

## PATTERN OF FINGER-PRINTS IN DIFFERENT ABO BLOOD GROUPS

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### ABSTRACT:

Finger print (dactylography / dermatoglyphic) is considered as the best tool of identification. This study was carried out in 2000-2001 on 300 students of different ABA blood groups of Medical College, Ajmer with two objectives, viz. (a) To study distribution of finger print pattern among the subjects having different ABO and Rh blood group and (b) Correlate any relation between their characters and blood groups. Male: female ratio was 2.4:1. Majority of the subjects (38.33%) in the study were of blood group A followed by blood group B, A and AB of whom 95.67% were Rh-positive. The general distribution of pattern of finger print showed high frequency (51.87%) of loops whereas whorls were moderate (35.83%) and arches were least (12.30%) in frequency. Almost same order was noticed in both Rh-positive and Rh-negative individuals or A, B, AB and O blood groups. Blood group A showed more loops (Rh +ve 54.26%, Rh -ve 60%) while, blood group AB had more whorls (Rh +ve 43.34%, Rh -ve 60%). The study suggests an association between finger print pattern and blood group. The distribution of different pattern of finger prints in individual fingers also showed some peculiarities in relation to blood group. The total finger ridge count (TFRC) was significantly greater in blood group B.

**KEY WORDS:** Finger Print, Dermatoglyphic, Dactylography, Identification.

### INTRODUCTION:

Cummins [1] coined the term dermatoglyphic (derma=skin + glyphs=curves) to the dermal ridge configurations on the digits, palm and sole. They develop between 13th to 19th weeks of prenatal life, Purkinje [2] for the first time distinguished nine principal configurations of rugae and sulci present on the terminal phalanges of human hands. Faulds [3] mentioned that the pattern of these papillary ridges remain unchanged in an individual throughout life. Herschel [4] used finger prints for personal identification in India. Galton [5] classified the types of finger prints depending upon their primary pattern as loops, whorl and arches. Cummins [1] found that the configurations of ridge pattern are determined partly by heredity and partly by accidental or environmental influence, which produce stress and tension in their growth during foetal life. Forest [6] reported that dermatoglyphic are laid down early in embryogenesis and represent

a part of structural constitution Bloterogel and Bloterogel [7] expressed a correlation between physical characters and blood groups. Hahne [8] in his study asserted that blood group O is associated with more loops and less whorls than blood group A. Herch [9] found high frequency of loops in blood group A. Recently in India Gowda and Rao [10] in their study on Gowda Saraswat Brahmin community of south Kannada district (Karnataka) reported high frequency of loops with moderate whorls and low arches in the individuals of A, B and O blood group. They also found significantly greater number of loops in Rh-Positive and whorls in Rh-negative subjects in their study total finger ridge count (TFRC) were higher in blood group A. The objective of study; carried out in the department of anatomy in JLN Medical College, Ajmer (Rajasthan) was to ascertain trends of finger prints in individuals with different ABO and Rh blood groups along with evaluation of relationship

between the pattern of finger prints and blood groups.

**MATERIAL AND METHOD:**

This study was carried out in the department of Anatomy at JLN Medical College, Ajmer. 300 medical students were randomly selected for study and their finger prints were studied. For taking dermatoglyphics, Ink Method suggested by Cummins [1] was used. Kores camel duplicating ink was spread with the help of a roller over an inking slab. A 15" x 6" sized plain glass was used as inking slab. The smeared palm and fingers of both hands were printed on a durable plain paper laid down on a pressure pad. Primary patterns (loops, whorl and arches) were observed along with the total ridge counting with the help of a powerful hand lens

**OBSERVATIONS:**

**Sex and Blood Group (Table - 1)**

Males out numbered the females in this study, the male: female ratio being 2.4:1. Majority of cases 115 (38.33%) in the study belonged to blood group O; followed by blood group B, A and AB which were 110 (36.67%), 50 (16.67%) and 25 (8.33%) respectively.

**Rh Blood Group (Table - 2)**

287 (95.67%) cases in the study had Rh-positive factor, of which 108 (36.0%) each belonged to blood group O and B. 47 (15.67%) cases were having A. Blood group with Rh-positive factor and almost half this number 24 (8.0%) belonged to AB positive blood group. Most of the Rh-negative cases 7 (2.33%) were of blood group O

**Type of Finger Print (Table - 3)**

Loops were the most common pattern,

Table: 1 Distribution of cases according to sex and blood groups

Sex	Blood group				Total
	A	B	AB	O	
Male	35 (11.67%)	75 (25.0%)	18 (6.0%)	84 (28.0%)	212 (70.7%)
Female	15 (5.3%)	35 (11.67%)	7 (2.33%)	31 (10.33%)	88 (29.33%)
Total (n)	50 (16.67%)	110 (36.6%)	25 (8.33%)	115 (38.33%)	300 (100%)

Table: 2 Distribution of cases according to Rh blood groups.

Blood group	Rh - positive	Rh - negative
A	47 (15.67%)	03 (01 %)
B	108 (36.0%)	02 (0.67%)
AB	24 (8.0%)	01 (0.33%)
O	108 (36.0%)	07 (2.33%)
Total (n)	287 (95.67%)	13 (04.33%)

Table: 3 General distributions of primary finger print patterns in all fingers of both hands

Pattern of finger print	Total	Percentage
Loops	1556	51.87
Whorls	1075	35.83
Arches	369	12.30
Total	3000	100

Table: 4 Distribution of pattern of finger prints among subjects of A, B, O and Rh blood groups (n = 3000)

Type of Finger print	Blood gr. A		Blood gr. B		Blood gr. AB		Blood gr. O	
	Rh +ve	Rh -ve	Rh +ve	Rh -ve	Rh +ve	Rh -ve	Rh +ve	Rh -ve
Whorl	169 (35.96%)	8 (26.67%)	36 (33.33%)	07 (35.0%)	104 (43.34%)	6 (60.0%)	400 (37.04%)	21 (30.0%)
Loops	255 (54.26%)	18 (60.0%)	579 (53.61%)	9 (45.0%)	125 (52.08%)	3 (30.0%)	528 (48.09%)	39 (55.71%)
Arches	46 (9.78%)	4 (13.33%)	141 (13.06%)	4 (20.0%)	11 (4.58%)	1 (10.0%)	152 (14.07%)	10 (14.29%)
Total (n)	470	30	1080	20	240	10	1080	70

Table: 5 Distribution of pattern of finger prints in different fingers of both hands of subjects (n = 300 x 2) (l = loops, W = whorls and A = arches)

Individual Finger	Blood groups											
	A (n = 50x2)			B (n = 110x2)			AB (n = 25x2)			O (n = 115x2)		
	l	W	A	l	W	A	l	W	A	l	W	A
Thumb (t)	53 53%	38 38%	9 9%	133 60.4%	73 33.1%	14 6.3%	22 44%	28 56%	0 0%	133 57.8%	79 34.3%	18 7.8%
Index (i)	41 41%	41 41%	18 18%	79 35.9%	75 34.1%	66 30%	16 32%	26 52%	8 16%	74 32.1%	91 39.5%	65 28.2%
Middle (m)	64 64%	20 20%	16 16%	141 64.1%	41 18.6%	38 17.2%	30 60%	18 36%	2 4%	128 55.6%	61 26.5%	41 17.8%
Ring (r)	35 35%	61 61%	4 4%	73 33.1%	127 57.7%	20 9.1%	20 40%	28 56%	2 4%	65 28.2%	144 62.6%	21 9.1%
Little (l)	80 80%	17 17%	3 3%	162 73.6%	51 23.2%	7 3.2%	40 80%	10 20%	0 0%	167 72.6%	46 28%	17 7.3%

Table: 6 Total finger ridge counts in A, B, O blood groups

Blood group	Total finger ridge count		Total
	Right hand	Left hand	
A	3330	3766	6496
B	6557	6873	13430
AB	1782	1637	3419
O	6011	5803	11814

registering 51.87% frequency in the study; followed by whorls (35.83%) and arches (12.30%).

**Pattern of Finger Prints in Different Blood Groups (Table - 4)**

Frequency of loops was highest in both the Rh-positive and Rh- negative subjects of ABO blood groups; followed by whorls and arches except,

blood group AB where the incidences of whorls (43.34% in Rh +ve and 60% in Rh-ve) were more. Incidence of loops varied between 30% (in 'AB' negatives) to 60% (in 'A' negatives) among the subject of different blood group of whom, blood group A showed highest loops (Rh +ve 54.26%, and Rh -ve 60%). Whorls showed moderate

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frequency followed by arches ranging between 26.67% (in 'A' negatives) to 60% (in 'AB' negatives) and 4.58% (in 'AB' positives) to 20% (in 'B' negatives) respectively.

#### **Pattern of Finger Prints in Different Fingers (Table - 5)**

The thumb, middle and little fingers of A, B and O blood group showed high frequency of loops i.e. Blood group A (t-53%, m-64% and l-80%); blood group B (t-79%, m-64.09% and l-73.64%) and blood group O (t-57.82%, m-55.65% and l-72.61 %). Whorls were more in ring fingers (blood group 'A' 61 %, 'B' 57.73% and 'O' 62.61 %). Individuals of AB blood group also presented more whorls in their thumbs (56%), index (52%) and ring (56%) fingers whereas; their middle and little fingers have 60% and 80% loops respectively. Frequency of arches were least (less than -10%) in majority of cases but index and middle fingers of blood group A, B and O individuals showed comparatively high frequency.

#### **Total Finger Ridge Counts (TFRC) In Different Blood Groups (Table - 6)**

TFRC was highest in blood group B (13,430) followed blood group O (11,814). In blood group A the TFRC was about half (6496) and in blood group AB it was about one fourth (3419) of the number of counts in blood group B and O. TFRC was almost equal in both hands.

#### **DISCUSSION:**

The present study reveals that there is an association between distribution of finger print (dermatoglyphic) pattern and blood groups [6, 7, 8, 9, 10] the general distribution pattern of the primary finger print was of the same order in individuals with A, B, AB and O blood group i.e. High frequency of loops, moderate of whorls and low of arches [8, 9, 10] the same findings were seen in Rh-positive and Rh-negative individuals of ABO blood group. The correlation is more consistent for blood group A and loops [10], arches were more in blood group AB in present study. The distribution pattern in individual fingers had high frequency of loops in thumb and little finger whereas ring fingers had more whorls and index and middle fingers presented higher incidences of arches in subjects of A, B and O blood groups. Individuals of blood group AB had high frequency of whorl in thumb, index and ring

fingers while middle and little fingers showed more number of loops. None of the previous studies had emphasized on the distribution of different finger prints in different fingers of both the hands. Our study revealed high total finger ridge count in blood group B which is contrary to other studies where, blood group A had a significantly greater number of TFRC.

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