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TOTAL FINGER RIDGE COUNT (TFRC) IN 'ABO' BLOOD GROUPS

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ABSTRACT

Objective: To find the correlation between Total Finger Ridge Count and 'ABO' blood groups. **Study design:** Cross-sectional, analytical study. **Study period:** From July 2016 to June 2017. **Study population:** Medical and dental students of Sir Salimullah Medical College, Dhaka Medical College, and International Medical College of age group between 18- 20 years with known Rh (+ve) blood groups. **Sampling technique:** Convenient purposive sampling. **Sample size:** 200 subjects. **Result:** Mean±SD of Total Finger Ridge Count was highest in blood group B (154.46±15.87) and lowest in blood group AB (113.14±11.30). **Conclusion:** This study showed that the Total Finger Ridge Count was highest in blood group B and lowest in blood group AB.

KEYWORDS: Total Finger Ridge Count, Dermatoglyphics, ABO blood group.

INTRODUCTION

Derma means skin, and glyphics means carve. Dermatoglyphics is studying epidermal ridge pattern of skin of fingers, toes, palms & soles.[1] Dr. Harold Cummins and Dr. Charles Midlo first used the term dermatoglyphics in 1926. Hence, Dr. Harold Cummins is the father of dermatoglyphics.[2] Sir Francis Galton classified the dermatoglyphics pattern of human fingertips into loops (about 60-70%), whorls (about 25-35%), and arches (about 6-7%) in 1892.[3] The approximate center of a dermatoglyphics pattern is the core of that ridge pattern.[4] Tri-radius is the meeting point of three opposing ridge systems. Total finger ridges were counted by taking the number of ridges from the tri-radius to the core pattern of both hands' digits. The core forms the center of the pattern area.[5] The important events for establishing the epidermal ridge pattern occur from 10 to 16 weeks.[6] In the 24th week, the epidermal ridge system has an adult morphology. Ridge formation usually starts in the middle of the volar pad. This area forms the center (core) of whorls and loops. This way, three ridge systems appear, which slowly spread over the fingertip, at the location where these ridge systems finally meet forms tri-radius.[7] Once established, these patterns remain unchanged throughout life, varying between individuals.[8] The dermatoglyphics of both hands are not exact. Dermatoglyphics of identical twins may be similar in appearance but truly not identical.[9] For this reason, they are considered the best tool for identification.[8]

The blood group depends on the presence or absence of antigens on the surface of red blood cells (RBCs). These antigens may be sugars or large proteins, depending on the blood group system. The presence or absence of these antigens makes the blood groups different from person to person.[10] Each blood group system is determined by a single gene or a set of genes carried by autosomes.[11] According to the 'ABO' blood group system, human beings may be put into four groups according to the nature of agglutinogens possessed by their corpuscles. These groups are called A, B, AB, and O.[12] These blood groups are determined by the 'ABO' gene, located in chromosome number 9.[13] An individual's blood group does not change in a lifetime and acts as a unique genetic marker for research. These features are also of great value in forensic medicine for detecting crime and determining paternity.[14] Since finger ridge patterns and blood groups both are

genetically determined, there would be some correlation between finger ridge count and blood groups. This study aims to establish a standard baseline data of Total Finger Ridge Count in 'ABO' blood groups of normal healthy individuals and to see the variations in our findings among different types of blood groups.

MATERIAL AND METHODS

The study was a cross-sectional analytical study carried out in the Department of Anatomy, Sir Salimullah Medical College, Dhaka, from July 2016 to June 2017. 200 male medical & dental students of Sir Salimullah Medical College, male medical students of Dhaka Medical College, and International Medical College of age group between 18- 20 years with known Rh (+ve) blood groups were selected randomly. Rh (-ve) blood groups were not included in this study. Subjects with a history of congenital or acquired deformities, trauma or burn, fungal infection of the fingers and palm, genetic and multifactorial diseases like - diabetes mellitus, hypertension, bronchial asthma, and β thalassemia minor were excluded from this study. Ethical clearance was obtained from the Ethical Committee of Sir Salimullah Medical College, Dhaka, Bangladesh.

After attaining due permission from the Principals of Sir Salimullah Medical College, Dhaka Medical College, and International Medical College, informed written consents were taken from the study subjects. Basic details such as the name, age, and blood group of each subject were recorded from the student's ID card and were noted on the upper left side of a white paper. The hands of the individual were washed with liquid soap and wiped with a paper towel. Both hands were painted with the help of an inked roller. Then handprint was taken on that paper containing the primary data fixed on a clipboard. The painted papers were scanned, and data were stored. Dermatoglyphics patterns on fingertips (loops, whorls, arches) were observed. The core and the tri-radius of the pattern were identified by using the 'Paint' software. A line was drawn from the tri-radius to the center of the core of the pattern. The ridges of each finger were counted on the monitor of the laptop. The ridges which crossed or touched the line were included in the ridge count. The ridges which run close to the line without touching the line were excluded from ridge count. The tri-radius and the final ridge, which form the center of the core, were also excluded. Finally, the ridge count of ten (10) fingers was summed up and recorded on datasheets.

- An arch has no tri-radius. So, in arch pattern, ridge count was zero (0) (Photograph 1.a).
- A loop has one tri-radius. In loop pattern, ridges were counted from the tri-radial point to the core (Photograph 1.b).
- A whorl pattern has two tri-radii. Ridges were counted from the core to one of the tri-radial points. The tri-radial point, which had the maximum number of ridges from the core, was selected to count the ridges (Photograph 1.c).

(a) (b) (c)

Photograph 1: Procedure of study of (a) Total Finger Ridge Count in arch pattern (magnified 30% with no error in magnification), (b) Total Finger Ridge Count in loop pattern by drawing a line between the tri-radial point to the point of core (magnified 35% with no error in magnification), and (c) Total Finger Ridge Count in whorl pattern by drawing a line between the tri-radial point to the point of core (magnified 40% with no error in magnification).

Variables were tabulated and analyzed with the help of the SPSS (Statistical Package for Social Science) program.

RESULT

Table I shows the distribution of subjects according to 'ABO' blood groups. Out of 200 subjects, the majority belonged to blood group B (40.5%), blood group O (31.0%), blood group A (21.5%), followed by blood group AB (7.0%).

Table I: Distribution of participants according to 'ABO' blood group (n=200).

Blood group	Number of subjects	Percentage (%)
A	43	21.5
B	81	40.5
O	62	31.0
AB	14	7.0
Total	200	100.0

Table II and figure I show the Total Finger Ridge Count distribution in 'ABO' blood groups. It was observed that mean±SD of Total Finger Ridge Count was highest in blood group B and that was 154.46±15.87 and lowest in blood group AB, and that was 113.14±11.30 and when compared was statistically highly significant (P<0.001). Total Finger Ridge Count ranged from 110.0-176.0 and 101.0-135.0 in blood group B and AB, respectively.

Table II: Total Finger Ridge Count (TFRC) in 'ABO' blood groups.

Blood Groups	Total Finger Ridge Count (Mean±SD)
A (n=43)	127.65±9.62 (106.0-140.0)
B (n=81)	154.46±15.87 (110.0-176.0)
O (n=62)	133.29±11.75 (97.0-150.0)
AB (n=14)	113.14±11.30 (101.0-135.0)
	P-value
A vs B	0.000**
A vs O	0.033*
A vs AB	0.000**
B vs O	0.000**
B vs AB	0.000**
O vs AB	0.000**

Figures in parentheses indicate the range. Comparison between blood groups done by One-way ANOVA. ** = significant at P<0.001, * = significant at P<0.05, n= number of study subject

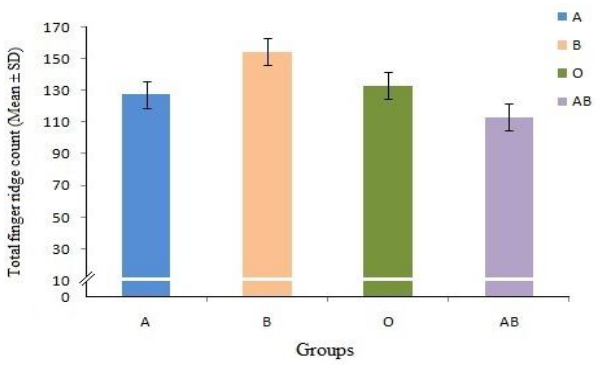

Fig 1: Distribution of Total Finger Ridge Count (TFRC) of hands in 'ABO' blood groups.

DISCUSSION

In the present study, Total Finger Ridge Count was found higher in blood group B and lower in blood group AB.

The results of present study coincide with the findings of studies conducted in Rajasthan, India in 2004, Nagpur, India in 2011, and Benishangul-Gumuz Regional State, Ethiopia in 2015 as they reported that Total Finger Ridge Count was highest in blood group B and lowest in blood group AB.[115,16,17]

Contrary to our findings, a study in Pune, India, in 2015 found that Total Finger Ridge Count was more in blood group A and low in blood group B.[18] Similarly, a study in YARSI University, Jakarta, Indonesia, in 2016 reported that Total Finger Ridge Count was more in blood group O and low in blood group AB.[19]

CONCLUSION

This study revealed that the Total Finger Ridge Count was highest in blood group B and lowest in blood group AB. The above study concludes a significant relation between Total Finger Ridge Count (TFRC) and the 'ABO' blood group system. Further similar studies are recommended to conduct on a larger sample to enhance the authenticity & accuracy of the findings of the present study.

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Financial or Other Competing Interests
None.

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