Original Article

Dissemination of Pattern of Fingerprints with Relation to Blood Group among Young Adults

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Abstract

Introduction: A Fingerprint pattern are geno typically determined and remains unchanged from birth till death which is one of the oldest methods oldest, reliable and generally used biometric technologies and is considered one of the best, cheapest and legitimate proofs of identification. The aim of the present study was to analyze association between blood group, fingerprint and gender among young adults.

Methods: After the permission from Institutional Ethics Committee this cross-sectional study was carried out 132 Nepalese Medical students of age group of 20-25 years of KIST Medical College and Teaching Hospital participated in the study. The fingerprint patterns were recognized based on the appearance of ridge lines to determine loops, whorls, mixed or composite and arches. Blood groups were confirmed on the basis of presence or absence of agglutination as per the standard protocol

Results: Total number of loops pattern was highest frequency in both genders 60% in right thumb and 62.5% in left thumb followed by whorls 50% in right thumb and 45% on left thumb while arches and composite are least. Blood group A was most common with loop fingerprint followed by blood groups B and O. The group AB has the least frequency in all the fingerprint patterns.

Conclusion: The present study confirms that loop was the most common fingerprint pattern while arch and composite was the least common. This study does not show any association between distribution of fingerprint patterns, blood group and gender.

Keywords: *Fingerprints pattern, Blood groups, Loop, Whorl, Composite and Arch*

Introduction

Dermatoglyphics is derived from the Greek word "Derma = Skin, Glyphe = Carve." Dermatoglyphics is defined as the scientific study of naturally occurring epidermal ridges and their configuration on the digits, palms, and soles apart from flexion creases and secondary folds. The design of ridges on the sole and foot is gritty by heredity and accidental or environmental influence in their intrauterine life. Fingerprints are the unique characteristics mainly used in personal identification relevant to forensic cases for many years.[1]The development of Dermatoglyphics initiates from 12th to 16th week of intrauterine life and is accomplished by the 20th week of intrauterine life.[2]Dermatoglyphics is constant and idiosyncratic even in monozygotic twins from birth till demise. A fingerprint is the personal identification of a human being.[3, 4]

The fingerprint is helpful in medico-legal cases for the identification of a suspect, victim, identification of accidental exchange of newborn infant, unidentified body, and even for the diagnosis of inheritable disease. Moreover, it is helpful in case of identifying fugitive through fingerprint comparison, exchange of criminal identifying information with identification bureau of foreign countries in cases of mutual interest as well.[(5, 6)]

ABO blood group system was discovered at University of Vienna by Austrian Scientist Karl Landsteiner. ABO and Rh blood group systems are of major importance

compared to other system. [7] ABO is further classified into four principal types: A, B, AB, and O. there are two antigens and two antibodies responsible for ABO type. Rh blood group is one of the most complex blood groups in humans and it is further classified into Rh-positive and Rh-negative due to the presence orabsence of the D antigen.[8, 9]

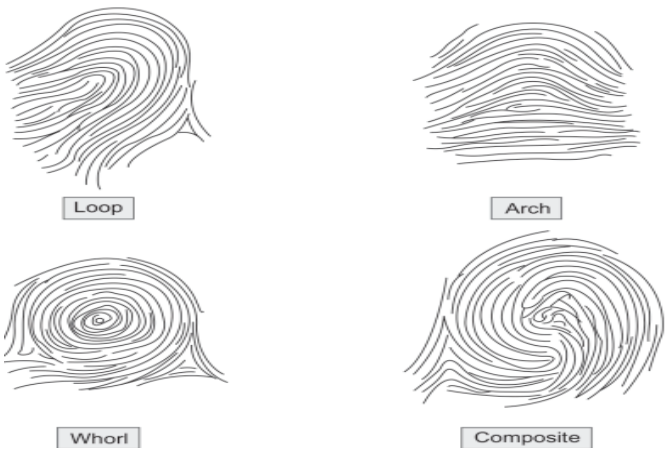
The aim of our research was to find out trend of fingerprints and its co-relation with ABO and Rh blood groups in Nepalese adults.

Methods

After the permission from Institutional Research Committee (IRC code no7076/77/32) this cross-sectional study was carried out from January to March 2020 on 132 Nepalese Medical students of KIST Medical College and Teaching Hospital, Lalitpur. Sample size was calculated and random sampling technique was used to select participants. All subjects with the age from 20 to 25 years who voluntarily consented to participate were included in the study.

Written consent was taken from all the participants. Fingerprints of right and left thumb fingers were collected with the help of an inking slab. To avoid smudging, overlapping and incomplete fingerprints strict quality measures were taken and repeated if required. Blood groups of all participants were recorded from records of practical classes of department of physiology. As per the curriculum of MBBS, blood grouping technique is one of the components of practical classes of department of physiology. Primary patterns of fingerprints such as loops, whorl, arches and composite according to Galton's classification were observed along with the total ridge counting with the help of a powerful hand lens and recorded. Then the data was analyzed for number and percentage using the statistical tool SPSS26.0 for Windows, version 12.0.

Figure 1. Types of fingerprints are



Results

In the present study carried out on 132 medical students, majority of the participants were from Blood group B 43(32.57%) followed by blood group A and Owas in equal number i.e 40 (30.30%).Least common was AB which was only 9(6.82%). In male participants, highest number was blood group was O 22(30.5%) whereas least common was AB 6(8.3%). Similarly, in the female common blood group was A 21(35%) and only 3(5%) was AB blood group. (Table 1)

Table 1. Distribution of subjects according to blood group and gender

Blood group	Male n=72 (%)	Femalen=60(%)	Total n=132 (%)
A	19 (26.39)	21 (35.00)	(30.30) 40
B	25 (34.72)	18 (30.00)	(32.57) 43
AB	6 (8.33)	3 (5.00)	(6.82) 9
O	22 (30.56)	18 (30.00)	(30.30) 40

Distribution according to Rh factors showed 127(96%) was Rh positive and 5(3.7%) depicted Rh negative among 132 students. (Table 2)

Table 2. Distribution of subject according to blood group and Rh factors

Blood group	Rh-positive	Rh-negative
A	(29.5) 39	(0.7) 1
B	(31.8) 42	(0.7) 1
AB	(6.1) 8	(0.7) 1
O	(28.9) 38	(1.6) 2
Total	(96.3) 127	(3.7) 5

The present study showed an increased frequency of loop finger print 66 in right thumb and 62 in left thumb followed by whorl 53 in right thumb and 50 in left thumb, followed by Arch that is 10 in right thumb and 18 in left thumb and the least common was composite which was only 3 in right thumb and 2 in left thumb. In the present study, we observed that loop was the most common in Blood group A, B and AB whereas whorl was most common in Blood group O in both right and left thumb. (Table 3)

Table 3. Distribution of pattern of fingerprint of Right and Left thumb according to blood group

	Blood Group A				Blood Group AB				Blood Group B				Blood Group O				Total			
Individual finger	W	L	C	A	W	L	C	A	W	L	C	A	W	L	C	A	W	L	C	A
Right Thumb	13	24	1	2	3	5	0	1	17	20	2	4	20	17	0	3	53	66	3	10
Left Thumb	8	25	1	6	3	5	0	1	21	14	1	7	18	18	0	4	50	62	2	18

W=Whorl, L=Loop, C= Composite, A= Arch

The distributions of pattern of fingerprints in relation to blood groups showed the loop pattern has the highest frequency 60% in right thumb and 62.5% in left thumb followed by whorls 50% in right thumb and 45% in left thumb while arches and composite are least. Blood group A had the highest number of loops followed by blood groups B and O. The group AB has the least frequency in all the fingerprint patterns. (Table 4)

Table 4. Distribution of various fingerprint patterns in the ABO Blood group

	Right Hand				Left Hand			
Fingerprint type	Blood group A	Blood group AB	Blood group B	Blood group O	Blood group A	Blood group AB	Blood group B	B l o o d group O
Whorl	13 (32.5%)	3 (33.33%)	17 (39.53%)	20 (50%)	8 (20.00%)	3 (33.33%)	21 (48.83%)	18 (45.00%)
Loop	24 (60.0%)	5 (55.55%)	20 (46.52%)	17 (42.5%)	25 (62.5%)	5 (55.56%)	14 (35.56%)	18 (45.00%)
Composite	1 (2.50%)	0	2 (4.65%)	0	1 (2.50%)	0	1 (2.32%)	0
Arch	2 (5.00%)	1 (11.11%)	4 (9.30%)	3 (7.50%)	6 (15.00%)	1 (11.11%)	7 (16.28%)	4 (10.00%)
Total	40	9	43	40	40	9	43	40

Discussion

This study revealed that blood B was the most common blood group 43(32.57%) followed by blood groups A and O of the same number that was40 (30.30%) and the least common was AB which was only 9(6.82%) which is in agreement of similar findings of previous studies [2,10,11] whereas Bharadwaja et al.[12] and Usha et al.[13] observed Blood group A while Soman et al.[14] study showed Blood group O to be most common which is both second most common finger-print in our study.

Furthermore, in the male the most common Blood group was O at30.5% and in the female the most common blood group was A in 35%in the present study. Jain et al. and Azhagiri et al. [11, 15] showed similar results in females that are Blood group O.

The present study showed Rh factors showed 96% was Rh positive and 3.7% depicted Rh negative similar to study done by other studies. [16]

In our study, we observed that loop is highest in blood group A i.e. 60% in right thumb and 62.5% in left thumb whereas in blood group O Whorl was more common that is 50% in right thumb and 45% in left thumb.In various studies done by Singh et al. and Shivhare et al. showed that the Loop fingerprint is highest in Blood group B and lowest in Blood group AB. [17, 18] Whorl the second most common fingerprint was highest in blood group O followed by B then A. Among the fingerprint the least common was Arch and it was in blood group AB, this finding is again similar to the study done by Doepa et al. [19]

This study is in agreement with the study done by Faryouz. N.E where the pattern of fingerprints showed high frequency of loops (50.5%), moderate whorls (35.1%), and low frequency of arches (14.4%) [16]. Similar results were seen in the study done by Bharadwaja et al. [12]Arushi et al.[11]revealed the same in their study and observed that blood group B was the commonest blood group followed by O blood group which is again similar to Desai B and Hamid S [20,10]

This study was an approach to associate finger prints, blood groups and gender. Blood group B 32.57% was predominantly found among the subjects followed by

O and A. The distribution of primary fingerprints among the subjects was a high frequency of loops, moderate of whorls and low of arches and composite.

Similarly, Desai et al conducted study on 200 Person. Hubli- Dharwad of Karnataka revealed that Blood group B had more loops found among the subjects followed by O. The distribution of primary finger prints among the subjects was high frequency of loops moderate of whorls and low of arches,whereas Bharadwaja[12]et al. conducted a study during 2000-2001 on 300 medical students with different ABO blood groups in Rajasthan which revealed that individuals with blood group A have more of loops, while that of blood group AB had more of whorls similar to Prateek, Rastogi and Ms. Keerti. R. Pillai.[21]Results of the present study differ comparatively.

Conclusion

The present study is an attempt to analyze and correlate fingerprint patterns with gender and blood group of an individual. Fingerprint identification is the oldest forensic discipline known to man. However, over time this is one of the most rapid, reliable, and cost-effective identification method especially during mass disaster. The present study revealed that most commonly found fingerprint pattern was loop and arches and composites are the least common. Blood group B is most prevalent and AB is rare. Loop in blood group A is more number was obtained and whorl was common in blood group O. Composite fingerprint was absent in blood group AB. No gender-based differences could be established. A similar study in other population groups is recommended for better correlation.

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