



# ABSOLUTE FINGER RIDGE COUNT (AFRC) IN 'ABO' BLOOD GROUPS

<sup>1</sup>Sharna Moin, <sup>2</sup>Humaira Naushaba, <sup>3</sup>Laila Farzana

<sup>1</sup>Assistant Professor, <sup>2</sup>Professor & Head, <sup>3</sup>Assistant Professor

<sup>1</sup>Department of Anatomy,

<sup>1</sup>Army Medical College Jashore, Jashore, Bangladesh

**Abstract:** This study has been undertaken to see the variations in Absolute Finger Ridge Count (AFRC) among different types of blood groups. This cross-sectional, analytical study took place from July 2016 to June 2017. Data were collected from 200 medical and dental students of Sir Salimullah Medical College, Dhaka Medical College, and International Medical College of the age group between 18- 20 years with known Rh (+ve) blood groups. In this study, it was revealed that the Absolute Finger Ridge Count was highest in blood group B and lowest in blood group O.

**Index Terms - Absolute Finger Ridge Count, dermatoglyphics, ABO blood group.**

## I. INTRODUCTION

The study of epidermal ridge pattern of thick skin of palms, fingers, soles, and toes is dermatoglyphics [1]. The epidermal ridge pattern starts to establish from 10 to 16 weeks [2]. This system gets an adult morphology around the 24th week [3]. Though it grows in its dimension, the epidermal ridge pattern remains unchanged throughout life. This pattern varies from person to person. Even identical twins never have the same pattern [4]. Hence, this system is considered the most secure and accurate means of identification. It is also preferred as it is the fastest & easiest method of identification. Finger ridge patterns are classified into three patterns- loops, whorls, and arches by Sir Francis Galton in 1892 [5]. The dermatoglyphics pattern's approximate center is the core of that ridge pattern, and the meeting point of three opposing ridge systems is the tri-radius [6,7]. There are two tri-radii of whorl pattern, one tri-radius of loop pattern, and no tri-radius for the arch pattern. If two or more tri-radii are present in a pattern, the tri-radius, which is located close to the core, is considered the tri-radial point. The number of epidermal ridges intersecting a straight line connecting the core and the tri-radius is Absolute Finger Ridge Count [8].

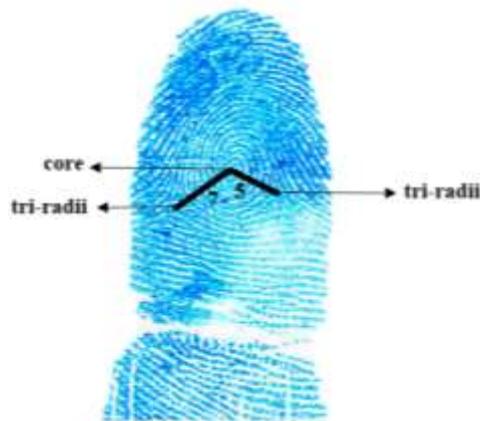
Blood grouping is determined by the presence and absence of antigenic substances on the surface of red blood cells (RBC), which are genetically inherited. Blood groups can be subdivided into Blood groups four basic types: A, B, AB, and O blood groups in the 'ABO' blood group system. 'ABO' gene in chromosome number 9 determines the type of the blood group [9]. As the blood groups are genetically determined, they do not change in a lifetime. This feature is of great importance in forensic medicine for detecting crime and determining paternity [10].

There would be some association between finger ridge count and blood groups since both finger ridge patterns and blood groups are determined genetically. This study aims to establish a standard baseline data of Absolute Finger Ridge Count in 'ABO' blood groups of normal healthy individuals and to see the variations in our findings among different blood groups.

## II. RESEARCH METHODOLOGY

This 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, Dhaka Medical College, and International Medical College of age group between 18- 20 years were selected randomly. All the subjects were of Rh (+ve) blood groups. Subjects with a history of congenital or acquired deformities of the hand, trauma or burn, fungal infection of the fingers and palm were excluded from this study. Genetic and multifactorial diseases like diabetes mellitus, hypertension, bronchial asthma, and  $\beta$  thalassemia minor were also excluded from this study. Researchers obtained Ethical clearance from the Ethical Committee of Sir Salimullah Medical College, Dhaka, Bangladesh.

Subjects were contacted after attaining due permission from Sir Salimullah Medical College, Dhaka Medical College, and International Medical College. The methodology and importance of this study were described to them; after that, informed written consents were taken from them. 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. Their hands 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 basic data fixed on a clipboard. The painted papers were scanned, and data were stored. Dermatoglyphics patterns on fingertips (loops, whorls, arches) were observed, and the ridges on the distal phalanges of all the digits of both hands were counted from all tri-radii present.



Photograph 2.1: Procedure of studying Absolute Finger Ridge Count in whorl pattern from the core to both tri-radii. The ridges of all digits of both hands were counted from all tri-radii, then summated and recorded on data sheets (magnified 50% with no error in magnification)

### III. 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 Absolute Finger Ridge Count distribution in 'ABO' blood groups. It was observed that in right-hand mean±SD of Absolute Finger Ridge Count was highest in blood group B that was 97.17±8.77 and lowest in blood group O that was 78.53±6.48 and when compared was statistically highly significant (P<0.001). Absolute Finger Ridge Count ranged from 76.0-116.0 and 60.0-91.0 in blood group B and blood group O, respectively.

In the left hand, it was further observed that the mean±SD of Absolute Finger Ridge Count was highest in blood group B that was 95.77±10.87, and lowest in blood group AB that was 74.79±5.98 and when compared was statistically highly significant (P<0.001). Absolute Finger Ridge Count ranged from 69.0-116.0 and 64.0-83.0 in blood group B and AB, respectively.

On both hands, the mean±SD of Absolute Finger Ridge Count was highest in blood group B, and that was 192.94±12.59 and lowest in blood group O, and that was 153.35±9.69 and when compared was found to be highly significant (P<0.001). Absolute Finger Ridge Count ranged from 156.0-215.0 and 120.0-168.0 in blood group B and blood group O, respectively.

Table II: Absolute Finger Ridge count in right hand, left hand, and both hands in 'ABO' blood groups

Blood Groups	Right hand Mean±SD	Left hand Mean±SD	Both hands Mean±SD
A (n=43)	88.77±8.00 (73.0-103.0)	84.26±8.69 (71.0-100.0)	173.02±5.44 (162.0-182.0)
B (n=81)	97.17±8.77 (76.0-116.0)	95.77±10.87 (69.0-116.0)	192.94±12.59 (156.0-215.0)
O (n=62)	78.53±6.48 (60.0-91.0)	74.82±5.95 (54.0-86.0)	153.35±9.69 (120.0-168.0)
AB (n=14)	82.43±6.96 (68.0-91.0)	74.79±5.98 (64.0-83.0)	157.21±9.60 (132.0-171.0)
	P value	P value	P value
A vs B	0.000**	0.000**	0.000**
A vs O	0.000**	0.000*	0.000**
A vs AB	0.009*	0.001**	0.000**
B vs O	0.000**	0.000**	0.000**
B vs AB	0.000**	0.000**	0.000**
O vs AB	0.095ns	0.989ns	0.208ns

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, ns = not significant. n= number of study subjects.

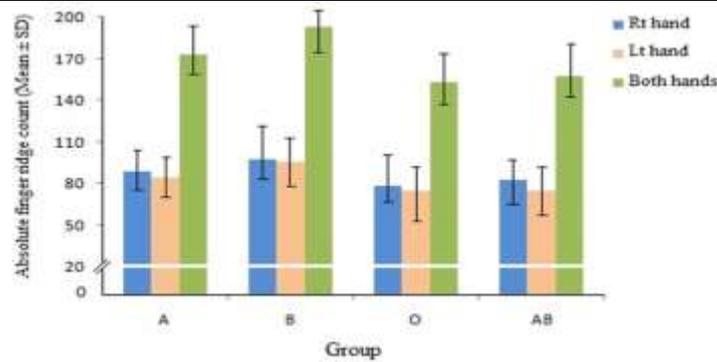


Fig I: Distribution of Absolute Finger Ridge Count of the right hand, left hand, and both hands in 'ABO' blood group

#### IV. DISCUSSION

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

The result of the present study correlates with the study conducted in Nagpur, India, in 2011. They reported that Absolute Finger Ridge Count was higher in blood group B and lower in O [11].

The present study's findings also coincide with the study in Ethiopia conducted in 2015. They found that Absolute Finger Ridge Count was highest in blood group B. However, the Absolute Finger Ridge Count was lower in blood group A, contrary to the present study's results [12].

#### V. CONCLUSION

This study revealed that Absolute Finger Ridge Count was highest in blood group B and lowest in blood group O. The above study concludes that there is a significant relation between Absolute Finger Ridge Count (AFRC) and '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.

#### VI. ACKNOWLEDGMENT

The authors are indeed grateful to Dr. Golam Moin Uddin & Dr. Nasreen Mannan for their valuable opinion & advice and their great role throughout this study.

Our heartfelt thanks to the students of Sir Salimullah Medical College, Dhaka Medical College & International Medical College for their volunteer participation in the study.

#### FINANCIAL OR OTHER COMPETING INTERESTS

None

#### REFERENCES

- [1] Kothari ML, Mehta LA. Essentials Of Human Genetics Fifth Edition. Universities Press; 2009.
- [2] Babler WJ. Prenatal development of dermatoglyphic digital patterns: Associations with epidermal ridge, volar pad, and bone morphology. *Collegium Antropologicum*. 1987 Dec 1;11(2):297-303.
- [3] Kucken M, Newell AC. Fingerprint formation. *Journal of theoretical biology*. 2005, pp.71-83.
- [4] Kumbnani HK. Dermatoglyphics: a review. *Anthropologist Special*. 2007; 3: 285-95.
- [5] Reddy KN, Murty OP. The essentials of forensic medicine and toxicology. 33rd ed., New Delhi, India; Jaypee Brothers Medical Publishers: 2014, pp.85-87.
- [6] Holder EH, Robinson LO, Laub JH. The fingerprint sourcebook. US Department. of Justice, Office of Justice Programs, National Institute of Justice; 2011.
- [7] Gupta UK, Prakash S. Dermatoglyphics: a study of fingertip patterns in bronchial asthma and its genetic disposition. *Kathmandu University medical journal (KUMJ)*. 2003 Oct 1; 1 (4): 267-71.
- [8] Holt SB. The genetics of dermal ridges. Thomas; 1968.
- [9] Daniels G. Human Blood Groups. 2nd edition. Osney Mead, Oxford OX2 0EL; Blackwell Science Ltd: 2002, pp. 1-7.
- [10] Daniels G. Human Blood Groups. 2nd edition. Osney Mead, Oxford OX2 0EL; Blackwell Science Ltd: 2002, pp. 1-7.
- [11] Mehta AA, Mehta AA. Palmar dermatoglyphics in ABO, RH Blood groups. *International Journal of Biological & Medical Research*. 2011; 2 (4): 961-4.
- [12] Yohannes S, Bekele E. Ethiopian population dermatoglyphic study reveals linguistic stratification of diversity. *Public Library of Science (Plos One)*. 2015 Jun 4; 10 (6): e0126897.