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Original Article

Dermatoglyphic characterization of Blood groups and its relevance to oral diseases- An *in vivo* Study

Anshu Sharma*

Department of Preventive Dental Sciences, College of Dentistry, Prince Sattam Bin Abdul Aziz University, Al Kharj, Saudi Arabia

***Corresponding Author**
Dr. Anshu Sharma
Department of Preventive Dental Sciences,
College of Dentistry,
Prince Sattam Bin Abdul Aziz University,
Al Kharj, Saudi Arabia
E-mail: dranshul@hotmail.com

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Abstract

Background: Dermatoglyphics have proven to be an extremely useful tool to characterize various health and disease states, through decades of scientific research, the hand has come to be recognized as a powerful tool in the diagnosis of psychological, medical and congenital disorders.
Aim: To determine if there is any significant co-relation between various blood groups and dermatoglyphic patterns.
Settings and Design: In the present study Dermatoglyphic patterns of sixty subjects divided into 4 groups (A,AB,B,O) of 15 each were evaluated using Cummins and Midlo method and were correlated with predetermined blood groups.
Methods and Material: The dermatoglyphic patterns of all individuals 10 palmar digits were recorded using stamp-pad method and the frequency of occurrence of type of dermatoglyphic pattern on fingertip of each digit was analysed.
Statistical Analysis: Data was subjected to statistical analysis and correlation of dermatoglyphic pattern with blood group was determined using chi sq test.
Results and Conclusion: Whorls were highest in A blood group and lowest in B blood group, Loops were highest in O blood group and the difference was significant in AB blood group, Arches were highest in B and lowest in A blood group.

1.Introduction

The present study aimed at unveiling the dermatoglyphic characterization of the haematological groups. The basis of study is to correlate between palmar dermatoglyphic pattern in ABO blood group and to evaluate their significance. Bleeding disorders are of major concern to the dental surgeon since they form a route a route of infection in day to day dentistry. Oral manifestations of bleeding disorders in children are noted first by a pediatric dentist. The genetics of blood group is complicated and is of clinical importance eg: One of the most significant disease associations described for non-O (subjects of group A, B, or AB) versus O subjects is susceptibility to arterial and venous thromboembolism (VTE).Non–group O patients have a greater risk of VTE than patients of group O. Extensive research work has been carried out regarding palmar dermatoglyphics and blood group system independently, combined study correlating the two entities are very few. Dermatoglyphics ("derma" means skin and "glyphic" means carvings) is a scientific study of epidermal ridges and their configuration on the volar aspect of the palmar and plantar regions[1]. The terminology was coined by Harold Cummins and Midlo in 1926, and Cummins is regarded as the "Father of Dermatoglyphics".[2] Sir Francis Galton, in 1892, gave the basic nomenclature of the types of fingerprint patterns. Herschel used fingerprints for personal identification in India. Fingerprints pattern are classified into three patterns[3] Loops, Whorls and Arches. Forest[4] reported that dermatoglyphic are laid down early in embryogenesis and represent a part of structural constitution Bloterogel and Bloterogel[5] expressed a correlation between physical characters and blood groups. Apart from use of dermatoglyphics in predicting the diagnosis of genetic disorders, it is used in forensic science for criminal identification. Blood group system was discovered way back in 1901 by Karl Landsteiner. So, far 19 major groups have been identified which vary in their frequency of distribution amongst various races of mankind.So, to bring forth further correlation between palmar dermatoglyphics and blood group system, the present study has been carried out.

2. Material and Method

Sixty subjects, age between 10-14 years with predetermined blood groups were randomly selected for the study. Subjects were divided into four groups of 15 each with each group representing one blood group (A, B, O .AB).All subjects were of specific age group , free from any systemic disease, same ethnic origin, Rh+ve and were free from haematological disorder. Study excluded those subjects who refuse to participate in the study, those with history of blood dyscrasias or any hematopoietic drug along with the one having any congenital anomaly or trauma of hand.

2.1 Blood group determination

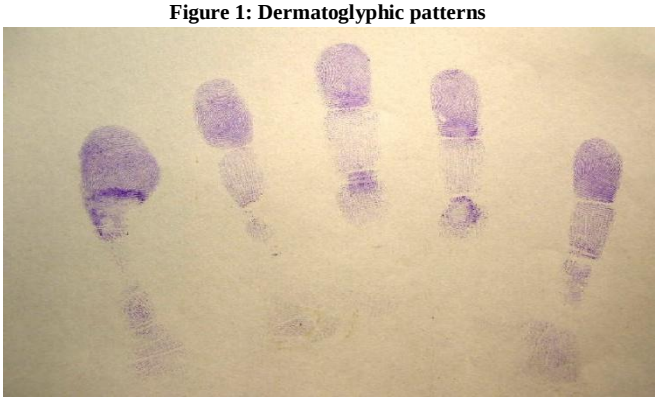
Blood groups were recorded from predetermined hospital records and on confirmatory basis a verbal confirmation was also taken.

2.2 Recording of dermatoglyphic patterns

Dermatoglyphic patterns of all 10 palmar digits were recorded using ink method by Cummins and Midlo [1-3]. The finger prints were recorded as follows:

Firstly, hands were scrubbed thoroughly with an antiseptic lotion (Savlon) and allowed to dry. After this, right hand digits were guided by the researcher to the ink stamp pad and pressed firmly against bond paper that was placed on a smooth surface board 3-4 times. This was repeated for the thumb of right hand. In this method, third recording was satisfactory and readable, so impressions were recorded 3-4 time. Same procedure was repeated for the left hand. The handprints were observed in a sequential manner: The handprints were observed from the left hand 4 th digit till the thumb. Then, they were observed from the thumb of right hand till the 4th digit. In this way, a total of 600 digital prints were obtained from 60 patients. These dermatoglyphic patterns were analyzed with the help of a magnifying glass (10x), with respect to available standards and data was tabulated and statistically analysed by using chi square test.

Figure 1: Dermatoglyphic patterns



3. Results

In the present study 60 subjects were taken out of which 47 were females and 13 males, all the subjects were Rh positive type It was observed that there was a significant co-relation between dermatoglyphic pattern and blood groups. The percentage of whorls was highest in A blood group (29.8%) and lowest in B blood group (21.4%). Percentage of loops were highest in O blood group (25.9%)with same percentage for B group, and difference was statistically siginficant with AB blood group (23.9%). Percentage of arches were highest in B (36.6%) followed by AB+ve (31.7%) compared to lowest in A (2.4%). (table 1 and table 2)

Table 1: Showing frequency distribution of dermatoglyphic pattern in various blood group.

			Pattern			Total
			Whorls	Loops	Arches	
Blood Group	A+ve	Count	64	85	1	150
		Expected Count	53.8	86.0	10.3	150.0
		% within Pattern	29.8%	24.7%	2.4%	25.0%
	B+ve	Count	46	89	15	150
		Expected Count	53.8	86.0	10.3	150.0
		% within Pattern	21.4%	25.9%	36.6%	25.0%
	O+ve	Count	49	89	12	150
		Expected Count	53.8	86.0	10.3	150.0
		% within Pattern	22.8%	25.9%	29.3%	25.0%
	AB+ve	Count	56	81	13	150
		Expected Count	53.8	86.0	10.3	150.0
		% within Pattern	26.0%	23.5%	31.7%	25.0%
Total		Count	215	344	41	600
		Expected Count	215.0	344.0	41.0	600.0
		% within Pattern	100.0%	100.0%	100.0%	100.0%

Table 2 Showing chi square test value of various dermatoglyphic pattern

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	15.683[a]	6	0.016
Likelihood Ratio	20.788	6	0.002
Linear-by-Linear Association	2.833	1	0.092
N of Valid Cases	600		

4. Discussion

Dermatoglyphic dependency of various blood groups have been delineated in previous study. [6]Blood group determination has been the primary measure to determine transfusion as well as systemic dependency of many diseases eg: Evidence suggests that in general, blood type A individuals are more predisposed to leukemia. This trend is particularly strong for a more rare variety of blood type A (the A2 A's) and chronic lymphocytic leukemia associated. Similarly, blood type O appears to grant a degree of resistance especially in acute leukemia[7]. The severity of infection can be directly linked to ABO phenotype. The authors of numerous studies have shown that once a person is infected with cholera (*Vibrio cholerae* strains O1 El Tor and O139)the phenotype group O confers a greater likelihood of severe infections than non-O blood group phenotypes.[8] . Blood group propensity of various systemic disorder manifesting in oral cavity was previously accepted [6]. Hence it was assumed that if there is any significant co-relation between blood group and dermatoglyphic ,it can be used as a screening tool.The present study, reveals that there exists a significant correlation between dermatoglyphic pattern and blood groups.. Mehta A(2010) and Upadhaya AK(2006) confirmed dermatoglyphic dependency of various blood groups. The general distribution pattern of the primary finger print was of the same order in individuals with ABO, i.e. high frequency of loops, moderate of whorls and low of arches Mahajan *et al* (1986) and Kshirsagar (2001) also confirmed the above mentioned study. In the present study samples were taken of age group 20-24, and equally divided for A, B, O and AB blood groups. In our study percentage of loops were highest in O blood group(25.9%) and lowest in AB blood group (23.9%) which correlates with the finding of Bharadwaja *et al* (2004) of having lowest percentage in AB blood group[6] and Mehta A (2010) of having highest loops in O blood group and lowest in AB blood group[7].Hanhe in his study asserted that blood group O is associated with more loops and less whorls than blood group A.[8] 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. In the present study Percentage of whorls were highest in A blood group (29.8%) and lowest in B blood group (21.4%) which was contrary to 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. Similarly, Bharadwaja *et al* (2004) observed higher percentage of whorls in AB blood group and lower percentage in A blood group. Percentage of arches in B blood group was highest (36.6%) in our study as compared to lowest in A blood group (2.4%) which correlates with the finding of, Bharadwaja *et al* (2004) observed higher percentage of arches in B blood group [6]. Contrary to our finding Mahajan *et al* (1986) and Kshirsagar *et al* (2001) of lowest percentage of arches in B blood group.Our study adds to the existing research work, but serious thought should be given in this direction which could lead to a new horizon and thus dermatoglyphic being a non-invasive method for determination of blood group could be reliably used as a screening tool.

5. Conclusion

In the light of this study it can be concluded that dermatoglyphics have proven to be a vital tool for screening purposes as well as delineating systemic dependency of many haematological disorders. If further research is done with larger sample size than haematology may have this valauble tool as routine screening criteria as dermatoglyphics which have been used for same in Stanford sleep center, USA.

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