



Research Article

ASSOCIATION OF AGGRESSIVE PERIODONTITIS WITH DERMATOGLYPHIC PATTERN AND ABO BLOOD GROUP - A POSSIBLE LINK EXPLORED

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ABSTRACT

Background: With the risk for aggressive periodontal disease being substantially heritable, search for new screening tools are in the forefront. Dermatoglyphics being one of the diagnostic tools has been an area of research. Although periodontitis is a multifactorial disease, their genetic determinants that exist could be suggestive of specific dermatoglyphic patterns for aggressive periodontitis. Though extensive research work has been carried out regarding dermatoglyphics and blood group system, combined study assessing the relationship with aggressive periodontitis subjects are rare. Hence the present study attempted to find any association of aggressive periodontitis with dermatoglyphic pattern and ABO blood group.

Objectives: The present study aimed to compare the dermatoglyphic pattern, ABO blood groups with Rh factor in periodontally healthy and aggressive periodontitis subjects.

Material and Methods: This study was conducted on 50 periodontally healthy subjects and 50 subjects diagnosed with aggressive periodontitis. The finger print patterns of participants were recorded using a rolling impression technique using duplicating ink on paper. Venous blood was collected from each subject and analyzed for determination of ABO blood groups. The obtained data were subjected to statistical analysis.

Results: It was observed that there is statistically significant increased frequency of ulnar and radial loops on the fingers of patients with aggressive periodontitis and also statistically increased prevalence of patients with A positive blood in aggressive periodontitis.

Conclusion: Within the limitations of this study, it may be concluded that dermatoglyphics can represent an anatomical, non-invasive, inexpensive tool for screening high-risk population and thus facilitate early detection and management

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INTRODUCTION

Periodontitis is considered to be a multifactorial disease that is influenced by local, systemic, and immunologic factors. Each factor is in turn directly related to individual genetic conditions. Periodontal destruction has been found among family members and across different generations within a family, thereby suggesting a genetic basis for the susceptibility to periodontal disease. In a number of studies, the prevalence of aggressive periodontitis has been investigated in families with a history of one or more family members with periodontitis.¹ Since Dermatoglyphics feature are genetically determined and the idea of using it as a diagnostic aid and supportive evidence in the diagnosis of genetic disorders have now become a reality.² Dermatoglyphics is a Greek words which means epidermal patterns (derma=skin and glyphe=carve) and refers to the epidermal skin ridge

formations which are seen on the fingers, palm of the hands and soles of the feet.³ These patterns are fully formed 16 weeks after conception and do not change during the rest of life. Before birth they are genetically determined and influenced by environmental forces that are operating. Since these patterns form early in fetal development and do not change throughout life, unusual epidermal pattern may indicate gene or chromosomal abnormalities consistent with diseases.⁴

The epidermal ridge patterns on the fingertips are divided into the 3 groups: arches, loops and whorls (Fig. 1). Arch is formed by a succession of more or less parallel ridges, which traverse the pattern area and form a curve that is concave proximally. The arch patterns are of two types. In simple (or plain) arch, ridges cross the fingertip from one side to the other without recurring. If, the ridges meet at a point so that their smooth sweep is interrupted, a tented arch is formed. Triradius is the union of ridges because ridges usually radiate from this point in three different directions. The most commonly found pattern on the fingertip is a loop. In this configuration, a series of ridges enters the pattern area on the same side. The ridge which wide opens on the ulnar side the resulting loop is termed

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an ulnar loop, whereas which wide opens toward the radial margin it is called a radial loop. A whorl is any ridge formed with two or more triradii. One triradius is present on the radial and the other on the ulnar side of the pattern.⁴

Landsteiner in 1900 first described the existence of serologic difference between individuals, and classified people into four groups depending on whether their RBC cell membrane contained agglutinin (antigens) "A," agglutinin "B," neither A nor B (group 0) or both A and B (group AB).⁵ The genetic of blood groups is proved by the fact that specific diseases are commonly seen in particular blood group; for example, duodenal ulcers in O+ blood group; gastric cancer in A blood group (Ian Arid *et al.*, 1953; Ian Arid *et al.*, 1969). Many research works were carried out independently regarding dermatoglyphics and blood group system but combined study linking the two entities with aggressive periodontitis are rare.³ So, the present study has been carried out to bring forth association between aggressive periodontitis, dermatoglyphic pattern and blood group.

MATERIALS AND METHODS

Subjects for the study were selected from regular outpatient Department of Periodontology, A.M.E'S Dental College and Hospital, Raichur. The study was approved from the ethical committee of the institution. The participants were explained about the study and then included with an informed consent. The control group consisted of 50 periodontally healthy subjects. The Test group consisted of 50 subjects diagnosed clinically and radiographically with aggressive periodontitis.

The exclusion criteria were as follows

1. Absence of a digit
2. Patient with conditions/abnormalities that did not allow accurate recording of finger prints
3. Smokers
4. Pregnant females
5. On antibiotics or other medications
6. Oral prophylaxis in past 6 months

Dermatoglyphic prints were taken by using Ink method by Cummins and Midlo. The materials used were duplicating ink, magnifying glass and sheets of paper (Fig. 2). All the participants were asked to wash their hands with soap in order to remove all the dirt. For each individual all ten finger patterns were recorded. The fingers were printed by rolling them from radial to ulnar side to include all the patterns (Fig. 3). The printed sheets were coded with name, age, sex and blood group. Prints were analysed with the help of magnifying hand glass (10x) by a trained person and parameters observed were loops, whorls and arches (Fig. 4). The venous blood samples were collected by a sterile finger prick with a disposable needle to identify the ABO blood groups and the Rh factor by slide method (Fig. 5).

Statistical Analysis

The percentage distribution was calculated. To explore the relationship between the study groups, ABO blood groups and Rh factor, the data was statistically analyzed using the Chi square test. Data was entered and tabulated in excel spreadsheet and subjected to frequency distribution analysis using SPSS version 20.

Table 1 Distribution of dermatoglyphic Pattern of test and control groups

Dermatoglyphic Pattern	Test		Control		Chi-square value	P value
	(Aggressive Periodontitis)		(periodontally healthy)			
	n	%	n	%		
Simple arch	0	0.0	40	8.0	226.031	<0.001 Significant
Tented arch	17	3.4	151	30.2		
Loop (ulnar)	306	61.2	200	40.0		
Loop (radial)	50	10.0	0	0.0		
Spiral whorl	120	24.0	93	18.6		
Double loop whorl	7	1.4	16	3.2		
TOTAL	500	100	500	100		

Statistical Analysis: Chi-square test. Statistically significant if P<0.05

Table 2 Distribution of ABO Blood group in cases and controls

ABO Blood Groups with Rh factor	Test		Control		Chi-square value	P value
	(Aggressive Periodontitis)		(Periodontally healthy)			
	n	%	N	%		
O+	13	26.0	16	32.0	31.939	<0.001 Significant
O-	0	0.0	3	6.0		
A+	27	54.0	3	6.0		
A-	0	0.0	3	6.0		
B+	10	20.0	25	50.0		
Total	50	100	50	100		

Statistical Analysis: Chi-square test. Statistically significant if P<0.05

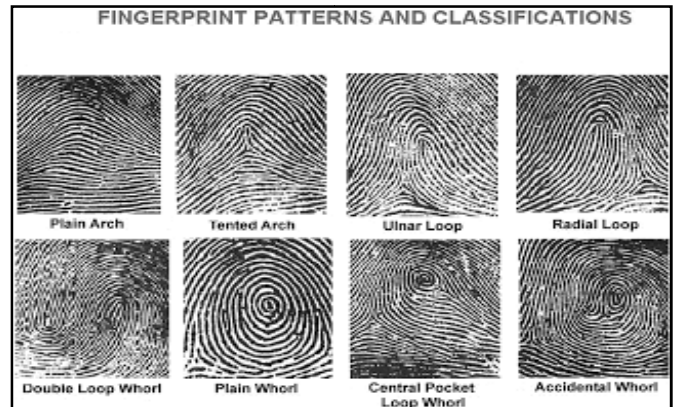


Fig 1 Ridge patterns on the distal phalanges of the fingertips



Fig 2 Armamentarium



Fig 3 The fingerprint patterns of the participants recorded with a rolling impression technique using duplicating ink on executive bond paper.



Fig 4 Finger prints under the magnifying glass

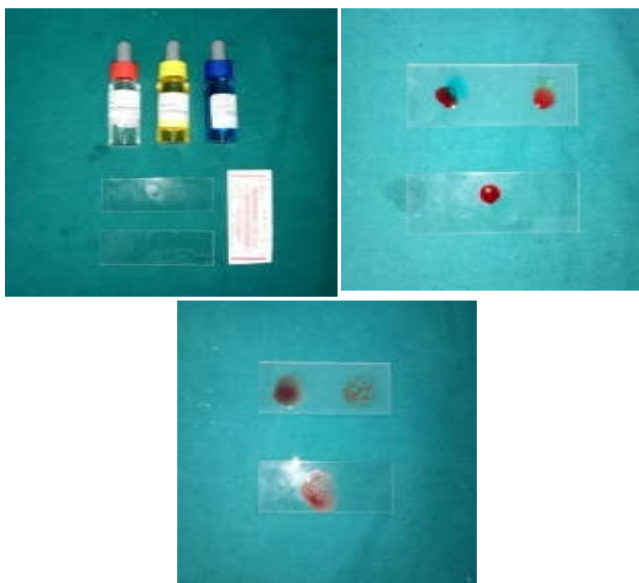


Fig 5 Identify the ABO blood groups and the Rh factor

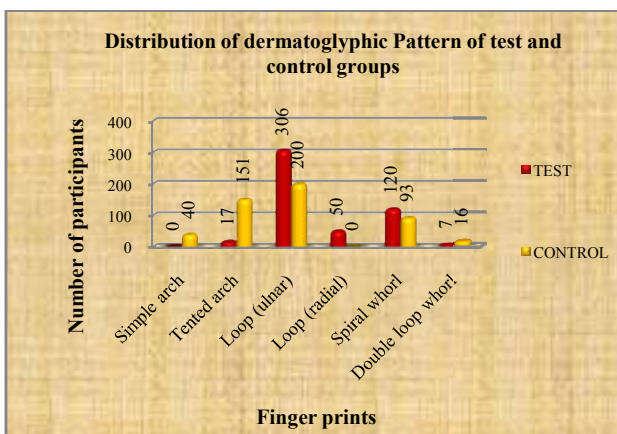


Figure 6 Distribution of finger print patterns among both groups

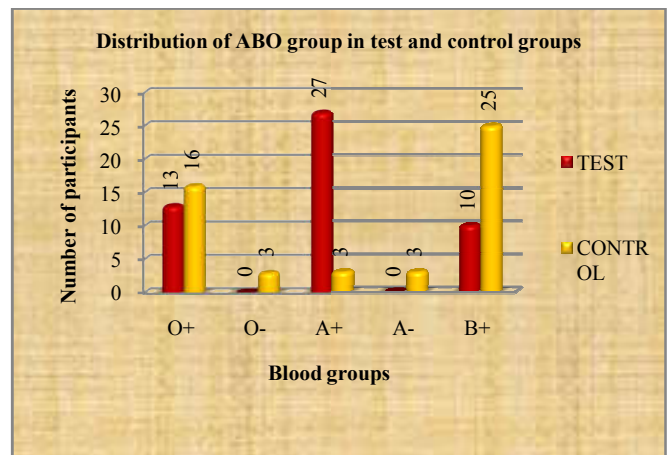


Figure 7 Distribution of blood groups among both groups

RESULTS

The percentage frequencies of all dermatoglyphic pattern types on fingertips of subjects with aggressive periodontitis and periodontally healthy subjects were assessed [Table 1]. It was found that in aggressive periodontitis subjects there was highest prevalence of ulnar loops (61.2%) followed by spiral whorls (24%), radial loops (10%), tented arches (3.4%) and double loop whorl (1.4%). Where as in periodontally healthy subjects there was increased frequency of ulnar loops (40%), tented arches (30.2%), spiral whorl (18.6%), simple arch (8%), double loop whorl (3.2%). Chi-square test applied to the above data showed highly statistically significant results that is $P < 0.001$ (Statistically significant if $P < 0.05$).

The percentage frequencies of ABO blood group in subjects with aggressive periodontitis and periodontally healthy subjects were assessed [Table 2]. It was found that in aggressive periodontitis subjects there was highest prevalence of A+ blood group (54%) followed by O+ blood group (26%), B+ blood group (20%). Where as in periodontally healthy subjects there was increased frequency of B+ blood group (50%), followed by O+ blood group (32%), O- blood group (6%), A+ blood group (6%), and A- blood group (6%). Chi-square test applied to the above data showed highly statistically significant results that is $P < 0.001$ (Statistically significant if $P < 0.05$).

DISCUSSION

The present study researched the relationship between dermatoglyphic patterns, ABO blood groups and aggressive periodontitis. In the light of the above data, there is increased frequency of ulnar loops and radial loop on the fingers of patients with aggressive periodontitis (Graph 6). Radial loop were present only on the right index finger of aggressive periodontitis. Simple arches were not present on the fingers of aggressive periodontitis. There was an overall more percentage frequency of A+ blood group in aggressive periodontitis subjects and B+ blood group in periodontally healthy subjects (Graph 7).

Dermatoglyphics has been a useful tool in understanding basic questions in medicine, genetics and evolution, since past 150 years. In addition being the best and most widely used method for personal identification (Pratibha Ramani *et al.*, 2011). Dermatoglyphics is still in budding stage where the association of dental conditions with that of dermatoglyphic patterns is done.³ Arowojolu *et al.*, stated that there was a relationship between juvenile and nonjuvenile periodontitis

and hemoglobin type A in his study. He also provided preliminary data for the association between ABO blood groups and periodontal diseases.⁶ In 2007 Turgut demir investigated the relationship between periodontal disease and ABO blood group. Author found a higher percentage of blood type A in gingivitis patients and a higher percentage of blood type O in periodontitis patients.⁷ Similarly, Gawrzewska found individuals with blood group O to have greater severity of periodontal diseases, but individuals of blood group A to have greater resistance to periodontal diseases.⁸ A study by Yilmaz *et al* 1993 was conducted to incept the role of dermatoglyphics in periodontal diseases in 70 individuals comprising of 36 early onset periodontitis cases, 20 adult periodontitis and 20 periodontally healthy patients and evaluated the quantitative and qualitative patterns of ridged skin. They also confirmed the role of heredity in the etiopathogenesis of periodontal diseases.⁹ Atasu *et al* 2005 in a case control study performed qualitative analysis of fingertip, palms and sole patterns of 158 subjects which encompassed 36 Juvenile Periodontitis (JP), 45 Rapidly Progressing Periodontitis (RPP), 38 Adult Periodontitis (AP) cases compared to 39 healthy controls. A lower frequency of ulnar loops on all digits and increased frequency of 'e' tri- radii on sole pattern was found in the JP group. A higher frequency of radial loops on second digit & IV and H loops and 't', 'b' triradiion the palms in RPP group whereas increased frequency of concentric whorls and ulnar loops on all digits was encountered in AP group.¹⁰ In our study an increased frequency of ulnar loop and radial loop patterns was observed in aggressive periodontitis subjects. In another case control study by Devishree *et al* 2015 evaluating the qualitative parameters on finger tips in 15 aggressive periodontitis as compared to 15 periodontally healthy cases an increased frequency of ulnar loops was found in the test group.⁴ However in our study a similar finding was observed. It can thus be assumed that although an increased frequency of ulnar loops and radial loops is a characteristic feature of aggressive periodontitis, a higher level of genetic analysis is required to categorize the type of periodontitis. Babitha *et al* 2016 conducted an observational study to assess correlation between dermatoglyphics, ABO blood group, Rh factor in periodontally healthy (n=100) and diseased patients (n=100). An increased frequency of whorls and loops were encountered in chronic periodontitis patients. Also majority of the test group participants had O positive blood group as compared to A positive healthy controls.³ However in our study majority of the test group participants had A positive blood group as compared to majority of B positive healthy controls. Another study by Pai *et al*. 2013 also found that periodontitis patients were more likely to have A positive blood groups.¹¹ A significant association of periodontitis with Rh factor was seen with more individuals being Rh positive as compared with Rh negative. Similarly in our study highly significant association of aggressive periodontitis with Rh positive subjects was seen. This is in contrast to a study done by Demir *et al* which showed no significant difference in the prevalence of periodontitis between Rh+ve and Rh-ve individuals.¹² As per our knowledge this is the first type of study where a research has been made to assess the association of aggressive periodontitis with dermatoglyphic pattern and ABO blood groups with Rh factor.

CONCLUSION

Within the limitations of this study, there is association between aggressive periodontitis, specific dermatoglyphic pattern and A+ blood group. However, further studies are required to arrive at a conclusive report linking aggressive periodontitis with dermatoglyphic patterns and ABO blood groups with Rh factor. This study just adds a cornerstone to the existing research work. It's not the end but an opening to a new arena tool.

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