

INCIDENCE OF THUMB IMPRESSION PATTERNS AND BLOOD GROUPS AMONG MEDICAL STUDENTS

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ABSTRACT

BACKGROUND

Fingerprints are one of the most reliable tool of identification. As fingerprints never change from birth till death, therefore fingerprint evidence is by far the most effective and reliable evidence in court of law.

The aim of the study is to find the incidence of patterns of left and right thumb impressions and blood groups of males and females, respectively.

MATERIALS AND METHODS

The present study was conducted on 150 medical students including 76 males and 74 females in the age group of 18-23 years in the Department of Physiology, Government Medical College, Amritsar, Punjab.

RESULTS

The distribution of loops were higher on thumbs of both sexes. In males, the frequency of loops on left thumb were found higher 48 (63.16), followed by whorls 21 (27.63%) and arches 7 (9.21%). In females, the frequency of loops on right thumb were found higher 45 (60.81), followed by whorls 23 (31.08) and arches 6 (8.11).

CONCLUSION

The frequency of loops were higher followed by whorls and arches on thumbs of both sexes. The blood group B was dominant followed by O, A and AB blood groups.

KEYWORDS

Fingerprints, Thumb Impressions, Patterns and Blood Groups.

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BACKGROUND

Fingerprints are one of the oldest, most reliable and best tool of identification, which is still considered to be one of the cheapest, simple and legitimate proof of investigation. The skin covering the anterior surface of human palms and soles is different in texture and appearance than rest of human body. The palmer and plantar skin covering is continuously wrinkled with narrow minute ridges known as friction ridges. The fingerprints appear during foetal stage from 12th - 16th week on human fingers, palms, soles and toes and is completed by 14th week of embryonic development. The ridges formed during foetal stage never change their course or alignment throughout life of an individual. The purpose of these ridges is to impart firmer grip and to avoid slippage. Although, various other methods of identification like DNA profiling, lip marks, footprints and bite marks are used. The fingerprints are constant and

individualistic and is the most reliable criteria of identification. Sir Francis Galton, a great biologist published his studies on finger in 1892. The study was later termed as dermatoglyphics by Dr. Harold Cummins.¹⁻³

Hershel⁴ used fingerprints for personal identification in India. Galton classified fingerprints into loops, whorls and arches. Cummins found that configurations and patterns are determined by heredity and partly by accidental or environmental influences, which produces stress and tension in their growth during foetal life. Blotterogel⁵ expressed correlation between blood groups and physical characters. Hahne⁶ in his study proved blood group O is associated with more loops and less whorls than blood group A. Herch⁷ found high frequency of loops in blood group A.

Karl Landsteiner⁸ in 1901 discovered blood group system. Many groups have been identified, which vary in their frequency of distribution amongst various races of mankind. Only ABO and Rhesus groups are of clinical importance. ABO system is further classified as A, B, AB and O blood group types according to presence of corresponding antigen in red blood corpuscle. Rhesus system is classified into Rh +ve and Rh -ve according to presence or absence of D antigen. Fingerprint patterns remain unchanged from birth till death. Fingerprints collected at a crime scene can be used to identify suspects, victims and other persons who touched the surface. Fingerprint scans can be used to

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validate electronic registration, cashless catering and library access, especially in schools and colleges.

Due to the immense potential of fingerprints as an effective method of identification, an attempt has been made in the present work to analyse the incidence of fingerprints, especially thumbprints and blood groups. Usually in legal, official and other important matters, left thumb impression of males and right thumb of females is used as an identification tool. The present study is an attempt to find patterns of thumb impressions.

MATERIALS AND METHODS

The present study was carried on 150 medical students comprising of 76 boys and 74 girls in the age group of 18-23 years in Physiology Department, Government Medical College, Amritsar. The students were described about the study and written consent was taken on printed pro forma. The blood groups and fingerprints of selected students were studied.

The ink method was used for fingerprints. Thumbprints were taken after washing hands with soap and water and dried using towel. The student was then asked to press his thumbs on cores stamp pad and then to the paper to transfer the fingerprint impression. The smeared thumb impressions of both hands were printed on a plain paper laid down on a pressure pad. Both rolled and plain prints of right and left thumbs were taken. Care was taken to avoid sliding of fingers to prevent smudging of print. The patterns of thumbprints were studied with the help of magnifying lens and classified into loops (L), whorls (W) and arches (A). The subjects with permanent scars on thumbs with any hand deformities due to injury were excluded from present study. The distribution of thumbprint patterns of both hands of students with different blood groups were evaluated.

Patterns of fingerprints-

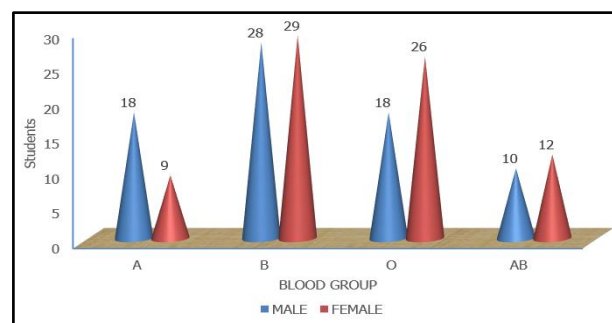
The fingerprint pattern configurations were classified as arches, loops, whorls and composites.

- Arch- It is the simplest pattern on fingertips in which series of ridges enter the pattern area on one side of finger and exit from opposite side. At the center of pattern, the ridges are slightly arched.
- Loop- Series of ridges enter the pattern on one side of the finger and exit from same side.
- Whorl- It is the most complex pattern in which ridges are arranged in series of concentric rings.
- Composites- These patterns are combinations of arch, loop and whorl.

RESULTS

Blood Group	Sex					
	Female		Male		Total	
	No.	%	No.	%	No.	%
A	18	24.32	9	11.84	27	18.00
B	28	37.84	29	38.16	57	38.00
O	18	24.32	26	34.21	44	29.33
AB	10	13.52	12	15.79	22	14.67
Total	74	100.00	76	100.00	150	100

Table 1. Distribution of Blood Groups According to Gender



Graph 1. Blood Group

Blood Group	Male		Total		Female		Total	
	Rh (+)	Rh (-)	Number	Percentage	Rh (+)	Rh (-)	Number	Percentage
A	9	0	9	11.84	17	1	18	24.32
B	28	1	29	38.16	24	4	28	37.84
O	26	0	26	34.21	18	0	18	24.32
AB	12	0	12	15.79	8	2	10	13.52
Total	75	1	76	100.00	67	7	74	100.00

Table 2. Distribution of ABO Blood Groups Among Students

Fingerprint Patterns	Total Number	Percentage
Loop	178	59.33
WHORL	100	33.33
ARCH	22	7.34
Total	300	100.00

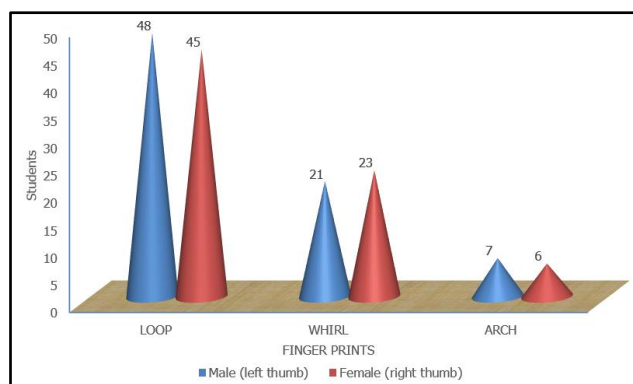
Table 3. Thumb Impression Patterns of all Males and Females

Fingerprint	Male (n=76)				Female (n=74)			
	Right Thumb		Left Thumb		Right Thumb		Left Thumb	
	Number	Percentage	Number	Percentage	Number	Percentage	Number	Percentage
Loop	39	51.32	48	63.16	45	60.81	46	62.16
Whorl	36	47.36	21	27.63	23	31.08	20	27.03
Arch	1	1.32	7	9.21	6	8.11	8	10.81
Total	76	100.00	76	100.00	74	100.00	74	100.00

Table 4. Distribution of Thumb Impression Pattern of Males and Females

Finger print	Male		Female	
	Left Thumb		Right Thumb	
	Number	Percentage	Number	Percentage
Loop	48	63.16	45	60.81
Whorl	21	27.63	23	31.08
Arch	7	9.21	6	8.11
Total	76	100.00	74	100.00

Table 5. Left Thumb Impression of Males and Right Thumb Impression of Females



Graph 2. Fingerprints

Table 1 shows distribution of blood groups. Blood group B is the dominant blood group 57 (38%), followed by O group 44 (29.33), A group 27 (18%) and AB group 22 (14.67%). The gender wise distribution shows that in females, the B blood group 28 (37.84%) is dominant followed by O group 18 (24.32%), A group 18 (24.32%) and AB group 10 (13.51%). In males, the distribution shows blood group B 29 (38.16%), O group 26 (34.21%), AB 12 (15.79%) and A group 9 (11.84%).

Table 2 shows distribution of students according to Rh factor of their blood groups, 142 among 150 students belonged to Rh+, whereas remaining 8 were Rh-.

Graph 1 shows distribution of ABO blood groups in males and females.

Table 3 shows distribution of all thumbprint patterns of both sexes. The total loops found were 178 (59.33%). Similarly, total whorls were 100 (33.33%) and arches 28 (9.33%). The table clearly indicates that loops were maximum followed by whorls and arches.

Table 4 shows distribution of thumbprint patterns of both sexes.

In males, the frequency of loops in left thumb were found to be 48 (63.16%) higher than right thumb 39 (51.32%). Similarly, whorls were higher in right thumb 36 (47.37%) than left thumb 21 (27.63%), while arches in left and right thumb were 7 (9.21%). On comparison of thumb patterns, the loops on left thumb were highest 48 (63.16%), while whorls in right thumb were highest 36 (47.37%) and arches 7 (9.21%) each on right and left thumb.

In females, the frequency of loops in left thumb were 46 (62.16%) higher than right thumb 45 (60.81%). Similarly, whorls were higher in right thumb 23 (31.08%) than whorls of left thumb 20 (27.03%) and arches were higher in left thumb 8 (10.81%) than right thumb 6 (8.11%). On comparison of thumb patterns, the loops of left thumb

46 (62.16%) and whorls of right thumb were highest 23 (31.08%). The arches of left thumb were highest 8 (10.81%).

Table 5 shows thumb impression patterns of males' left hand and females' right hand.

In males, the frequency of loops on left thumb were found higher 48 (63.16%), followed by whorls 21 (27.63%) and arches (9.21%).

In females, the frequency of loops on right thumb were found higher 45 (60.81%) followed by whorls 23 (31.08%) and arches 6 (8.11%).

Graph 2 shows distribution of left thumb impression of males and right thumb impression of females.

On comparison of left thumb impression patterns of males and right thumb impression patterns of females, it has been observed that in both sexes that loops were higher followed by whorls and arches.

DISCUSSION

The present study explains general distribution of thumb impression patterns in both sexes and blood groups. The study showed high frequency of loops, moderate of whorls and low of arches. The blood group B was dominant blood group followed by O blood group.

The study revealed that loops were of high frequency on left thumb of males than females and whorls on right thumb of females than males. The arches were least and almost of same frequency. Sajad Hamid⁹ et al in 2016 conducted a study on 100 first year medical students of SKIMS, Srinagar, on relation of blood groups and fingerprints. Their study revealed high frequency of loops followed by whorls and arches on thumb patterns, which is similar to our study. Bharadwaja¹⁰ et al conducted a study during 2000-2001 on 300 medical students with different blood groups in Rajasthan, which revealed that individuals with blood group A have more loops, while that of blood group AB had more of whorls. Similar study was conducted on 200 medical students of Kasturba Medical College, Mangalore, by Dr. Prateek¹¹ et al and showed that blood group A had higher frequency of loops and blood group O had higher frequency of whorls.

Our study was to reveal pattern of thumb impressions as left thumb of males and right thumb of females are used in legal and official purposes as a permanent mark of biometric identification. Many studies have proved that loops are of higher frequency followed by whorls and arches, which is true in our study also. The present study also proved that loops are of higher frequency on thumbs of both sexes also.

CONCLUSION

The present study is an attempt to find incidence of different patterns of thumb impressions of both sexes, especially left thumb impression of males and right thumb impression of females. The loops are most commonly found on thumb impressions of both sexes followed by whorls. Although, we know that fingerprints are never alike and never change

from birth till death. The study reveals the patterns of thumb impressions of both sexes, which may in turn enhance the authenticity of fingerprints.

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