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To analyse the relationship between fingerprints and different blood groups: An institutional study.

Dental Science

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ABSTRACT

Introduction: Fingerprint is one of the oldest, reliable and mature biometric technologies and is considered one of the best, cheapest and legitimate proofs of identification in the court of law. Fingerprints are the ridges formed during the foetal period and do not change their course of alignment throughout an individual life except in cases of decomposed skin or some sort of injury. Fingerprints characteristics of either a same individual or two different individual are never same. Thus, these two aspects are enough to prove the efficiency and effectiveness of fingerprints. Two person having identical fingerprints is about one in 64 thousand million.

Materials and Methods: In our study 100 students of Indira Gandhi Govt Dental College were included in which 50 were males and 50 were females. Age range was between 18-22 years respectively. Fingerprints were broadly classified into loops, whorls and arches.

Results: It was found that most common fingerprint pattern was loops followed by whorls and least common was arches. Loops were common in all blood groups both Rh+ve and Rh-ve. Whorls were common in B group both Rh+ve and Rh-ve and also dominating in O+ve blood group. It was also observed that loops and arches were in higher frequency in females and whorls being common in males.

KEYWORDS:

Fingerprints, blood groups, pattern, identification.

Introduction

Skin on the palmer and planter surface of the human hand and foot is continuously wrinkled with minute narrow ridges known as friction ridges. The impression of the epidermal or the friction ridges on all parts is known as fingerprint. These fingerprint begin to develop on 12th to 16th week of IUL and their formation gets completed by 6th foetal month. These ridges remain unchanged throughout the life of an individual until destroyed by the decomposition of skin after death. [1] These features statistically differ among sexes, ethnic group and age categories. Fingerprints may be classified and documented on the basis of ridge pattern thus becoming a infallible identification system.[2]

Material & Method: The present study was carried out in Indira Gandhi Govt Dental College. 100 students were selected randomly and their fingerprints were studied using Ink method as suggested by Cummins. Kores camel duplicating ink was spread with the help of a roller over an inking slab. A 15"×6" was used as inking slab. The smeared thumb and fingers of both hands were printed on a durable plain paper laid on a pressure pad. Basic fingerprint patterns were observed i.e loops, whorls and arches with the help of a powerful hand lens. After obtaining fingerprint name, age and sex was also gathered. Blood group of all the students was also noted. Each finger in fingerprint was assigned a number. The 1st number was given to right thumb and 10th number was given to left little finger. Subjects with scars or any kind of deformity due to injury were not included in the study.

Results

In this study out of the 100 subjects that participated 50% were males and 50% were females. Result showed that the dominant ABO group was group B (38%) followed by group O (35%), group A (21%) and group AB (6%). (Table 1 & Graph 1) Both males and females showed higher percentage of blood group O and B. It was also observed that Rh+ve was the dominant rhesus factor (94%) and Rh-ve was 6%. The prevalence was in the following order. Blood group B+ve 35%, O+ve 34%, A+ve 19%, AB+ve 6%, B-ve 3%, A-ve 2% and O-ve 1% (Table 2 & Graph 2). In this study loops were the most common pattern accounting for 56.6% followed by whorls 31.2% and least were arches 12.2% (Table 3 & Graph 3). Frequency of loops (54.9%) and arches (59%) were higher in females as compare to males were loops were 45% and arches 40.9%. whorls were in higher frequency in males (54.1%) as compare to females (45.8%) (Table 4 & Graph 4). Loops were higher in blood group B (40%) and least in blood group AB (9.5%). Whorls were higher in blood group B (34.6%) and least in blood group AB (13.4%). Arches were higher in blood group in B (42.6%) and least in blood group AB (4.9%) (Table 5 & Graph 5). Frequency of loops was higher in both Rh+ve and Rh –ve subjects of ABO blood group. Frequency of whorls and arches was highest in Rh+ve subjects of ABO blood group as compare to Rh-ve (Table 6 & Graph 6). Loops were prominent in little finger of blood group A and AB, middle finger of blood group of B and thumb of blood group O. Whorls were prominent in ring finger of blood group A, B AB and O. Arches were prominent in index finger blood group A, B, AB and O respectively (Table 7 & Graph 7).

Discussion

Dermatoglyphics is study of pattern of fine ridges on fingers, palm and soles. The term "Dermatoglyphics" was coined by Cummins.[3] He found that configuration of fingerprint pattern was partly determined partly by hereditary and partly by accidental or environmental influence which produce stress or tension in their growth during foetal life. Skin marked by "carved woods" appear for the first time on human fingers, palm, soles and toes from 12th -16th week of embryonic development and their formation gets completed by about 6th foetal month and remain in alignment throughout the life of an individual until destroyed by decomposition of skin after death or by some scars or injury.[1,2] Purkinjee for the first time introduced nine principal configuration of rugae and sulci present on the terminal phalanges of human hands.[4] Flauds mentioned that the pattern of these papillary ridges remain unchanged in an individual throughout life.[5]Herschel used fingerprints for personal identification in india.[6] Forest reported that dermatoglyphics are laid down in early embryogenesis and are a part of structural constitution.[7] Galton classified the primary fingerprint pattern as loops, whorls and arches.[8] Loops are formed by ridge lines that flow in from one side of the print, sweep up in the center like a tented arch, and then curve back around and flow out or tend to flow out on the side from where they entered. Loops are designated as being either radial or ulnar, depending on which side of the finger the lines enter. The loop is the most common of all the patterns. There are four different whorl patterns: the plain whorl, the central pocket loop, the double loop, and the accidental whorl. Their common features are that they have at least two deltas and one or more of the ridge lines curves around the core to form a circle or spiral or other rounded, constantly curving form. The accidental whorl can be any pattern or combination of patterns that does not fit into any of the above classifications. There are two types of arches: plain arches and tented arches. In both types the ridge lines flow into the print from one side, rise in the middle of the pattern, and flow out to the other side of the

print. The term "Composite" is used to describe such patterns. Positive identification using fingerprints can be established only if 16 to 20 points of similarity exist in the minutiae. Bloterogel & Bloterogel expressed a correlation between physical characters and blood group.[9] Our study was consistent with many studies which observed highest frequency of loops followed by whorls and then arches. In the present study high frequency of loops was observed in blood group B (56.6%) followed by whorls (31.2%) and arches (12.2%) which is consistent with the study conducted by Desai[10] and Sandip K[11] but it differed from the observations made by Hahne and Bharadwaja who stated high frequency of loops in blood group O.[12,13]Whorls were highest in blood group B in the present study which differed from the study conducted by Bharadwaja and Prateek who observed high frequency of whorls in blood group O and AB.[12,14]Arches were higher in prevalence in blood group B consistent with the study observed by Muralidhar. [15] In the present study loops were more in both Rh+ve and Rh-ve group. Whorls and arches were slightly more in Rh+ve results of which were almost similar to the study conducted Muralidhar.[15]Distribution pattern in individual finger had high frequency of loops in thumb, middle and little finger whereas whorls were more commonly observed in ring finger and arches in index and middle finger of blood group A,B,AB and O which is similar to results observed by Bharadwaja.[12]

Conclusion

There is an association between distribution of finger print pattern and blood groups. We know that fingerprints are never alike and they never change from birth till death. The present study is an attempt and approach to associate, analyse and correlate fingerprint patterns in blood group of an individual as well as with gender which may in turn enhance the authencity of fingerprint for identification and detection purposes. So prediction of blood group to some extent may be possible with the study of finger print pattern which may be of great value in forensic medicine, but influence regional variations, gender and genetic factors should not be overlooked.

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Table 1: Distribution of blood group according to prevalence

Blood group	Male	Female	Total	%age
B	18	20	38	38%
O	18	17	35	35%
A	11	10	21	21%
AB	3	3	6	6%
Total	50	50	100	100%

Table 2: Distribution according to Rh factor of blood group.

Blood group	Rh+ve		Rh-ve	
A	19	19%	2	2%
B	35	35%	3	3%
AB	6	6%	0	-
O	34	34%	1	1%
Total	94	94%	6	6%

Table 3: Distribution of fingerprint pattern of all fingers in both hands.

Fingerprint pattern	Total number	%age
Loops	566	56.6%
Whorls	312	31.2%
Arches	122	12.2%
Total (n)	1000	100%

Table 4: Distribution of Fingerprint pattern according to gender.

Fingerprint pattern	Male		Female	
Loops	255	45.5%	311	54.9%
Whorls	169	54.1%	143	45.8%
Arches	50	40.9%	72	59%

Table 5: Distribution of fingerprint pattern according to Blood groups.

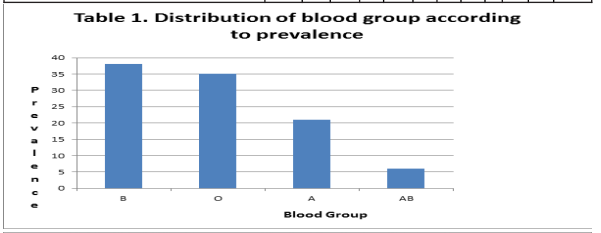
Fingerprint pattern	A		B		AB		O	
Loops	105	18.5%	228	40%	54	9.5%	179	31.6%
Whorls	75	24%	108	34.6%	42	42%	87	27.8%
Arches	25	20.4%	52	42.6%	6	6%	39	31.9%

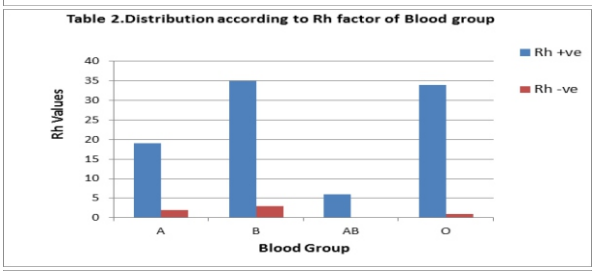
Table 6: Distribution of fingerprint patterns among blood group with Rh factors.

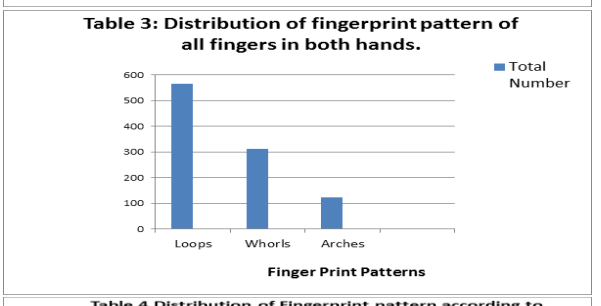
Fingerprint pattern	A		B		AB		O	
	+ve	-ve	+ve	-ve	+ve	-ve	+ve	-ve
Total loops	94	11	204	2	54	-	176	3
%age	49.4%	55.5%	58.2%	24%	90%	-	52%	30%
Total whorls	70	5	102	6	42	-	81	6
%age	36.2%	26.3%	29.1%	20%	70%	-	23.8%	60%
Total arches	22	3	49	3	6	-	38	1
%age	14.5%	15%	14%	10%	10%	-	11.1%	10%

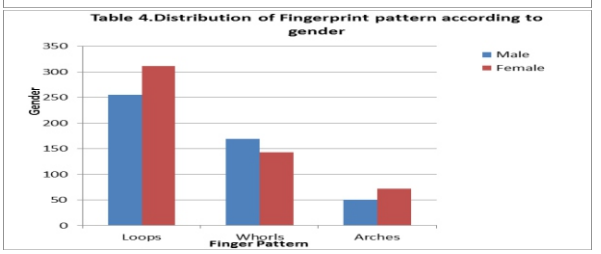
Table 7: Distribution of fingerprint patterns in different fingers of both the hands

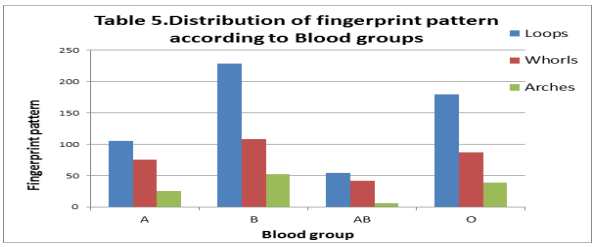
Individual finger	A			B			AB			O		
	L	W	A	L	W	A	L	W	A	L	W	A
Thumb	22	13	4	46	22	5	10	9	0	38	16	6
Index	16	17	10	35	19	23	9	7	3	34	20	12
Middle	20	11	6	70	14	12	13	6	1	42	14	9
Ring	17	26	3	32	38	9	7	16	1	28	26	8
Little	30	10	2	45	15	3	15	4	1	37	11	4

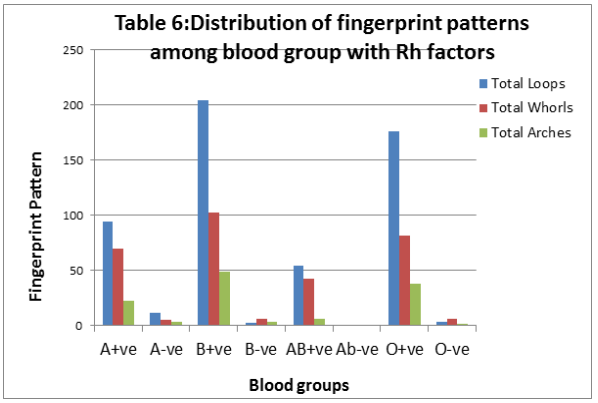


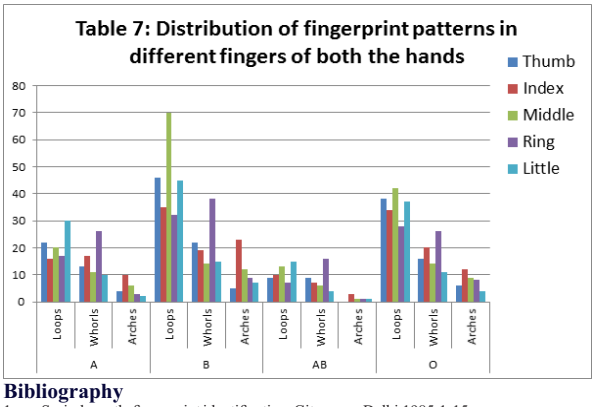












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