Study of Fingerprint Patterns among Young Adults and its Relation with Their Gender & Blood Groups.

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ABSTRACT

Background: Fingerprint patterns are genotypically determined and remain unchanged from birth till death so they are used as effective means of establishing identity of an individual & study of finger prints as method of identification is known as Dactylography or Dactyloscopy. Aim- was to study fingerprint patterns among young adults & its relation with their gender & blood groups. **Methods:** Study includes 100 young adults of both genders selected randomly.Fingerprints were taken by pressing fingertips of subjects on stamp pad & then transferring the impressions on paper. Subjects were instructed to mention their Blood group, Age & sex on the same paper. **Results:** Subjects were having 69%,25%,6% of Loops, Whorls & Arches respectively.Males had 68%,26%,6% & females had 69%,24%,7% of Loops,Whorls & Arches respectively.Arches were absent in Rh -ve blood group & were maximum in blood group B+ i-e 50.8% followed by blood groups O+ve,AB+ve & A+ve with 34.4%, 13.1% & 1.7% respectively.Whorls were absent in B-ve Subjects & were maximum in B+vesubjects with 34.8% followed by O+ve, A+ve,AB+ve,O-ve,AB-ve with 28%,22.4%,10.8%, 2.4%,1.6% respectively.Loops were maximum in B+ve i-e 36.6% followed by A+ve,O+ve,AB+ve,O-ve,B-ve, AB-ve with 26.6%,24.5%,6.5%,3.5%, 1.4%,0.9% respectively. **Conclusion:** Loops are the most common & arches are the least common fingerprint pattern found in the population & Rh- blood groups lack Arches. whorls were absent in B-ve blood group & loops were minimum in AB-ve blood group.Whorls, loops & Arches all types were maximum in B+ve blood group.

Keywords: Finger Print Patterns, Blood Groups, Loops Whorls & Arches.

INTRODUCTION

A fingerprint is an impression of the friction ridges of all part of the finger. A friction ridge is a raised portion of the epidermis on the digits or on the palmar and plantar skin, consisting of one or more connected ridge units of friction ridge skin.[1] Study of finger prints as a method of identification is known as Dactylography or Dactyloscopy or Dermatoglyphics and at present, also as Henry-Galton system of Identification.[2] The word Dactylography is taken from two Greek words, daktylos meaning _finger' and graphein meaning _to write'.[3] Dactylography is a progressing science and new methods for the recording, lifting and developing of prints under different field conditions, including those from the decomposed body, are being introduced regularly.[4]

The earliest work on fingerprints and its use for personal identification were carried out many years ago in India.(5) It has been reported by Cummins and Kennedy that the unique characteristics pattern of epidermal skin ridges is uniquely differentiated in definitive forms during the 3rd and 4th intrauterine life.[6] The finger prints appear for the first time on the human fingers, palms, soles, and toes from 12th to 16th week of embryonic development and their formation gets completed by the 14th week i.e. about the 6th foetal month.[7] It is said that the fingerprint patterns are genetically determined and are constant throughout the life of an individual from birth till death.[8] There are three basic dermatoglyphic patterns; whorl, loop and arch. Whorl pattern has two deltas, Loop has one delta and Arch has one central or no delta at all.[9]

Blood group system was discovered way back by Karl Landsteiner in 1901. Later "Rhesus" system was defined by Landsteiner and Wiener in 1937. A total of 30 human blood group systems are now recognized by the International Society of Blood Transfusion which vary in their frequency of distribution among various races of mankind. Clinically, only "ABO" and "Rhesus" groups are of major importance. "ABO" system is further classified as "A," "B," "AB," and "O" blood groups according to presence of corresponding antigen in plasma. "Rhesus" system is classified into "Rh +ve" and "Rh –ve" according to the presence or absence of "D" antigen.[10] As the inheritance of

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dermatoglyphic patterns and ABO blood group is polygenic,[11] the exact manner of inheritance of ABO blood group was revealed by Bernstein and low arches in the individuals of A, B and O blood group.[1,12]

Dermatoglyphics studies done earlier have found strong association between fingerprint patterns and blood groups.[13,14] Earlier studies done have reported that primary fingerprint pattern is same for different blood groups where loop was the most common pattern followed by whorls and arch was the least common.[13-17] Similar fingerprint studies done has concluded existence of strong association between distribution of fingerprint patterns, blood group and gender.[1,7,18] The available literatures have concluded that there is an association between distribution of fingerprint patterns, blood groups, and sexes.

MATERIALS AND METHODS

100 young adults were selected randomly from dehradun area of uttarakhand & were informed about the procedures and consent was obtained.

Exclusion Criteria
- Individuals with any scars on fingers which may be congenital or acquired due to any injury.
- Individuals other than the young adults i-e age group 18-25 yrs.

Details of individuals such as name, sex, and blood group were noted. Each subject was informed to wash his/her hands with soap & then were towel dried. Then subjects were instructed to press their fingertips on the ink stamp pad & then the subjects were asked to press the fingers on proforma sheet which was prepared on A4 size white paper divided into two sections marked as right and left, and each section further into five columns marked as thumb, index, middle, ring and little. Impressions were numbered according to Henry's system of classification, this system assigns each finger a number according to the order in which is it located in the hand, beginning with the right thumb as number one and ending with the left little finger as number 10.

The patterns of finger prints (loops, whorl & arches) were observed with the help of naked eye & a magnifying lens where so ever it was needed. Both rolled and plane prints of right and left hand and were identified into basic three patterns as follows: loops, whorls, and arches according to Galton's classification. The data was recorded on Microsoft excel sheet & then the distribution of fingerprint patterns in both hands of individuals and its relationship with sex and different ABO blood groups were evaluated and analyzed statistically using Microsoft excel 2007.

RESULTS

Out of 100 subjects, 95 (95%) belonged to Rh positive and 5 (5%) belonged to Rh negative. The percentage of Rh negative individuals was as usual less in the study. Total number of the loops seen in all the fingers of both hands were 689 (69%) followed by total number of whorls 250 (25%), and Arches were 61 (6%). This clearly shows that loops were the maximum as depicted by [Figure 1 & Table 1].
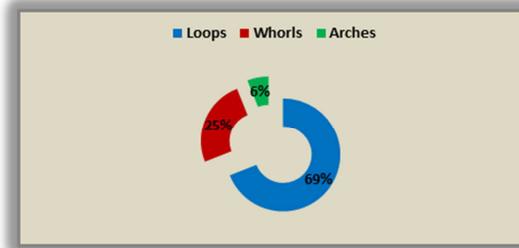

Figure 1: Showing Distribution of Fingerprint Patterns of both the hands.

Table 1: Showing Distribution of Fingerprint Patterns of both the hands.

Finger Patterns	Number (Percentage)
Loops	689 (69%)
Whorls	250 (25%)
Arches	61 (6%)

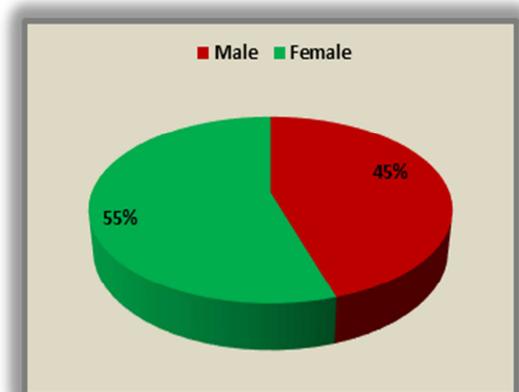Out of 100 subjects, 54 (54%) were female and 46 (46%) were male as shown in [Figure 2 & Table 2]

Figure 2: Showing Distribution of both Genders

Table 2: Showing Distribution of both Genders

Gender/Sex	Number (Percentage)
Male	46%
Female	54%

In females Loops were common 375 (69%) followed by whorls 130 (24%), arches 35 (7%). Similarly the same pattern was observed in male subjects, loops 314 (68%), followed by whorls 120(26%), arches 26(6%) as shown in [Figure 3 & Table 3]
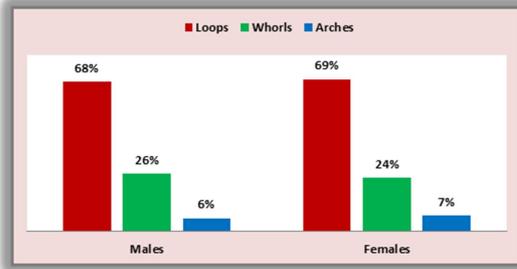
Figure 3: Showing Distribution of Finger Patterns of both Genders

Table 3: Showing Distribution of Finger Patterns of both Genders

Finger Patterns	Number (Percentage) in Males	Number (Percentage) in Females
Loops	314 (68%)	375 (69%)
Whorls	120 (26%)	130(24%)
Arches	26(6%)	35 (7%)

Most common blood groups were 'B' positive 37 (37%) and 'O' positive 26 (26%) followed by 'A' positive 24 (24%), AB positive 8 (8%), O negative 3(3%) & AB negative, B negative are rarer being present in 1(1%). A –ve subjects were absent in the present study as shown in Figure 4 & Table 4.

Figure 4: Showing Distribution of Subjects according to Blood Groups.

Table 4: Showing Distribution of Subjects according to Blood Groups.

Blood Group with their Rh Factors		Number (Percentage)
A Blood Group	A +ve	24 (24%)
	A –ve	0
B Blood Group	B +ve	37 (37%)
	B –ve	1 (1%)
AB Blood Group	AB +ve	8 (8%)
	AB -ve	1 (1%)
O Blood Group	O +ve	26 (26%)
	O –ve	3 (3%)

Table 5: Showing Distribution of fingerprint patterns among blood groups with their Rh factors

Finger Patterns	Number (Percentage) in Blood Groups								Total
	A Blood Group		B Blood Group		AB Blood Group		O Blood Group		
	Rh+ve	Rh -ve	Rh +ve	Rh -ve	Rh+ve	Rh -ve	Rh +ve	Rh -ve	
Loops	183(26.6%)	0	252(36.6%)	10(1.4%)	45(6.5%)	6(0.9%)	169(24.5%)	24(3.5%)	689
Whorls	56(22.4%)	0	87(34.8%)	0	27(10.8%)	4(1.6%)	70(28%)	6(2.4%)	250
Arches	1(1.7%)	0	31(50.8%)	0	8(13.1%)	0	21(34.4%)	0	61

More number of loops were observed in B+ve subjects 252(36.5%) followed by A+ve 183(26.5%), O+ve 169(24.5%),AB+ve 45 (6.5%), O-ve 24 (3.4%), B-ve 10 (1.4%) & AB-ve 6(0.9%). Whorls again were predominant among B+ve 87(34.8%), followed by O+ve 70(28%), A+ve 56(22.4%), AB+ve 27 (10.8%), O-ve 6 (2.4%) & AB-ve 4(1.6%) subjects. Whorls were absent in B-ve subjects. Arch pattern was seen maximum among B+ve subjects 31(50.8%), followed by O+ve 21(34.4%), AB+ve 8(13.1%) & A+ve 1(1.7%). Arches were absent in Rh –ve subject (AB-ve, B-ve & O-ve) as depicted in [Table 5]

DISCUSSION

The purpose of classifying fingerprints is that they can be filed and retrieved when needed. The various classification systems used throughout the world are based on the pattern of friction ridges seen on pulp of terminal part of all the ten fingers. These patterns fall into three general classes called arches, loops, and whorls. Although human beings have been using fingerprints as a means of identification for a long time but in this study we have made an effort to take step further to study Fingerprint patterns among young adults and its relation with their gender & blood groups so that one can get an idea about the expected blood group and gender from the study of fingerprint pattern and vice versa.[18]

Most common Fingerprint Pattern was loop and the least common was arch. On analyzing the distribution of fingerprint patterns in either sex, Loops were the predominant pattern in both genders, followed by whorls & Arches as observed in the general population, The same findings were observed by Kshirsagar, et al., Mahajan, et al. and Bharadwaja, et al.[13,17,19]

 The distribution of the fingerprint pattern in different blood groups with their Rh factor revealed that irrespective of the blood group, loop was the commonest fingerprint pattern followed by whorl and arch. Similar findings were observed by previous researchers.[1,13-17,20] When Fingerprint Patterns were observed in subject according to their blood group distribution it was noticed that Arches were maximum in Blood group B+ve followed by O+ve ,AB+ve, A+ve & were absent in the subjects

with Rh –ve blood groups. Whorls were also maximum in B+ve blood group followed by O+ve, A+ve ,AB+ve, O-ve, AB-ve subjects & were absent in B- blood group. Loops were maximum in B+ve subjects followed by A+ve, O+ve, AB+ve, O-ve, B-ve & AB-ve subjects.

CONCLUSION

The present study has identified loop as the most common type & arches as the least common type of fingerprint pattern. Study concludes that Rh- blood groups lack Arches & whorls to be absent in B-ve blood group. Whorls, loops & Arches all types were maximum in B+ve blood group & loops were minimum in AB-ve blood group. We may hence conclude that prediction of blood group and gender to some extent may be possible with the study of finger print pattern which in turn increases the authenticity of the fingerprints in identification of an individual. We suggest to carry similar studies in future to search association between the fingerprint pattern, gender, blood group & other parameters.

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