Research Paper

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Study of Correlation of Finger Print Patterns in Different Abo, Rh Blood Groups

Medical Science

KEYWORDS : Finger Print, ABO, Rh, Arch, Loop, Whorl.

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ABSTRACT

OBJECTIVE: To correlate between palmar dermatoglyphics patterns in ABO, Rh blood groups & evaluates their significance.

METHODS: A total of 304 MBBS students of B.J. Medical College, Ahmedabad were included in the study. Fingerprints were obtained by printing method. Parameters studied were arches, whorls, loops & quantitative indices.

RESULTS: Majority of the students were of blood group O Followed by blood group B, A & AB. The distribution of pattern of finger print showed high frequency of loops whereas whorls were moderate & arches were least in frequency. Blood group A showed more loops while; blood group AB had more whorls. The study reveals an association between finger print pattern & blood group. The total finger ridge count was significantly greater in blood group B.

Introduction

Dermatoglyphics is a term coined by Cummins and Mildo (1943). It is the study of ridged skin found on the finger pad, palms and soles1. It includes anthropologic, genetic and Egypt logic study of finger prints. Finger prints are dermal ridge configurations having grooves in between them2. They develop at 13th week of prenatal life and remain unchanged throughout the remaining life, thus providing mark of individuality3. Finger print is a multifactor trait. Large number of genes plays their role along with environmental influence4. Monozygotic twins have close resemblance in dermatoglyphic pattern showing common genetic factors and least differences showing influences of other factors5. Actually there is large number of genes determining the ridge pattern. Chromosomal aberrations affect these genes and produce variations in dermatoglyphic pattern in various chromosomal syndromes6. There are three basic dermatoglyphic patterns; whorl, loop and arch1. Whorl pattern has two deltas, Loop has one delta and Arch has one central or no delta at all. Loop pattern is further classified into Radial and Ulnar loop depending on the side to which loop opens. Average frequency of Whorl, Ulnar loop, Radial loop and Arch in whole world population is 25%, 70%, <1% and 5 % respectively1, 2. In recent years interest increased among the clinicians in medical application of Dermatoglyphics6.

Blood group system was discovered way back in 1901 by Karl Landsteiner. Total 19 major groups have been identified which vary in their frequency of distribution amongst various races of mankind. Clinically, only 'ABO' and 'Rhesus' groups are of major importance. 'ABO' system is further classified as A, B, AB, O blood group types 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' antigen7.

Bloterogel and Bloterogel expressed a correlation between physical characters and blood groups8. Hahne in his study asserted that blood group O is associated with more loops and less whorls than blood group A9. Herch found high frequency of loops in blood group A10. Recently in India Gowda and Rao in their study on Gowda Saraswat Brahmin community of south Kannada district (Karnataka) reported high frequency of loops with moderate whorls and low arches in the individuals of A, B and O blood group. They also found significantly greater number of loops in Rh-Positive and whorls in Rh-negative subjects in their study, total finger ridge count (TFRC) were higher in blood group A11.

In present study efforts have been made to access relationship between the pattern of finger prints and ABO, Rh blood groups.

Materials and Methods

A total of 304 MBBS students of B. J. Medical College; Ahmedabad (Gujarat, India) were taken as subjects out of which 216 were males and 88 were females.

For dermatoglyphics, Ink method was used as described by Cummins & Midlow which requires ink slab, inverted 'T' shaped pad, Kore's duplicating ink, white paper, magnifying lens, protractor, scale, soap & pencil12.

Hands were thoroughly washed with soap before taking prints. Then requisite amount of ink was placed on the ink slab & inverted 'T' shaped pad was soaked in it. The ink was evenly spread on the ink slab by light dusting. Then fingers were rolled laterally on the slab on which ink was transferred. Then they were placed on a white paper with one lateral edge & then rolled over in opposite direction. To take palm print palm was lightly dusted with the same 'T' pad. The palm was then kept on white paper & firm pressure was given on the center of the dorsum of hand & inter-digital areas.

After obtaining the finger prints the basic details such as name, age and sex was also gathered. Blood groups of all the persons were also noted for further study. Two types of blood group system were used.

1. ABO blood group system – Subjects were grouped into four Blood groups → A, B, AB and O.
2. Rh blood group system – Subjects were grouped into two blood Groups → Rh positive and Rh negative.

If the blood group wasn't known then the blood group was identified using antiserum A, B and D.

3. Results

In the present study 304 students were studied out of which 216 were males and 88 were females.

Sex and Blood Group (Table - I)

Number of Male students is higher than Females in this study, the male: female ratio is 2.45:1. Most of cases 117 (38.49%) in the study belonged to blood group O; followed by blood group B, A and AB which were 111 (36.51%), 50 (16.45%) and 26 (8.55%) respectively.

Table: I Distribution of cases according to sex and blood groups

SEX	BLOOD GROUP				TOTAL
	A	B	O	AB	
MALE	35 (11.51%)	76 (25%)	86 (28.29%)	19 (6.25%)	216 (71.05%)
FEMALE	15 (4.94%)	35 (11.51%)	31 (10.20%)	7 (2.30%)	88 (28.95%)
TOTAL	50 (16.45%)	111 (36.51%)	117 (38.49%)	26 (8.55%)	304 (100%)

Rh Blood Group (Table – II)

293 (96.38%) cases in the study had Rh positive factor, of which 111 (36.51%) belonged to blood group O , 110 (36.18%) having B group and 48 (15.79%) cases were having A. Blood group with Rh-positive factor and almost half this number 24 (7.89%) belonged to AB positive blood group. Most of the Rh-negative cases 6 (1.97%) were of blood group O.

Table II Distribution of cases according to Rh blood groups

Blood Group	Rh - Positive	Rh- Negative	Total
A	48 (15.79%)	2 (0.66%)	50
B	110 (36.18%)	1 (0.33%)	111
O	111 (36.51%)	6 (1.97%)	117
AB	24 (7.89%)	2 (0.66%)	26
Total	293 (96.38%)	11 (3.62%)	304

Type of Finger Print (Table - III)

Loops were the most common pattern, registering (51.54%) frequency in the study; followed by whorls (35.79%) and arches (12.67%).

Table III: General distributions of primary finger print patterns in all fingers of both hands

Pattern of fingerprint	Total	Percentage
Loops	1567	51.54
Whorls	1088	35.79
Arches	385	12.67
Total	3040	100

Pattern of Finger Prints in Different Blood Groups (Table - IV)

Frequency of loops was highest in both the Rh-positive and Rh- negative subjects of ABO blood groups; followed by whorls and arches except, blood group AB –Ve where the incidence of whorls 60% was more. Incidence of loops varied between 30% (in 'AB' negatives) to 60% (in 'A' negatives) among the subject of different blood group of whom, blood group A showed highest loops (Rh +ve 55%, and Rh -ve 60%). Whorls showed moderate frequency followed by arches ranging between 25% (in 'A' negatives) to 60% (in 'AB' negatives) and 4.59% (in 'AB' positives) to 20% (in 'B' negatives) respectively.

Table IV: - Distribution of pattern of finger prints amongsubjects of A, B, O and Rh blood groups (n = 3040)

Type of Finger print	Blood gr. A		Blood gr. B		Blood gr. O		Blood gr. AB	
	Rh+ve	Rh-ve	Rh+ve	Rh-ve	Rh+ve	Rh-ve	Rh+ve	Rh-ve
Whorls	168 (35%)	5 (25%)	366 (33.27%)	4 (40%)	410 (36.94%)	18 (30.0%)	105 (43.75%)	12 (60%)
Loops	264 (55%)	12 (60%)	590 (53.64%)	4 (40%)	534 (48.10%)	33 (55.0%)	124 (51.66%)	6 (30%)
Arches	48 (10%)	3 (15%)	144 (13.09%)	2 (20%)	166 (14.96%)	9 (15%)	11 (4.59%)	2 (10%)
Total	480	20	1100	10	1110	60	240	20

Total Finger Ridge Counts (TFRC) In Different Blood Groups (Table – V)

TFRC was highest in blood group B (13,630) followed by blood group O (12,014). In blood group A the TFRC was about half (6696) and in blood group AB it was about one fourth (3619) of the number of counts in blood group B and O. TFRC was almost equal in both hands.

Table: V Total finger ridge counts in A, B, O blood groups

Blood group	Total finger ridge counts		Total
	Right hand	Left hand	
A	3430	3266	6696
B	6657	6973	13630
O	6111	5903	12014
AB	1882	1737	3619

4. 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, moderate of whorls and low of arches. The same findings were observed by Kshirsagar et al (2001), Mahajan et al (1986) and Bharadwaja et al (2004)13, 14, 15.

In our study, percentage of whorls were highest in AB blood group (AB+Ve: 43.75%, AB –Ve: 60%) and lowest in A blood group (A+Ve: 35%, A –Ve: 25%) which correlates with the findings of Bharadwaja et al (2004) observed higher percentage of whorls in AB blood group and lower percentage in A blood group, but contrary with the findings of Mahajan et al (1986) and Kshirsagar et al (2001) who observed higher percentage of whorls in O blood group and lower percentage in AB blood group.

Percentage of arches in B blood group was highest (B+Ve: 13.09%, B –Ve: 20%) in our study as compared to lowest in AB blood group (AB+Ve: 4.59%, AB –Ve: 10 %) which correlates with the findings of Bharadwaja et al (2004) observed higher percentage of arches in B blood group and lower percentage in AB blood group, but contrary with the findings of Mahajan et al (1986) and Kshirsagar et al (2001) of lowest percentage of arches in B blood group.

In our study, percentage of loops was highest in A blood group (A+Ve: 55%, A –Ve: 60%) and lowest in AB blood group (AB+Ve: 51.66%, AB –Ve: 30%) which correlates with the finding of Bharadwaja et al (2004) of having lowest percentage in AB 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 revealed high total finger ridge count in blood group B which is contrary to the studies of Gowda and Rao where,

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blood group A had a significantly greater number of TFRC 11.

5. Conclusion

Whorls were highest in AB blood group and the difference was statistically significant with A blood group. Loops were highest in A blood group and the difference was statistically significant with AB blood groups. Arches were highest in B blood group and the difference was statistically significant with AB blood group. Total finger ridge counts were highest in B blood group and the difference was statistically significant with O blood group. Arches were higher in Rh negative blood group as compared to Rh positive blood group and the difference was statistically significant.

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