

# DERMATOGLYPHICS AND BLOOD GROUP IN MEDICAL STUDENTS OF KHYBER MEDICAL COLLEGE AND KHYBER COLLEGE OF DENTISTRY, PESHAWAR

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## ABSTRACT

**Objectives:** To find an association between finger print pattern and blood group.

**Materials and Methods:** Study was conducted on 400 healthy medical and dental students of Khyber Medical College and Khyber College of dentistry, Peshawar. The finger prints was categorized into arches, loops and whorls pattern. The statistical analysis was done by using frequency distribution and chi square test. A P value of  $\leq 0.05$  was considered statistically significant. SPSS version 22 was used for analysis.

**Results:** Results of this study showed that loops had the highest percentage as 53.47% in the RH+ blood type and 5.07% in the RH- blood type. This was followed by the whorl fingerprint pattern as 29.57% in the RH+ blood type and 3.07% in the RH- blood type. The lowest percentage was found for the arch fingerprint pattern as 8.2% and 0.06% for RH+ and RH- blood types, respectively.

**Conclusion:** On basis of the findings in this study, there is an association of fingerprint patterns of all the digits of both hands with the ABO blood group types and this information can be of great help in forensic department and crime investigations.

**Key Words:** Finger print, blood group, medico legal cases

## INTRODUCTION

Dermatoglyphics is a Greek word, meaning “Derma: Skin, Glyphe: Carve”<sup>1,2</sup>. Dermatoglyphics is defined as the systematic study of logically happening epidermal ridges and arrangement on the digit, palm, and sole beside flexion line and resultant crease<sup>3</sup>. The phrase dermatoglyphics was originally invented in 1926 by Anatomist Harold Cummins. His research revealed that pattern of ridges on the sole and foot is determined by genetics and by chance or due to environmental factors in the womb<sup>4</sup>. Finger prints start to develop from 12th to 16th week of intrauterine life and is completed by 20th week<sup>5</sup>.

<sup>6</sup>. These prints are unique to each individual and remain so till death. These prints are the individual's recognition as a person<sup>7</sup>. They play an important role in medico-legal cases for identification of criminals and persons who have come in contact with the crime scene and also for the diagnosis of genetic diseases.

Fingerprints are also widely used in biometric systems, authentication of electronic registration, transactions of cash, access to annals and for forensic intention<sup>8-10</sup>. Blood group ABO system was identified by Austrian Scientist Karl Landsteiner at University of Vienna<sup>11</sup>. The common blood groups globally are ABO and Rhesus groups. These are further grouped into four different types based on the presence or absence of a characteristic antigen on surface of the red blood cells. The system of “Rhesus” is grouped into two types according to the status of D antigen Rh -ve and Rh+ve<sup>12-14</sup>. A research has reported in-

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creased number of whorls in blood type AB+ 43.34% and AB- 60%, while loops were found 54.26% in A+ and 60% in A-, revealing a relationship of dermatoglyphics with blood groups<sup>15</sup>.

Increased quantity of arches and decreased quantity of whorls were found in A- individuals<sup>16, 17</sup>. A Maiduguri study showed that males have large percentage of loops while females have arches patterns, and which is contradictory to the study on Americans females of African origin having loops and arches were more frequent as compared to males whom whorls patterns were more prevalent<sup>18</sup>. Studies have been done on finger printing and blood grouping separately but no research has been done in our set up in order to correlate the dermatoglyphics with various blood groups. This study was conducted to obtain base line information, which can be of valuable significance in determination of blood group and may also compliment the dermatoglyphics in the investigation of various crimes and criminals.

The objective of this study was to find an association between dermatoglyphics and blood group in medical students of Khyber Medical College and Khyber College of Dentistry, Peshawar, Khyber Pakhtunkhwa.

### MATERIALS AND METHODS

A study amongst 400 medical and dental students of Khyber medical college and Khyber College of dentistry, Peshawar was carried out in 2019. All those students who were present on the day of interview and willing to participate in the study were included in the study population. Those having hand injury or had bandage on the hand or had any deformity of hands were not included in the study population. After ethical approval from the Institutional research and ethical review board (IREB), informed consent was obtained and confidentiality was maintain.

A pretesting questionnaire was implemented. Hands were washed with soap and water and were then air dried. Each finger of the subject was placed on the stamp pad starting from right thumb and ending with left little finger and the fingerprints impression was obtained on the specialized page in a sequence as shown in (Figure 1.1).

A gentle pressure was applied in order to have clear uniform print. Smudged and double prints were discarded and the procedure was repeated. The prints

were air dried and were studied using a magnifying lens. The ink was removed by using soap and water. The fingers i.e. the thumb, index, middle, ring and little fingers were assigned numbers 1, 2, 3, 4 and 5, respectively. The fingerprint patterns were then studied and identified as being loop, whorl or arch with the aid of a magnifying lens and recorded on data sheet. The data recorded was entered in SPSS software, version 22 and the statistical analysis was done by using frequency distribution and non-parametric test i.e. chi square test. A P value of < 0.05 was considered statistically significant.

### RESULTS

The fingerprint pattern of loops had the highest percentage as 53.47% in the RH+ blood type and 5.07% in the RH- blood type. This was followed by the whorl fingerprint pattern as 29.57% in the RH+ blood type and 3.07% in the RH- blood type. The lowest percentage was found for the arch fingerprint pattern as 8.2% and 0.06% for RH+ and RH- blood types, respectively.

Table 1 shows that loops were more prevalent in ABO-Rhesus blood group system followed by the whorl pattern and arch fingerprint pattern had the lowest distribution among different blood types. Significant correlation was observed between the distribution of fingerprint patterns and its prevalence among the various blood group types (P < 0.05). For detail see table 2.

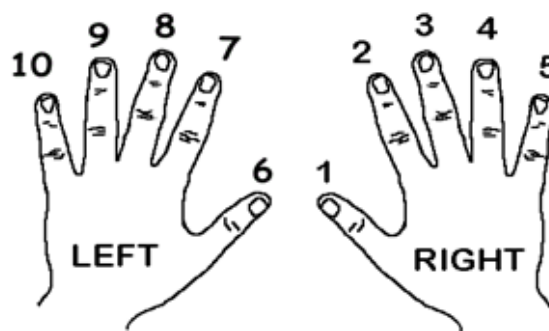


Table 1: Finger prints impression sequence

**Table 1: Fingerprint patterns distribution with respect to ABO-Rhesus type**

ABO-Rhesus type	Fingerprint pattern			Total	P value
	Arch	Loop	Whorl		
A+	62 (1.55%)	497 (12.42%)	291 (7.27%)	850 (21.25%)	0.001
A-	8 (0.02%)	56 (1.4%)	36 (0.09%)	100 (2.5%)	
B+	113 (2.82%)	750 (18.75%)	397 (9.92%)	1160 (29%)	
B-	6 (0.01%)	37 (0.92%)	47 (1.17%)	90 (2.25%)	
AB+	29 (0.07%)	215 (5.37%)	86 (2.15%)	330 (8.25%)	
O+	124 (3.1%)	677 (16.92%)	409 (10.22%)	1210 (30.25%)	
O-	6 (0.01%)	72 (18%)	32 (0.08%)	110 (2.75%)	
AB-	4 (0.1%)	38 (0.09%)	8 (0.02%)	50 (1.25%)	
Total	352 (8.8%)	2342 (58.55%)	1306 (32.65%)	4000 (100%)	

## DISCUSSION

The loop pattern was seen to be more prevalent in RH+ individuals and was calculated as 53.47%, while the whorls pattern was found to be 29.57% in this study. This relationship between the fingerprints patterns and blood types was found to be significant ( $P < 0.05$ ). A previous study has reported that the loop patterns were more common in AB, while low in O blood group. The percentage of loops in AB blood type was 61.76% and lowest in blood group O (48%). The increased frequency of loops patterns in the middle and little fingers of all the blood groups were reported as blood group “A” (M, 65.79%, and L, 75.26%), blood group “B” (M, 60.74%, and L, 72.96%), blood group “AB” (M, 75.00%, and L, 81.57%), and blood group “O” (M, 62.5%, and L, 71.21%). The data showed that the whorls prevalence was higher in the ring finger of all blood groups except blood group O, that is, blood type “A” (R, 50.00%), “B” (R, 41.48%), “AB” (R, 39.50%), and “O” (Thumb, 44.32%). Similar findings have been observed in a study conducted on students in Forensic department in India<sup>15-17</sup>.

Moreover, a study conducted on medical students in Libya showed that the loops were predominantly seen in thumb, index, and ring finger of all blood groups. The variation could be due to the geographical location or the genetic predisposition, which were not considered by the researchers<sup>18</sup>.

This study showed that the frequency of arches was less than 10% in majority of cases but the index finger of all blood groups and occurred in blood group “A” (10.0%), blood group “O” (14.4%) followed by middle finger in blood group “B” (12.22%)

and ring finger in blood group “AB” (10.53%). These finding are supported by a previous study performed on the medical students in anatomy department in India<sup>17</sup>. Furthermore, in an another study, in Libya, it was revealed that the higher number of arches was reported in little finger of blood types A, B, and O as 14%, 23% and 19% respectively, while in AB type, the arches were found in higher percentage in the ring finger as 22%<sup>18</sup>.

## CONCLUSION

On basis of the findings in this study, we found an association of fingerprint patterns of all the digits of both hands with the ABO blood group types and this information can be of great help in forensic department and crime investigations.

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Table 2: Distribution of fingerprint patterns of both hands among the ABO blood groups types

(A = Arch, L = loops, W = whorl)

Individual Finger	Blood group type A (n = 950)			Blood group type B (n = 1350)			Blood group type AB (n = 380)			Blood group type O (n = 1320)		
	A	L	W	A	L	W	A	L	W	A	L	W
Thumb	11	101	78	16	152	102	7	45	24	16	131	117
(% types of fingerprints with- in each blood group)	(5.78%)	(53.15%)	(41.05%)	(5.92%)	(56.29%)	(37.78%)	(9.21%)	(59.21%)	(31.58%)	(6.06%)	(49.62%)	(44.32%)
Index finger	19	99	72	30	135	105	5	51	20	38	124	102
(% types of fingerprints with- in each blood group)	(10%)	(52.10%)	(37.94%)	(11.11%)	(50%)	(38.89%)	(6.58%)	(67.1%)	(26.31%)	(14.40%)	(45.97%)	(38.64%)
Middle finger	18	125	47	33	164	73	7	57	12	28	165	71
(% types of fingerprints with- in each blood group)	(9.47%)	(65.79%)	(24.74%)	(12.22%)	(60.74%)	(27.04%)	(9.21%)	(75%)	(15.79%)	(10.61%)	(62.5%)	(26.94%)
Ring finger	10	85	95	19	139	112	8	38	30	18	141	105
(% types of fingerprints with- in each blood group)	(5.26%)	(44.74%)	(50%)	(7.04%)	(51.48%)	(41.48%)	(10.53%)	(50%)	(39.50%)	(6.82%)	(53.41%)	(39.78%)
Little finger	12	143	35	21	197	52	6	62	8	30	188	46
(% types of fingerprints with- in each blood group)	(6.3%)	(75.26%)	(18.42%)	(7.78%)	(72.96%)	(19.26%)	(7.89%)	(81.57%)	(10.52%)	(11.35%)	(71.21%)	(17.04%)
P value	P = 0.001			P = 0.002			P = 0.001			P = 0.002		

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