Palmar Dermatoglyphics in Abo Blood Groups

A. D. Patil[1*], D. S. Joshi[2], S. A. Patwardhan[3]

[1]Associate Professor, Department of Anatomy, B. J. Government Medical College Pune, Maharashtra, INDIA.

[2]Professor and Head. Department of Anatomy. Government Medical College Nanded, Maharashtra, INDIA.

[3]Retired Professor and Head, Department of Anatomy. B. J. Government Medical College, Pune, Maharashtra, INDIA.

[*]Corresponding Address:

dranjalidpatil@gmail.com

Research Article

Abstract: Dermatoglyphics, the study of palm prints are the patterns of the ridged skin of the digits, palms and soles, which are constant and individualistic. Dermatoglyphic study of finger tip and palmer patterns had been done extensively in various genetic and metabolic disorders. The present study is carried out to see the co-relation between the dermatoglyphic patterns and ABO blood groups. The study included 785 medical students of the age between 18 to 22 yrs. The fingerprints and palm prints were taken by using the kores duplicating ink. Parameters studied were arches, loops, whorls and quantitative indices. In the present study majority of students shows the higher incidence of blood group O and lower incidence of blood group AB .Frequency of ulnar loops and combine whorls in males and females in different blood groups shows significant difference (P<0.05).

Keywords: dermatoglyphics, arches, ulnar loops, whorls , blood group.

Introduction

The word "dermatoglyphics"is derived from the Greek word "Derma"meaning skin and "glyphae meaning carve. The term dermatoglyphics was introduced by Harold Cummins (1926)[1].The typical pattern of epidermal ridges was determined since their formation in the early foetal life which is permanent. The ridges are differentiated in their definitive form during third and fourth month of foetal life and once formed remain permanent and never change throughout the life except in the dimension in proportion to the graph of an individual (Cummins H and Midlo, 1943)[2]. Since dermatoglyphics and blood groups both show ethnic and genetic variations, a correlative study between dermatoglyphics and blood groups may reveal the genetic interdependence. However there are very few studies on correlation between dermatoglyphics and blood groups. (Otto and Bozoti, 1980[3]; Nayak and Patel, 1973[4]).Therefore the study was under taken to find correlation between ABO blood group system and various dermatoglyphic patterns.

Material and method

The present study has been carried out on 785 healthy individuals (534 males and 251 females). Medical students of age in between (18 – 22 years) were randomly chosen, students suffering from certain disorders or ill were excluded from the study on the basis of history. The ethical committee permitted to carry out the work using the medical student as subjects with written permission from each individual .The ABO blood groups was selected for the study and individuals were grouped into four blood groups i.e. A, B, AB and O. On each print paper following points were noted

Name –

Age- Standard –

Sex - College Name –

Date of the print - Right or left palm –

Dermatoglyphic prints were taken by the "INK METHOD "as described by CUMMINS (1936)[5] and CUMMINS and MIDLO (1961)[6] .The materials used were Kores duplicate ink., plain glass with smooth surface, Ball with handle for uniform application of ink, White paper with glazed surface ,Magnifying lens, Pencil Pen The prints were analyzed for the following parameter

A) Fingertip patterns

I) Arches Ii) Radial loops

Iii) Ulnar loops IV) Whorls

B) Indices

i) Pattern intensity index (P.I .Index):

$$= \frac{2 \times (\% \text{ of whorls} + 1) + \% \text{ of loops}}{10}$$

ii) Dankmeijer index (A / W index)

$$= \frac{\% \text{ of arches}}{\% \text{ of whorls}} \times 100$$

iii) Furuhata index (W / L index)

$$= \frac{\% \text{ of whorls}}{\% \text{ of loops}} \times 100$$

The data was tabulated according to four blood groups and sex. And was analyzed for statistical significance by Chi – square test and unpaired 't 'test.

Results

The dermatoglyphic patterns on right and left hand of a total 785 individuals (534 males, 251 females) of different blood groups were obtained, compared and analyzed.

Table 1: Number of male and female individuals of different blood groups in the present study

Blood Group	Male		Female		Total	
	NO	%	NO	%	NO	%
A	163	30.52	41	16.33	204	25.98
B	136	25.47	80	31.87	217	27.64
O	194	36.33	89	35.46	283	36.05
AB	41	07.68	41	16.33	81	10.31
Total	534	---	251	-----	785	----

From table -1. It is evident that blood group' O' is most common in general population and blood group AB the least.

Table 2: Distribution of finger tip patterns of both hands in A, B, O and AB blood group

Type of Finger Pattern	Percentage of finger tip patterns in blood group							
	A		B		O		AB	
	Male	Female	Male	Female	Male	Female	Male	Female
Arch	1.96(32)	2.91(12)	1.25(17)	1.50(12)	2.32(45)	3.26(29)	2.92(12)	2.92(12)
Radial Loop	2.88(47)	1.70(7)	3.01(41)	1.37(11)	2.78(54)	1.80(16)	3.66(15)	2.44(10)
Ulnar Loop	52.76(860)	67.80(278)	50.51(867)	71.63(573)	53.40(1036)	56.18(500)	63.90(262)	67.31(278)
Whorl	42.39(691)	27.56(113)	31.98(435)	25.50(204)	41.49(805)	38.76(345)	29.51(410)	27.31(112)

1. Frequency of arches and radial loops of male and female in different blood groups are compared shows no significant difference($P>0.05$).
2. In male frequencies of arches are 1.25%in blood group B whereas blood group AB shows highest number of arches (2.92%). Females with blood group B have (1.50%) of arches whereas blood group O shows highest number of arches (3.26%).These are not statistically significant.
3. The frequency of radial loops is only 2.78% in blood group O whereas blood group AB shows highest number of radial loops (3.66%) in male. Females with blood group B has (1.37%)of radial loops where as blood group AB shows frequency of radial loops (2.44%).These are not statistically significant.
4. Frequency of ulnar loops and combined whorls of male and female in different blood groups are compared shows significant difference($P<0.05$).
5. The frequency of ulnar loops is 50.51%in blood group B whereas blood group AB shows highest number of ulnar loops (63.90%)in males . Females with blood group O has (56.80%)of ulnar loops whereas those of blood group B shows highest number of ulnar loops (71.63%).These differences are statistically significant($P<0.05$).
6. Frequency of whorls is only 29.51% in blood group AB whereas blood group A shows highest frequency of whorls (42.39%) in males. Females with blood group B has (25.50%)of whorls where as blood group O shows highest frequency of whorls (38.76%).These differences are statistically significant($P<0.05$).

Table 3: Indices in A, B, O and AB blood group

Blood group	Sex	Index		
		Pattern intensity index	Dankmeijer index	Furuhata index
A	M	14.24	4.62	76.18
	F	12.66	10.59	39.65
B	M	11.94	3.90	59.75
	F	12.60	5.88	34.93
O	M	14.11	5.59	73.85
	F	13.75	8.41	66.85
AB	M	12.85	9.89	43.67
	F	12.63	10.69	39.15

Table 3. shows that the blood group B shows the lowest P.I. index in both sexes as compared with the other blood groups ,while in females the blood group O shows the highest P .I .index (13.75) but in males the blood group A shows highest P. I. index (14.24). Females are having more A/W index than males. In both males and females the blood group AB shows the highest A/W index while the blood group B shows the lowest index. Males are having more value of W/L index than females. While in males the blood group A shows the highest W/L index (76.18) than rest of the blood groups and the blood group O shows the lowest(43.63). While in females the blood group O shows the highest W/L index (66.85) but in males the blood group B shows lowest (34.93).

Discussion

i) The present study reveals that there is an association between distribution of fingerprint pattern and blood groups. In the present study blood group O is found

to be the commonest (36.05%) and AB the least common(10.31%). Similar findings has been reported by Agte, A.V. (1973). However Dapson(1946) found higher incidence of blood group O and A in British population.

ii) A significant decrease of simple arches in blood group B as compared with rest of the blood groups in both male and female individuals is observed in the present study. Nayak and Patel (1973) reported that no. of arches were significantly low in blood group O than rest of the blood groups.

iii) The frequency of radial loops in different blood groups in males and females did not reveal any significant difference. It indicates uniform distribution of radial loops in the population.

iv) In the present study the male population shows 56.64% ulnar loop frequency, but the incidence of ulnar loop is higher in blood group AB (63.93%) and blood group O (53.40%). While lower in blood group A(52.72%) and blood group B(50.51%). This difference of the frequency of ulnar loops is statistically significant. In females blood group O (56.18%) has lower frequency of ulnar loops than blood group A (67.80%), blood group B (71.63%) and blood group AB (67.31%). This variation between the blood groups is also significant.

v) In the present study, the true whorls, double loop whorls and composite whorls are totally tabulated as combined whorl frequency. Frequency of whorls in males and females in different blood groups are compared and shows significant difference ($P<0.05$).Nayak and Patel (1973) did not find any significant difference in the frequency of combined whorls between the four blood groups.

vi) In the present study the P.I. index is lower in the blood group B in both the sexes while it is highest in the blood group O in females and blood group A in males. Nayak and Patel studied only male individuals and noticed lowest P.I. index in blood group AB.

vii) The D.J. index in the present study is highest in blood group AB and lowest in blood group B in both sexes. However, Nayak and Patel showed lowest D.J. index in blood group O. and similar distribution of D.J. index in rest of the blood groups in male individuals.

viii) In the present study males of the blood group A shows the highest Furuhata index (76.18) and the blood group AB shows the lowest index (43.67). While in females, blood group O shows the highest Furuhata index (66.85) and the blood group B shows the lowest index (34.93). Nayak and Patel in their study found the Furuhata index highest in blood group AB and lowest in blood group A.

Conclusion

Present study revealed the correlation between ABO blood group system and dermatoglyphics. Frequency of arches and radial loops of male and female in different blood groups are compared shows no significant difference($P>0.05$).Frequency of ulnar loops and combined whorls of male and female in different blood groups are compared shows significant difference($P<0.05$). P.I. Index is lowest in blood group AB in both sexes and highest in blood group O in females and blood group A in males. D.J. index is highest in blood group AB and lowest in blood group B in both sexes. Furuhata index is highest in blood group A and lowest in blood group AB in males. While in females, Furuhata index is highest in blood group O than rest of the blood groups. Though not precisely the results of the present study will be helpful in the gross identification of sex and race on the basis of dermatoglyphics.

References

1. Cummins H.. Palmar and Plantar Epidermal Ridge Configuration (Dermatoglyphics) in Europeans and Americans. Am J Phy Anthrop.1926; 179: 741-802.
2. Cummins H and Midlo C; Finger Prints, Palms and Soles- An introduction to dermatoglyphics, The Blakiston Company, Philadelphia 1943.
3. Cummins,H. Dermatoglyphics stigma in Mongolism Idiocy . Anatomical Record 64.1936. (Supplement 3): 11.
4. Cummins, H. and Midow,C. Finger prints, palms and soles, New York, Dover Publication. (1961)
5. Gray H, Grays Anatomy 40th Edition; Skin and its appendages. Elsevier Churchill Livingstone. 2008; p 160.
6. Hale, A.R.. Morphogenesis of volar skin in human foetus.American Journal of Anatomy. 1952;Vol.91:147.
7. Hellar,A.D.. Dermatoglyphics peculiarity in Mongoloids.Mentally defectives and their blood relatives.Medical Press. 1957;Vol.119:203.
8. Herschel WJ. Skin Furrows of the Hand . Wahul 1880; 23: 76.
9. Hirsch W; Dermatoglyphics and Creases in Their Relationship to Clinical syndromes: A Diagnostic Criterion in Dermatoglyphics, An International Perspective by Jamshed Mavalwala, Moulton Publishers, The Hague/Paris.
10. Kulkarni,D.S.Dermatoglyphic study on Human Fetus . Journal of Anatomical Sciences.Vol.3(1):47-52.
11. Levin,H.ABO incompatibility.Progress in Medical Genetics. 1939;Vol.I(5):120.
12. Nayak and Patel, Genetic correlation between finger ball pattern and blood groups. Journal of Indian Medical Association.1973;Vol.61:119-20.
13. Otto and Bozoti. Digital dermatoglyphics and blood groups.Lancet.1968;Vol.2:1250-51.