as an important aid in sex and blood group determination through fingerprint types and vice versa.

Regarding Table 1: The highest distribution of blood groups in male and female is B<sup>+</sup> and O<sup>+</sup> respectively. These results agree with a study was done in Navi Mumbai [13].

There was significant association between gender and blood group (P<0.05) in contrast to study in the Delta State University, Abraka, Nigeria which did not find significant association between gender and blood group (P>0.05) [14].

Regarding Table 2: Distribution of fingerprint types in both genders found that loop had the highest percent followed by whorl and arch, which agree with a study done in Malabar Medical College [15].

In this study, there was no significant association between gender and fingerprint pattern (P>0.05). Similar observation was reported by Eboh, D. and Odokuma E.I. [14,16,17].

Regarding Table 3 and Figure 1: The distribution of the fingerprint pattern in different ABO blood groups [A, B, AB and O] and in Rhesus blood groups showed that loop had the highest percentage, followed by whorls and then arches. It means that regardless of the blood group, loop was the commonest fingerprint pattern followed by whorl and arch. Similar findings were observed by Eboh D (2013) and Prateek R (2010) [14,16].

This study did not find statistically significant association between fingerprint pattern and ABO blood group (P > 0.05). This was in conformity with observation of Eboh D (2013), Odokuma EI (2008) and Kshirsagar SV (2003) who did not find any association between fingerprint patterns and ABO blood groups [14,17,18]. But this finding did not match with observations of similar earlier studies done by Bharadwaja A (2004) and Mehta AA (2011) [19,13].

This study did not find statistically significant association between fingerprint pattern and Rh blood group (P>0.05) in contrast to the study of the Delta State University, Abraka, Nigeria which found significant association [14].

Regarding Table 4: The distribution of the primary fingerprint patterns in individuals with the ABO-Rhesus blood groups was the same for O<sup>+</sup>, O<sup>-</sup>, A<sup>+</sup>, A<sup>-</sup>, B<sup>+</sup>, B<sup>-</sup>, AB<sup>+</sup>, where loop had the highest percentage, followed by whorl while arch comes at the end. However, in AB- blood group, loop and whorl had the same percentage. These findings agree with Eboh D (2013) and Bharadwaja A (2004) [14,19]. Where Eboh D (2013) found that A<sup>-</sup> and O<sup>-</sup> were higher in arch and whorl compared to loop respectively. While Bharadwaja A (2004) found that AB<sup>-</sup> blood groups were higher in whorl than in loop.

In this study there was no significant association between fingerprint patterns and ABO-Rhesus blood group (P value>0.05) this result come in parallel with the result of a research done in Manipal Teaching Hospital and Manipal College of Medical Sciences [20], but it disagrees with the study of the Delta State University, Abraka, Nigeria which found significant association between fingerprint patterns and ABO-Rhesus blood group (P<0.05) [14].

### Conclusion

The study has revealed significant association between blood group types and gender. This study failed to find significant association neither between fingerprint patterns and gender nor between fingerprint patterns and blood group types.



In the above study, loops are the most frequent and arches are the least common fingerprint. The distribution of fingerprints in both gender and blood groups showed that Loops had the highest percent followed by whorls and then arch.

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