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(RESEARCH ARTICLE)

Thumb print patterns in relation to gender and blood groups: A study in central district of Tamil Nadu

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Abstract

In the presentexamination, an endeavor has been made to study the fingerprint patterns in Central district of Tamil Nadu population. Thumb print patterns in relation with gender and blood group were studied in 275 participants,134 males and 141 females among the age group 18-25. The present study was conducted at the department of biotechnology, V.S.B. Engineering College, Karur district during the year 2022. Fingerprint patterns were studied in left and right thumb among males & females and analyzed with ABO blood grouping.The outcome demonstrated that the predominant pattern among both male and female was the loop, trailed by whorl and arches.

Keywords: Thumb prints; Central district of Tamil Nadu population; Ink method; Gender difference; Blood groups

1. Introduction

Dactylography is the investigation of fingerprints as a strategy for distinguishing proof, and it is currently known as the Henry-Galton arrangement of distinguishing proof. Dr. Henry Fauldsrecognised the significance of fingerprints in 1872 and published an article in Nature in 1880, but Sir Francis Galton, an English anthropologist, completed the most notable investigation on unique marks in 1892 [1].

Biometrics is a science that uses people's physical or biological characteristics to identify them [2]. Fingerprinting is one type of biometrics. The tiny ridges, whorls, and arch patterns on the tip of each finger are known as fingerprints. Pressure on a baby's tiny, developing fingers in the womb causes them to form. Fingerprints have never been found to be identical in two people; they are completely unique. Fingerprints are more individual than DNA, the genetic material that makes up each of our cells. Identical twins can share the same DNA or at least the majority of it but not the same fingerprints. Fingerprints are ideal for this because they are inexpensive to collect and analyse, and they do not change with age [3].

Friction ridges are an arrangement of ridges that make up a fingerprint. Each ridge has pores that connect to sweat glands beneath the skin. Because of your sweat, you leave fingerprints on glasses, tables, and just about anything else you touch [4].Fingerprint ridges form patterns known as loops, whorls, and arches:Loops start on one side of the finger, curve around or up, and exit on the opposite side. Loops are divided into two types: The radial loops face the thumb, while the ulnar loops face the little finger.The whorls form a spiral or circular pattern.Arches, like very narrow mountains, slope upward and then down [5].

Karl Landsteiner, an Austrian scientist, discovered the ABO blood group system at the University of Vienna [6]. In comparison to other systems, the ABO and Rh blood group systems are extremely important. The ABO system is divided into four types: A, B, AB, and O. ABO type is determined by two antigens and two antibodies. The Rh blood group is one

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of the most complicated in humans, and it is divided into Rh-positive and Rh-negative subgroups based on the presence or absence of D antigen [7].

The aim of this study was to find correlation between ABO and Rh blood group with dermatoglyphic pattern in Central district of Tamil Nadu population.

2. Material and methods

The present investigation was conductedduring the year 2022 at department of biotechnology, V.S.B. Engineering College, Karur district. Thumb finger prints were studied in 275 participants, 134 males and 141 females, among the age group of 18-25 years. The study included all healthy people who had never had a genetic disorder. Participants with permanent scars on their fingers, a birth defect or malady, any finger deformities due to injury, and those who had additional or webbed fingerprints were excluded from the study. To consider the finger print, a glass slab-inking roller strategy was used. The materials used were Kores duplicating ink, glass plate, ink roller, magnifying lens, and paper. Each participant was asked to dehydrate and wash their hands with cleanser water. Rolling the finger on white paper to get an impression of the entire tip was used to take the finger print. Prior to taking fingerprints with legitimate methodology disclosed to the participants, informed written consent was obtained. The student t-test and chi square test were used to analyze the results.

3. Results

Among the 275 students taken for the present study, 134 were males and 141 were femalesTable 1 shows the distribution of right and left thumb finger print patterns by gender. The loop, which accounted for 76.8% of the male and female left thumbs in this study, was followed by whorls (22.5%) and arches (0.7 %). Similarly, 73.6 % of loops are found in the right thumb, followed by whorls (25.4 %) and arches (1%). The two-tailed P value equals 1.0000. By conventional criteria, this difference is considered to be not statistically significant.

Table 1 Displays the finger print pattern distribution of right and left thumb according to gender

Finger Print Pattern	Gender	Left Thumb (n=275)	Right Thumb (n=275)
Plain Arch	Male	0	1
	Female	6	6
Tented Arch	Male	0	1
	Female	2	1
Ulnar Loop	Male	4	83
	Female	3	87
Radial Loop	Male	83	4
	Female	82	2
Plain Whorl	Male	19	39
	Female	17	29
Central Pocket Loop	Male	9	2
	Female	11	6
Double Loop Whorl	Male	18	5
	Female	21	8
Accidental Loop	Male	0	1
	Female	0	0

Table 2 demonstrates the finger print pattern distribution of left thumb and studied with blood group. In this study, the majority of subjects (40.4%) were O blood group trailed by blood group B, A & AB, 86.8 % of which were Rh Positive. The chi-square statistic is 1.2936. The *p*-value is 0.972. The result is not significant at $p < .05$.

Similarly in the right thumb also the majority of subjects (44.4%) were O blood group trailed by blood group B, A & AB, 87.2 % of which were Rh Positive (Table 3).The chi-square statistic is 4.2311. The *p*-value is .64544. The result is not significant at $p < .05$.

Among the loop which is dominated in both the thumb with respect to gender. The ulnar loop was dominated in the right thumb and radial loop was dominated in the left thumb.

Table 2 Demonstrates the finger print pattern distribution of left thumb and studied with blood group

Left Thumb (n=275)													
Blood Groups		**A^+**	**B^+**	**O^+**	**AB^+**	**A^{1+}**	**A^{2+}**	**A^1B^+**	**A^-**	**B^-**	**O^-**	**AB^-**	**A^{1-}**
Plain Arch	Male	-	-	-	-	-	-	-	-	-	-	-	-
	Female	1	1	3	1	-	-	-	-	-	-	-	-
Tented Arch	Male	-	-	-	-	-	-	-	-	-	-	-	-
	Female	-	1	-	1								
Ulnar Loop	Male	1	-	3	-	-	-	-	-	-	-	-	-
	Female	-	-	3	-	-	-	-	-	-	-	-	-
Radial Loop	Male	8	20	32	12	2	1	-	2	3	1	3	-
	Female	11	21	27	6	2	1	-	1	3	2	4	-
Plain Whorl	Male	3	4	6	-	-	-	-	-	3	-	-	-
	Female	1	1	4	2	-	-	-	-	2	-	2	1
Central Pocket Loop	Male	-	1	3	1	-	-	-	-	-	3	-	-
	Female	1	1	4	2	1	-	-	-	-	1	-	-
Double Loop Whorl	Male	1	8	8	-	-	-	-	-	-	-	-	-
	Female	2	6	8	1	1	-	1	-	-	-	2	-
Accidental Loop	Male	-	-	-	-	-	-	-	-	-	-	-	-
	Female	-	-	-	-	-	-	-	-	-	-	-	-
Chi- square test		1.2936											
p-value		0.972											
Statistically significant at 5 % level		Not Significant											

Table 3 Demonstrates the finger print pattern distribution of right thumb and studied with blood group

Right Thumb (n=275)													
Blood Groups		**A^+**	**B^+**	**O^+**	**AB^+**	**A^{1+}**	**A^{2+}**	**A^1B^+**	**A^-**	**B^-**	**O^-**	**AB^-**	**A^{1-}**
Plain Arch	Male	-	1	-	-	-	-	-	-	-	-	-	-
	Female	-	1	3	2	-	-	-	-	-	-	-	-
Tented Arch	Male	-	-	-	-	-	-	-	-	-	1	-	-
	Female	1	-	-	-	-	-	-	-	-	-	-	-
Ulnar Loop	Male	8	26	31	8	-	1	-	2	2	1	4	-
	Female	10	20	32	8	2	1	1	1	4	3	4	-
Radial Loop	Male	1	1	2	-	-	-	-	-	-	-	-	-
	Female	-	-	2	-	-	-	-	-	-	-	-	-
Plain Whorl	Male	3	5	20	3	2	-	-	-	3	3	-	-
	Female	3	7	13	1	2	-	-	-	1	-	2	1
Central Pocket Loop	Male	-	1	-	-	-	-	-	-	1	-	-	-
	Female	1	-	4	1	-	-	-	-	-	-	-	-
Double Loop Whorl	Male	1	2	2	-	-	-	-	-	-	-	-	-
	Female	-	3	4	1	-	-	-	-	-	-	-	-
Accidental Loop	Male	-	-	1	-	-	-	-	-	-	-	-	-
	Female	-	-	-	-	-	-	-	-	-	-	-	-
Chi- square test		4.231											
p-value		0.645											
Statistically significant at 5 % level		Not Significant											

4. Discussions

The goal of this study was to determine thumb fingerprint patterns in relation to gender and blood groups among Tamil Nadu's central population. In this population, no studies on this topic have been conducted to this extent. This will be useful for determining sex and blood group through thumb fingerprint types and vice versa.

In the year 2019, Iraq, Talib Saddam Mohsin et al. investigated the relationship between left thumb fingerprint types, blood groups, and gender among students at al-kindy college of medicine. The participants of the patients in the study (38.7%) were of blood group O, followed by blood groups B, A, and AB, with Rh-positive being the most common. Loops have the highest fingerprint pattern distribution (59.4%), followed by whorls and arches. Except for blood group AB negative, where loop and whorl had the same percentage, both ABO and Rh blood groups had almost the same sequence (50.0 %) [8]. Similarly in our study also we found that in left thumb print the loop with blood group O was dominated, followed by blood groups B, A, AB, with Rh-positive being the dominant.

Anu and his colleagues investigated the link between primary fingerprint patterns and blood types and gender. Loops were found to have a high frequency (72.3%), whorls had a moderate (24.9%), and arches had the least (2.68%) frequency in fingerprint distribution patterns. Both Rh+ve and Rh-ve individuals, as well as the A, B, AB, and O blood groups, had nearly identical arrays. Whilethey merged both genders data, the chi-square test found no link between fingerprint pattern and A, B, AB, and O blood groups. The chi-square test findings demonstrate no correlation between fingerprint patterns and A, B, or O blood groups; however, the chi-square value for AB blood group students is zero since their small fingers have no arches [9]. Comparing to this study, in our population study also there is no arches were found in the left thumb print, whereas only one arches with O- was found in the right thumb print. Similarly

another type of study conducted by Vinay and Gowri in 200 MBBS & BDS students at department of anatomy MES medical college, Perinthalmanna. Fingerprints were taken from all the fingers and categorised into 3 groups like loops, whorls and arches. Their finding shows that the 'loop' pattern was the maximum followed by the 'whorling' and 'arches' in various ABO and Rh blood groups. The maximum numeral of 'loop' variety was detected in people with 'O positive' blood group [10]. These results showing that in Indian population, loops were dominated trailed by whorls and arches.

Urvik and his colleagues studied 150 medical students at GMERS Medical College in Junagadh, Gujarat, 75 of whom were male and 75 of whom were female, all of whom had distinct ABO blood groups and were of various ages. Loops, Whorls, and Arches were used to split all ten fingerprint patterns. The results show that Loops are the most common fingerprint pattern, while Arches are the least common. Loops were discovered to be dominant in all Rh+ve and Rh-venegative blood types, but Whorls were found to be dominant in just the O-veblood group. In this study, the only link between gender and finger print patterns was that females had a higher frequency of loops and arches than males, whereas males had a higher frequency of whorls [11]. While comparing with our study loops were dominated in the both thumb prints.

The fingerprint patterns on the thumb were explored in connection to gender and blood group by Rinkal Chaudhary et al. They investigated 230 people (122 men and 108 women) from Haryana, India, to study fingerprint patterns. Rh-negative people made up 6.08 percent of the population, according to the researchers. The blood group O accounts for 40% of the subjects in this study, followed by B (35.2%), A (15.2%), and AB (15.2%). The loop pattern was found to be the most common in both right and left thumb fingerprint patterns (50.2%), followed by whorls (47.3%), and Arches (2.17%). The whorl pattern was most common in male blood group O, whereas loop pattern was most common in female blood group O.Males and females from the North Indian population have significantly different fingerprint patterns on both their right and left thumbs [12]. In comparison to the previous study, our findings demonstrate that there was no significant difference in blood grouping between male and female.

5. Conclusion

The purpose of this study was to look into the relationship between finger print pattern types in both thumbs and ABO and Rh blood groups in the Central Tamil Nadu district population. Individual characteristics, unique patterns, and the fact that fingerprints remain unchanged from birth to death are the fundamental principles of fingerprints. Fingerprints show an individual's individuality, have unique patterns that allow them to be systematically classified, and they never change.

The findings were as follows:

- Loops were found in highest numbers in both right and left thumb of both genders.
- The t-test results shows that the left thumb and right thumb prints are not statistically significant.
- In the study, the majority of the participants were O blood group trailed by blood group B, A & AB, 86.8 % of which were Rh Positive.
- The ulnar loop was dominated in the right thumb and radial loop was dominated in the left thumb.

Chi square test shows that there was no significant difference in blood grouping related with thumb print in both the genders.

Compliance with ethical standards

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Disclosure of conflict of interest

No conflict of interest.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

References

[1] Kumar GV, Sasikalaa V, Pratheepa T, Thulasidhasanb J. A study of finger printing pattern in kanchipuram district inhabitants. Journal of Emerging Technologies and Innovative Research. 2018; 5(8): 49-502.

[2] Basu R. Fundamentals of Forensic Medicine and Toxicology. 1st ed. Nepal: Books and Allied (P) Ltd; 2003.

[3] Mant AK. Taylor's Principles and Practice of Medical Jurisprudence. 13th ed. New Delhi: B I Churchill Livingston; 1994.

[4] Galton F. Finger Prints. 1st ed. London: Macmillan and Co.; 1892.

[5] Pillay VV. Text Book of Forensic Medicine & Toxicology. 15th ed. Hyderabad: Paras Medical Publishers; 2009.

[6] Patil A, Malik A, Shirole T. Fingerprint patterns in relation to gender and blood groups-A study in Navi Mumbai. Indian Journal of Forensic and Community Medicine. 2017; 4(3): 204-208.

[7] Fayrouz IN, Farida N, Irshad AH. Relation between fingerprints and different blood groups. Journal of Forensic and Legal Medicine. 2012; 19(1): 18-21.

[8] Mohsin TS, Hasan HS. The Relation Between Left Thumb Fingerprint Types with Blood Groups and Gender Among Students of Al-Kindy College of Medicine. Prensa Medica Argentina, 2019; 106(1): 174.

[9] Anuprasanna V, Manaswitha B, Mariya DP. Relationship of Primary Fingerprint Patterns with Blood Groups and Gender: A Dermatoglyphic Study. International Journal of Medical Research & Health Sciences. 2021; 10(3): 31-39.

[10] Vinay G, Gowri SRM. To assess the relation between finger print pattern and blood groups. Indian Journal of Clinical Anatomy and Physiology. 2019; 6(4): 488-491.

[11] Urvik K, Pratik T, Ashish R, Chintan L. Study of fingerprint patterns in relationship with blood group and gender in saurashtraregion. International Journal of Anatomy and Research. 2020; 8(2.3): 7564-7567.

[12] Rinkal C, Richa R. Fingerprint Patterns on Thumb in Relationship with Gender and Blood Group: A Pilot Study on North Indian Population. International Journal of Forensic Science. 2020;3(1):37–42.