A Study of Dermatoglyphics in Relation to Gender and Blood Group among College Students in Sivagangai

Sasikumar MD *, Anitha MD, Subhalakshmi MD

ABSTRACT: Finger print pattern of human beings are individualistic and constant determined by cornified layer of epidermis and dermal papillae. Blood group of an individual is determined by genes. Aim of the study is to correlate the ABO blood group type of the individuals with their finger print patterns. A sample of 272 individuals of college students was included in the study. Their blood group and Rh type were determined by slide agglutination method. Fingerprints were obtained by printing method. Parameters studied were loops, arches, whorls. It was concluded that, commonest fingerprint pattern in all blood group is loop followed by other whorl and arch respectively. Statistical significant association was noted between patterns of finger print and ABO blood group, while association between Rh positivity and fingerprint pattern association was found to be insignificant.
Key words: Fingerprint, Whorl, Loop, Arch, Blood group

I. INTRODUCTION:

Finger print pattern is individualistic and constant throughout life. The basal layer or germinative layer of epidermis forms ridges and hollows, which are reflected on the surface of the skin in the fingerprint. These are ridges formed over fingers as well as palms and sole during intrauterine life and the pattern remain constant throughout embryonic life, birth and life of the individual. (It never changes unless destroyed by physical, chemical or biological agents or in influence) Dermatoglyphics is defined as scientific study in medical genetics and criminal investigations of epidermal ridges and their configuration on what aspect of palm and plantar regions. Three major pattern studied are Loop, Whorls and Arches according to Galton's classification.

Blood group system is another specific identity of any individual that does not change throughout the life. ABO blood group having major importance on individual is determined by gene (chromosome 9). Finger print pattern is determined during embryonic development, though it is not predictable as well as its inheritance.

Incidence of certain diseases like duodenal ulcer and stomach cancer has been found higher in blood group O and A respectively than in general populations. Our present study is carried out to become a pioneer for future studies whether the association of diseases and blood groups can further be extended to finger print patterns so that a simple noninvasive quick test as like finger print could give us further idea of any individual for having risk/association of any disease in near future.

1.1 Aim & Objective:

- To evaluate the percentage distribution of ABO, Rh blood groups
- To study the finger print patterns with ABO and Rh blood groups
- To study the finger print pattern distribution among gender

II. MATERIAL & METHODOLOGY:

In this present study 272 college students were taken, out of which 130 were males and 142 were females. All the subjects were healthy and their ages range between 17 to 25. After obtaining Institutional Ethical committee clearance (02072015), and written informed consent, study subjects underwent taking finger print as well as blood group determination.

Blood group and Rh typing is determined by agglutination method for all subjects. A, B, AB, and O four major blood group and Rh positive and Rh negative were the parameters to determine the blood group of an individual.

Finger prints of all 10 finger tips were obtained by print method using materials like ink pads, gauze pads, finger print collection cards specifically made for the purpose by the author. After washing and drying the hands, small amount of ink was applied over volar aspect of all distal phalanxes and each finger is individually rolled in the specific box on finger print collection card. Care was taken not to overlap double print or

smudge with excess ink. The card was dried for few seconds and stored in a collection kit for analysis later.

2.1 Statistical analysis:

Analysis /identification of finger print pattern were done in research lab using simple magnifying hand lens. The parameters observed were Arches, Loops, and Whorls. These data was tabulated and statistically analyzed with chi square test using spss software version 16 for comparing blood group, gender with finger patterns. Level of significance was kept 0.05.

2.2 Results:

Tables 1 show the anthropometric measurements of the study subjects differentiated by gender & they are comparable. Though the age and BMI has not much influence over the other parameters.

Table 1 socio demographic characters of study subjects			
Anthropometric parameter	Male (132)	Female (140)	Total (272)
Age (avg)	18.7	19.7	272
Height (avg)cm	170.4	157.6	163.8
Weight (avg) kg	60.0	52.4	56.1
BMI (avg) kg/m^2	20.7	21.1	20.9

Table 2 shows the frequencies of finger print patterns of all ten digits.

Table 2 Frequency Distribution of Digital Patterns										
	RIGHT HAND DIGITS					LEFT HAND DIGITS				
Patterns (%)	R I	R II	R III	R IV	R V	L I	L II	L III	L IV	L V	Total (2720)
Loops	147	125	208	124	206	144	118	175	126	204	1577
Whorl	111	113	50	137	56	114	110	71	136	60	958
Arch	14	34	14	11	10	14	44	26	10	8	185

The study population has highest occurrence of O blood group (M 39.4%, F 36.4%) in both gender, and lowest for AB blood group (M 11.4%; F 10.7%) in both gender (Table 3).

Table 3 Distribution of blood group among gender						
	Male (132)		Female (140)		Total(272)	
Blood group	No	%	No	%	No	%
A	22	16.7%	26	18.6%	48	17.6%
B	43	32.6%	48	34.3%	91	33.5%
AB	15	11.4%	15	10.7%	30	11.0%
O	52	39.4%	51	36.4%	103	37.9%

Figure1 shows distribution of blood groups among study subjects. In both gender distribution O blood group predominates followed by B, A and AB respectively
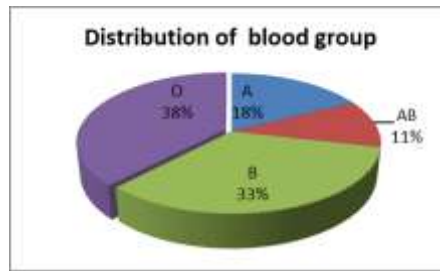
Figure 1distribution of blood group

Rh type distribution among gender follows universal patterns found in literature (Table 4).

Table 4 Distribution of Rh types among gender					
	GENDER				
	Male (132)		Female (140)		Total (272)
Rh factor	NO	%	NO	%	
POSITIVE	124	93.9%	133	95.0%	257
NEGATIVE	8	6.1%	7	5.0%	15

On comparing Rh typing with the blood group A blood group has maximum Rh negative (8.3%) while B blood group has least Rh negative values (2.2%)(Table 5).

Table 5 Blood Group According to Rh factor					
	Rh type				
BLOOD GROUP	POSITIVE (257)	94.49%	NEGATIVE(15)	5.51%	Total(272)
A	44	91.7%	4	8.3%	48
B	89	97.8%	2	2.2%	91
AB	28	93.3%	2	6.7%	30
O	96	93.2%	7	6.8%	103

Out of 3 dermatoglyphic pattern (Table 6) loop contributes maximum (58%), followed by whorls(35.2%), and arches(6.8%)

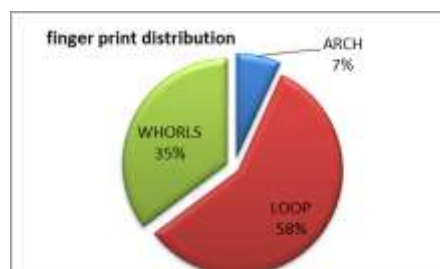| Table 6 Distribution of finger print patterns in entire study groups	
Finger print patterns	% values
ARCH	185 (6.8%)
LOOP	1577 (58.0%)
WHORLS	958 (35.2%)
Total	2720

Figure 2 Distribution of finger print patterns

Gender difference in all these 3 dermatoglyphic also shows(table 7) the same occurrence. Significant difference (p=0.002) was observed between gender for 3 dermatoglyphic pattern. Whorl pattern is noted higher (38.3%) in male, while loops and arches are higher in female gender.

Table 7: Fingerprint Pattern According to Gender			
Pattern (%)	Gender		
	Male (1320)	Female (1400)	
Loops	735 (55.7%)	842 (60.1%)	1577
Whorl	506 (38.3%)	452 (32.3%)	958
Arch	79 (6.0%)	106 (7.6%)	185
P value	0.0026036		

With table 8It is evident that percentage of whorls was highest in B blood group (38%) and lowest in O blood group (32.1%). Also, percentage of arches in AB blood group was highest (9%) as compared to lowest in B blood group (5.2%). Similarly, percentage of loop was highest in O blood group (60.7%) and lowest in A blood group (55.4%).As per table 10, significance difference was observed between dermatoglyphic and ABO blood group. O blood group has highest occurrence of loops (60.7%), while whorl in B blood group (38%), arch in AB blood group (9%).

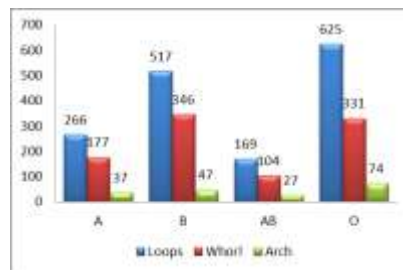| Table 8 Distribution of finger print patterns within blood groups				
	BLOOD GROUP			
Type of Finger Print	A	B	AB	O
Loops	266 (55.4%)	517 (56.8%)	169 (56.3%)	625 (60.7%)
Whorl	177 (36.9%)	346 (38%)	104 (34.7%)	331 (32.1%)
Arch	37 (7.7%)	47 (5.2%)	27 (9%)	74 (7.2%)
P	0.030*			

Figure 3 Distribution of finger print patterns within blood groups

Table 9 shows frequency and percentage wise distribution of various fingertip patterns in Rh blood groups. Among Rh individuals loop pattern occupies most numbers (66.7%), while arch pattern, the least numbers (7.3%).No significant difference was observed between Rh typing positive and negative for major 3 dermatoglyphic patterns although loops and arches are slightly found more in Rh negative groups (Table 9).It was further observed that percentage of loops (66.7%) and arches (7.3%) in Rh negative blood group was higher than percentage of loops (57.5%) and arches (6.8%) in Rh positive blood group. Similarly percentage of whorls (35.8%) in Rh positive blood group was higher than the percentage of whorls (26%) in Rh negative blood group.

Table 9 Distribution of finger print patterns within Rh types		
Type of Finger Print	Rh positive (2570)	Rh negative (150)
Loops	1477 (57.5%)	100 (66.7%)
Whorl	919 (35.8%)	39 (26%)
Arch	174 (6.8%)	11 (7.3%)
p value	0.050656028	

III. DISCUSSION:

The present study reveals that there was an association between distribution of fingerprint (dermatoglyphic) pattern and blood groups. The general distribution pattern of the primary finger print was of the same order in individuals with ABO, Rh blood groups i.e. high frequency of loops, followed by whorls and arches respectively. Similar observations were made by Mahajan et al (1986), Bharadwaja et al (2004) and Kshirsagar et al (2001).

In our study, percentage of whorls were highest in B blood group (38%) and lowest in O blood group (32.1%) which was similar to observations made by Amit A mehta et al (2011),Rajeshwar S Pate (2017),partialy with Amit patil (2017) and same time contrary to the observations of Kshirsagar et al (2001) and Mahajan et al (1986) who observed higher percentage of whorls in O blood group and lower percentage in AB blood group. However Bharadwaja et al (2004) observed higher percentage of whorls in AB blood group and lower percentage in B blood group.

Percentage of arches in AB blood group was highest (9%) in our study as compared to lowest in B blood group (5.2%) which is similar with the finding ofpartialy Amit patil (2017), Amit A Metha (2011),Kshirsagar et al (2001) and Mahajan et al (1986) of lowest percentage of arches in B blood group. Contrary to our findings, Bharadwaja et al (2004) observed higher percentage of arches in O blood group and lower percentage in AB blood group.

In our study, percentage of loops were highest in O blood group (60.7%) and lowest in A blood group (55.4%) which is partially correlating with the finding of Bharadwaja et al (2004),Amit patil (2017), Amit A Mehta (2011), Deepa deopa et al (2014),Harem Othman smail(2019) of having highest percentage in O blood group.However, Mahajan et al (1986) and Kshirsagar et al (2001) observed higher percentage of loops in B and AB blood groups respectively; while lower percentage in O blood group.Our study showed association between ABO blood group and finger print patterns were statistically significant (p<0.05). In the present study highest percentages of whorls was observed in Rh positive blood group as compared to Rh negative blood group. Also, highest percentage of loops and arches were observed in Rh negative blood group as compared to Rh positive blood group, while the association was statistically insignificant. This partially correlates with findings observed by Kshirsagar et al (2001).

IV. CONCLUSION:

Whorls were highest in B blood group and the difference was statistically significant with O blood group. Loops were highest in O blood group and the difference was statistically significant with A, B and AB blood groups. Arches were highest in AB blood group and the difference was statistically significant with B and O blood group. Whorls were higher in Rh positive blood group as compared to Rh negative blood group and the difference was statistically insignificant. Association of finger print pattern with blood group would be further adding value for identity of an individual in medico legal cases. We would like to extend the study further in large numbers in general population and patients so that any significance of association of diseases with finger print patterns as like ABO blood group could be found in future that lead to much simpler screening investigation list for patients and general population who seek healthcare.

V. ACKNOWLEDGMENTS

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