



## DISTRIBUTION OF PATTERN OF FINGERPRINTS IN DIFFERENT DIGITS OF DIFFERENT BLOOD GROUPS

### Medical Science

**Ms. Monika Rathee\***

B.Sc., M.Sc. Medical Anatomy, Demonstrator, Department of Anatomy, Pt. B. D. Sharma PGIMS, Rohtak. \*Corresponding Author

**Dr. Shivani Gupta**

M.Sc., Ph.D (Anatomy), Demonstrator, Department of Anatomy, Pt. B. D. Sharma PGIMS, Rohtak.

### ABSTRACT

**Introduction:** Fingerprint patterns being constant and unique are considered as one of the methods of identification. These are classified into loops, whorls and arches. These form a reliable criterion in medico-legal cases.

**Aims & Objectives:** To find distribution of fingerprint patterns in different digits of different blood groups.

**Material & Methods:** The study was conducted in the Anatomy department of National Institute of Medical Sciences University, Jaipur. 150 subjects having different 'ABO' blood groups were selected for the study. Fingerprints were recorded by the ink method in a rolling pattern over plain white paper. The 'ABO' blood groups of each subject were noted from the medical laboratory register of the university.

**Results:** The thumb, middle and little fingers of A, B, AB & O blood groups showed high frequency of loops i.e. Blood group A (l-23.5%, t & m-22.4%), blood group B (l-25.1%, t & m- 20.7%) and blood group O (l-23.5%, m-22.5%, t-21.0%) and blood group AB (l-25.9%, t & m-22.2%). Whorls were found to be high in ring and index fingers i.e. Blood group A (r-37.0%, i-20.9%), blood group B (r-32.2%, i- 20.6%) and blood group O (r-33.3%, i-19.8%) and blood group AB (r-36.8%, i-23.6%). Index and middle fingers of all blood groups showed comparatively high frequency of arches then other fingers i.e. Blood group A (i-50%, m-35%), blood group B (i-52.1%, m- 28.2%) and blood group O (i-40%, t-20%, m-16%) and blood group AB (i-36.3%, m-27.2%). All digits showed highest frequency of loops followed by whorls and arches.

**Conclusion:** This study may help to associate fingerprints with blood group of an individual which in turn can enhance the authenticity of the fingerprints in identification and detection of criminals.

### KEYWORDS

Blood groups, Digits, Fingerprint pattern.

#### INTRODUCTION:

Fingerprint is defined as an impression of the curved lines of skin at the end of a finger that is left on a surface or made by pressing an inked finger onto paper. Fingerprint patterns being constant and unique are considered as one of the methods of identification. These are formed during the third or fourth month of the fetal life<sup>1</sup>. These are determined partly by hereditary and partly by accidental or environment influence which produces stress and tension in their growth during fetal life<sup>2</sup>.

These are classified into loops, whorls and arches<sup>3</sup>.

**Loops-** The lines coming from one side returning in the middle to the same side.

**Whorls-** The one or more of the ridge lines curves around the core to form a circle or spiral or other rounded, constantly curving form.

**Arches-** The lines are going like waves from one side to the other side.

Blood grouping is also one of the most reliable identification methods. A, B, AB, and O blood groups are classification of ABO system based on the presence of corresponding antigen in plasma. Correlating finger prints with blood groups may be useful in forensic science in accurate identification of an individual than by using finger prints alone. These form a reliable criterion in medico-legal cases. Fingerprint pattern and blood groups both show ethnic and genetic variations<sup>4</sup> and these patterns are different for each finger(digit) in different blood groups.

The present study is aimed to analyze the fingerprint patterns in different digits with different blood groups which may help in identification and detection of criminals.

#### MATERIAL & METHODS:

The study was conducted in the Anatomy department of National Institute of Medical Sciences University, Jaipur. 150 subjects having different 'ABO' blood groups were selected for the study. Fingerprints were recorded by the ink method in a rolling pattern over plain white paper suggested by Cummins<sup>5</sup>. The 'ABO' blood groups of each subject were noted from the medical laboratory register of the university.

**Materials Used-** self inking pad, Plain white paper, Magnifying lens.

#### RESULTS:

The results of the study showed that loops were the most common pattern, registering (65.8%) frequency in the study, followed by whorls

(27.4%) and arches (6.8%). (Table 1)

**Table 1: General Distribution Of Primary Fingerprint Patterns In All Fingers Of Both Hands**

PATTERN OF FINGER PRINTS	TOTAL	PERCENTAGE
Loops	987	65.8%
Whorls	411	27.4%
Arches	102	6.8%
Total	1500	100%

**Table 2: Distribution Of Cases According To Blood Groups**

BLOOD GROUPS	NO. OF CASES	PERCENTAGE (%)
A	26	17.33%
B	61	40.66%
AB	13	8.67%
O	50	33.33%

Most common blood group among subjects was 'B' blood group (40.66%) followed by 'O' (33.33%), 'A' (17.33%) and least number of subjects were of blood group 'AB' (8.67%). (Table 2)

**Table 3: General Distribution Of Patterns Of Finger Prints In Different Digits**

INDIVIDUAL FINGERS	FINGERPRINT PATTERNS		
	LOOPS	WHORLS	ARCHES
Thumb	210	77	13
Index	167	85	48
Middle	215	58	27
Ring	164	139	7
Little	241	52	7

Number of loops were maximum in little finger, whorls were maximum in ring finger and arches were found to be maximum in index finger. (Table 3)

**Table 4: Distribution Of Patterns Of Fingerprints In Different Fingers Of Blood Group 'A' Subjects**

Individual Finger	Fingerprint Patterns		
	Loops	Whorls	Arches
Thumb	40 (22.4%)	11 (17.7%)	1 (5%)
Index	29 (16.2%)	13 (20.9%)	10 (50%)
Middle	40 (22.4%)	5 (8%)	7 (35%)
Ring	27 (15.2%)	23 (37%)	2 (10%)
Little	42 (23.5%)	10 (16.1%)	0

Total pattern	178	62	20
---------------	-----	----	----

The blood group 'A' subjects had the highest frequency of loops in little finger, whorls were more in ring finger and arches were found to be highest in index finger. (Table 4)

**Table 5: Distribution Of Patterns Of Fingerprints In Different Fingers Of Blood Group 'B' Subjects**

Individual Finger	Fingerprint Patterns		
	Loops	Whorls	Arches
Thumb	85 (20.7%)	32 (20.6%)	5 (10.8%)
Index	66 (16.1%)	32 (20.6%)	24 (52.1%)
Middle	85(20.7%)	24 (15.4%)	13 (28.2%)
Ring	70 (17.1%)	50 (32.2%)	2 (4.3%)
Little	103 (25.1%)	17 (10.9%)	2 (4.3%)
Total pattern	409	155	46

The blood group 'B' subjects had the highest frequency of loops in little finger, whorls were more in ring finger and arches were found to be highest in index finger. (Table 5)

**Table 6: Distribution Of Patterns Of Fingerprints In Different Fingers Of Blood Group 'O' Subjects**

Individual Finger	Fingerprint Patterns		
	Loops	Whorls	Arches
Thumb	67 (21%)	28 (17.9%)	5 (20%)
Index	59 (18.4%)	31 (19.8%)	10 (40%)
Middle	72 (22.5%)	24 (15.3%)	4 (16%)
Ring	46 (14.4%)	52 (33.3%)	2 (8%)
Little	75 (23.5%)	21 (13.4%)	4 (16%)
Total pattern	319	156	25

The blood group 'O' subjects had the highest frequency of loops in little finger, whorls were more in ring finger and arches were found to be highest in index finger. (Table 6)

**Table 7: Distribution Of Patterns Of Fingerprints In Different Fingers Of Blood Group 'AB' Subjects**

Individual Finger	Fingerprint Patterns		
	Loops	Whorls	Arches
Thumb	18 (22.2%)	6 (15.7%)	2 (18.1%)
Index	13 (16%)	9 (23.6%)	4 (36.3%)
Middle	18 (22.2%)	5 (13.1%)	3 (27.2%)
Ring	11 (13.5%)	14 (36.8%)	1 (9%)
Little	21 (25.9%)	4 (10.5%)	1 (9%)
Total pattern	81	38	11

The blood group 'AB' subjects had the highest frequency of loops in little finger, whorls were more in ring finger and arches were found to be highest in index finger. (Table 7)

## DISCUSSION:

The aim of present study was to find an association between distribution of fingerprint patterns and blood groups. Similar association was found in the studies done by Bharadwaja et al<sup>5</sup> and Mehta & Mehta<sup>6</sup>.

In general distribution, loops have maximum frequency, whorls have moderate and arches have minimum frequency which are similar to the studies done by Bharadwaja & Saraswat<sup>7</sup>, M. Abasi & Mengal<sup>8</sup>, Raloti & Shah<sup>9</sup> and Ekanem et al<sup>10</sup>.

In all blood groups i.e. 'A', 'B', 'O' And 'AB', loops are predominant followed by whorls and arches are least in number. These same findings are seen in studies done by Prateek<sup>11</sup>, Gowda & Rao<sup>12</sup> and Bharadwaja et al<sup>5</sup>.

The present study showed that loops are most common in little finger and least in ring finger of all blood groups except 'B' blood group in which index finger has minimum number. Whorls are highest in ring finger and least in little finger of all blood groups except in blood group 'A' in which middle finger has less number. Number of arches are maximum in index finger and minimum in ring and little fingers of all blood groups. These findings of loops, whorls and arches are same to the findings of Bharadwaja et al<sup>5</sup> and Sudikshya KC et al<sup>13</sup> and Shashikala & Ashwini<sup>14</sup> except Bharadwaja et al found that in blood group 'AB', index finger has lowest number of loops and in blood group 'O', middle finger has lowest number of whorls. Contrary to present study, Fayrouz et al<sup>15</sup> noted high frequency of loops in thumb and index

finger in all blood groups and high frequency of arches in little finger of all blood groups i.e. 'A', 'B' And 'O' except in blood group 'AB' in where ring finger has higher arches.

## CONCLUSION:

These findings may help to associate fingerprints with blood group of an individual which in turn can enhance the authenticity of the fingerprints in identification and detection of criminals in medico-legal cases.

## REFERENCES:

- Cummins H., Kennedy R.W. (1940). Physiological Examination of visual organ and of the cutaneous system. Am J Crim Law Criminal 31:343-56.
- Cummins H. Palmar and Plantar Epidermal Ridge Configuration (Dermatoglyphics) in Europeans and Americans. Am. J. Phy. Anthrop. 1926; 179: 741-802.
- Galton F, Textbook of Finger Prints. London: Macmillan and Co. 1892.
- Vij K. (2005). Textbook of Forensic Medicine and Toxicology. 3rd ed. Elsevier, New Delhi. 89-91.
- Bharadwaja A., et al. Pattern of fingerprints in different ABO blood groups. JIAFM. 2004; 26(1): 6-9.
- Mehta AA, Mehta AA. Palmer dermatoglyphis in ABO, RH blood groups. Int J Biol Med Res. 2011; 2(4): 961-964.
- Bharadwaja A., Saraswat P.K., Aggarwal S.K., Banerji P. Bharadwaja S. (2004). Pattern of fingerprints in different ABO blood groups. J Indian Acad Forensic Med 26 (1):6-9.
- Mudaser H.A, Muhammad A. M, Rana M. A. Khan. Muhammad Hammad, Haroon Habib, Yasir Ali Bhatt; Comparative Study of Dactylography among the Students of Avicenna Medical College Lahore, 2012.
- Raloti SK, Shah KA, Patel VC, Mori RN, Chaudhari NK. An Effort to Determine Blood Group and Gender from Pattern of Finger Prints. Natl J Community Med 2013; 4(1): 158-60.
- A.U. Ekanem, H. Abubakar and N. I. Dibal; A Study of Fingerprints in Relation to Gender and Blood Group. IOSR Journal of Dental and Medical Sciences, 2014; 13(8) :18-20.
- Encarta (2009). Microsoft Encarta Dictionary. 1993-2008. Microsoft Corporation.
- Gowda M.S., Rao C.P. A study to evaluate relationship between dermatoglyphic features and blood groups. J Anat Soc India, 1996; 45: 39.
- KC Sudikshya, Maharajan N, Adhikari N and Shrestha P. Qualitative Analysis of primary fingerprints in different blood group and gender in Nepalese. Anatomy Research International, 2018;7.
- RL Shashikala and SJ Ashwini. Digital dermatoglyphic and ABO blood groups. Indian Journal of Forensic Medicine and Pathology, 2011; 4(2): 77-81.
- IN Faayrouz, N Farida and AH Irshad. Relation between fingerprints and different blood groups. Journal of Forensic and Legal Medicine, 2012; 19(1): 18-21.