ISSN: 0975-833X

Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 8, Issue, 07, pp.34224-34228, July, 2016

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

RESEARCH ARTICLE

DERMATOGLYPHICS, ABO BLOOD GROUPS WITH Rh FACTOR - AN EXPLORING LINK TO PERIODONTITIS

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ARTICLE INFO

Article History:
Received 25th April, 2016
Received in revised form
10th May, 2016
Accepted 23rd June, 2016
Published online 16th July, 2016

Key words:
Chronic periodontitis,
Fingerprints,
Bloodgroups,
Rh factor.

ABSTRACT

Objective: To assess correlation between dermatoglyphics, ABO blood groups ,Rh factor among periodontally healthy and diseased patients

Materials and Methods: A total of 100 patients with chronic periodontitis and 100 periodontally healthy patients were included in the study. The finger print pattern of participants will be recorded with a rolling impression technique using duplicating ink on executive bond paper. Non fasting venous blood was collected from each subject, and analyzed for determination of ABO blood groups and Rh factor. Oral hard and soft tissue examination done with clinical parameters like gingival bleeding on probing, probing pocket depth, clinical attachment level. The data will then be correlated

Results: It was observed that there is increased frequency of whorl and loop on all fingers compared to arch pattern in patients with chronic periodontitis. There is increased prevalance of patients with O positive blood group showed inclination towards chronic periodontitis, where as patients with A positive blood group inclined towards healthy periodontium.

Citation: Dr. Babitha, G. A., Dr. Shiva Charan Yadav, Dr. Shobha Prakash, Dr. K. Suresh, Dr. Snehal Deotale and Dr. Sachin Gaikwad, 2016. "Dermatoglyphics, ABO blood groups with Rh factor - An exploring link to periodontitis", *International Journal of Current Research*, 8, (06), 34224-34228.

INTRODUCTION

Human periodontal disease comprises of heterogeneous group of infectious diseases that lead to pathologic destruction of the periodontium. It is well known that periodontal disease can vary with respect to bacterial etiology, host response, and clinical disease progression. Although differences exist among the various types of periodontal disease, all share the common characteristic of complex host–bacterial interactions. Disease onset and progression reflect the balance between homeostasis and destruction of the periodontal tissues (Listgarten, 1986). The word 'dermatoglyphics' comes from two Greek words (derma=skin and glyphe=carve) and refers to the epidermal skin ridge formations which appear on the fingers, palm of the hands and soles of the feet (Sharma Anshu *et al*., 2010).

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This term was coined by Harold Cummins in 1926, and it is known that finger and palm prints are formed during the 6th-7th week of the embryonic period and are completed after 10-20 weeks of gestation (Gh. Mohd. Bhat *et al*., 2014). Genetic process of dermatoglyphic traits is complex and is not perfectly known (Ram Nath Sharma and Rajendra K. Sharma, 2007). Their variable characteristics are not duplicated in other people, even in monozygotic twins or even in the same person, from location to location (Rokaya H. Ahmed *et al*., 2010). Abnormalities in these areas are influenced by a combination of hereditary and environmental factors, but only when the combined factors exceed a certain level, can be expected to appear these abnormalities. (Natekar and DeSouza, 2006) Widespread interest in epidermal ridges developed only in the last several decades when it became apparent that many patients with chromosomal aberrations had unusual ridge formations (Sridevi *et al*., 2010). Thus the study of dermatoglyphics is considered as a window of congenital

abnormalities and is a sensitive indicator of intrauterine anomalies as abnormal dermatoglyphic patterns have been observed in several non–chromosomal genetic disorders and other diseases whose aetiology may be influenced directly or indirectly by genetic inheritance (Kiran *et al*., 2010). Early detection can aid the clinician to anticipate health problems in children and initiate preventive and protective health measures at a very young age. The main dermatoglyphic patterns are arches, loops and whorls. A loop is recognized as a series of ridges that enter the pattern area on one side of the digit, recurves abruptly, and leaves the pattern area on the same side. A whorl is different from loop in that it is made of concentric rings. Arches are formed by the succession of one or more parallel ridges which cross the finger from one side to the other side without recurving. Dermatoglyphic patterns remain permanent during life and they play a significant role in the diagnosis of many disorders with genetic background. The ridge configurations are genetically determined and are influenced or modified by environmental forces. Although bacteria are the main cause of inflammatory periodontal disease, there is increased evidence that host factors, such as diabetes, smoking and genetic predisposition, contribute to the clinical appearance, distribution of lesions and severity of destruction in each individual. It has been estimated that less than 20% of the variability in periodontal disease severity can be explained by the quantity of specific bacteria found in disease-associated plaques, instead, a key role for genetic effects have been suggested (Offenbacher, 1996). Blood group system was discovered in 1901 by Karl Landsteiner. So far 19 major groups have been identified of which ―ABO and ―Rhesus groups are of major importance. The genetics of blood groups is proved by the fact that specific diseases are common in particular blood group; for example, duodenal ulcers in ―O+ blood group; gastric cancer in ―A+blood group (Ian Aird *et al*., 1953; Ian Aird *et al*., 1969) Though extensive research work has been carried out regarding dermatoglyphics and blood group system independently combined study correlating the two entities are few. So, the present study has been carried out to bring forth correlation between chronic periodontits, dermatoglyphics and blood groups and to evaluate their association.

Selection criteria

Inclusion criteria

Patients who had at least 20 teeth (except 3rd molars) were included in this study

Exclusion criteria

- Patients who are unable to perform routine oral hygiene
- Smokers and alcoholics
- Any previous history of antibiotic therapy 6 months prior to examination
- Any periodontal treatment within 6 months prior to examination
- Subject suffering from systemic diseases
- Pregnancy

MATERIALS AND METHODS

Study design: - This study was observational study

Study setting: - The study was conducted in Department of Periodontics, College of Dental Sciences, Davangere for a period of 2 months.

Sample size :- 100/ group (periodontally healthy and chronic periodontitis patients)

The informed consent was obtained from each participant and ethical approval was obtained from the Institutional Review Board at College of Dental Sciences, Davangere, Karnataka. A standard proforma consisting of details of each subject, such as name, age, sex, medical histroy, past dental history, oral hygiene habits and periodontal index were recorded. Detailed oral examination was carried out using mouth mirror and explorer. The Oral hygiene index simplified (OHIS index) was used to assess oral hygiene. Periodontal status was recorded using a mouth mirror and UNC 15 periodontal probe under artificial light. Periodontal scoring was performed according to Ramfjord's periodontal disease index (PDI). Based on PDI scoring, the study population was segregated into two groups: periodontally Healthy and Periodontitis patients. 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 after obtaining informed consent from all the subjects. Investigation was carried out by slide method. Dermatoglyphic prints were taken by using Ink method by Cummins and Midlo. The materials used were printers, duplicating ink from Kores, cardboard, roller, gauze pads and sheets of paper (Fig. 1). Subjects were asked to wash and dry their hands. A small quantity of ink was applied over the palm with a gauze piece and smeared thoroughly and uniformly (Fig. 2). A sheet of paper was kept at the edge of the table. The palm was placed on the sheet from proximal to distal end (Fig. 3). Then it was lifted from the paper in the reverse order. The fingers were also printed by rolling them from radial to ulnar side to include all the patterns. The printed sheets were coded with name, age, sex and blood group. Prints were analysed with the help of magnifying hand glass and parameters observed were loops, whorls and arches (Fig. 4).

Fig. 1. Armamentarium

Fig. 2. Hand digits were guided by the researcher to the ink stamp pad

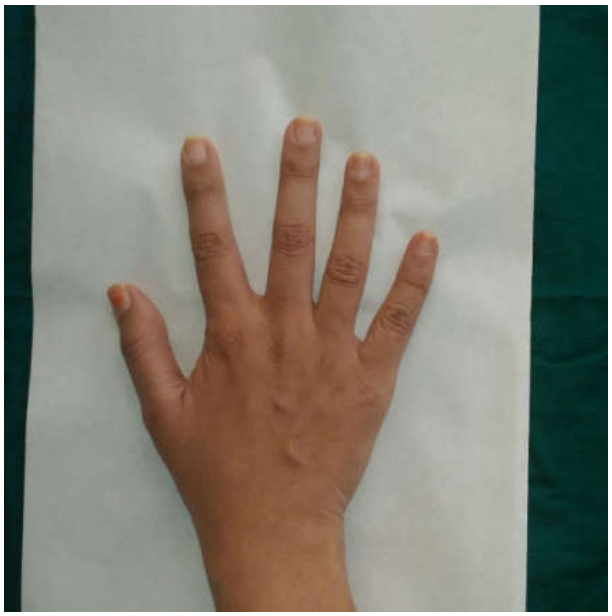

Fig. 3. Hand pressed firmly against bond paper

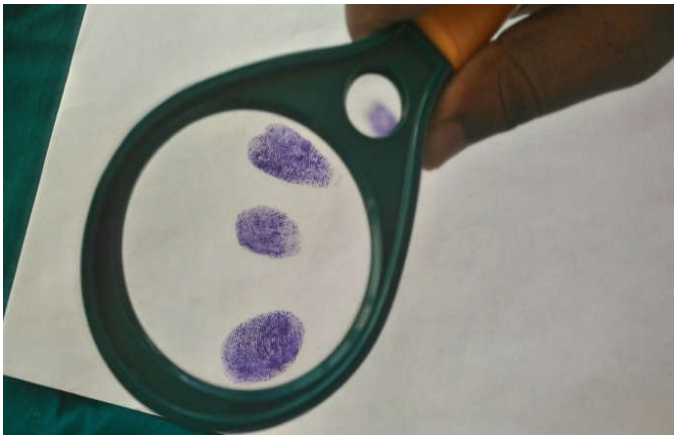

Fig. 4. Finger prints under the magnifying glass

Statistical analysis

The percentage distribution was calculated in both. 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 21, Chicago, Los Angels.

RESULTS

These dermatoglyphic patterns were analyzed with the help of a magnifying glass (10x), with respect to available standards the number of loops, arches and whorls were recorded. There is increased frequency of whorl and loop on all fingers compared to arch pattern in patients with chronic periodontitis (Table 1). There is increased prevalance of patients with O positive blood group showed inclination towards chronic periodontitis, where as patients with A positive blood group inclined towards healthy periodontium (Table 2).

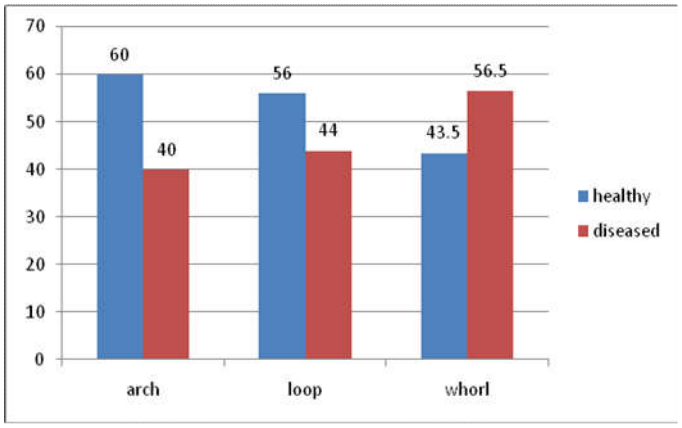

Table 1

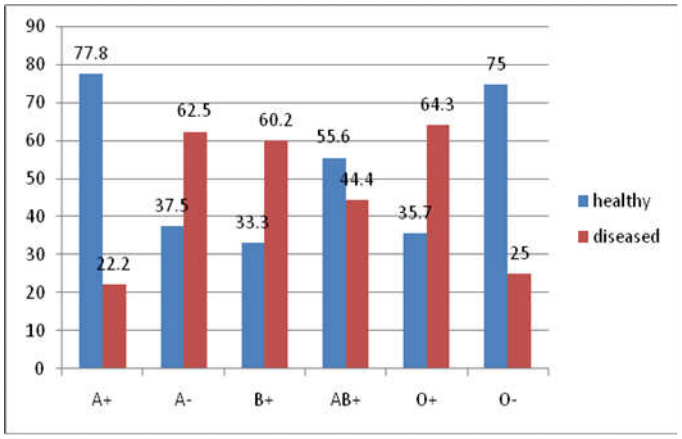

Table 2

DISCUSSION

Over the past 150 years, dermatoglyphics has been a useful tool in understanding basic questions in biology, medicine, genetics and evolution, in addition to being the best and most widely used method for personal identification (Pratibha Ramani *et al*., 2011). However it is still at infancy in the world of dentistry where the co-relation of dental conditions with that of dermatoglyphic patterns is done. Periodontal diseases are infectious diseases caused due to a multifactorial process. This

multifactorial etiology revolves around host, micro organism, time and substrate but genetic susceptibility too plays an important role. A lot of research work needs to be done in this arena. The genes responsible for causation of these infectious diseases are Pa+ and Pr22.5. The method of recording and evaluating dermatoglyphics used in the present study is ink-stamp pad method given by Cummins and Midlo. Dermatoglyphic patterns are broadly classified into three major types: whorl, loops, and arches, which have been subdivided into various subtypes. These patterns are present on finger tips/buds, whereas whole of human palm show certain other features such as atd angle, H-loop, IV loop, and t-triradius. (Metin Atasu, 1998; Cummins, 1928)

The basic principles

1. The fingerprint is not same for any two individuals, not even for identical twins.
2. This fingerprint once established does not change throughout life. (Joel, 2009)

The question arises how are these infectious diseases and dermatoglyphics related?

In human, the palate, lip and the enamel start developing by 6^{th} to 7^{th} week of intrauterine life, the dermal ridges develop from volar pads also start developing at the same time. Secondly, the enamel is an ectodermal structure and so is the epithelium of the finger buds. So any hereditary factors affecting the oral cavity will also show effects in the skin of the fingers. This means genetic message contained in the genome, normal or abnormal, is deciphered during this period and is also reflected by dermatoglyphics (Mathew *et al*., 2006; Cummins, 1928). According to Carter and Matsunga threshold theory, abnormalities in these areas are influenced by a combination of hereditary and environmental factors, but only when the combined factors exceed a certain level, can these abnormalities be expected to appear. In the present study there is increased frequency of whorl and loop on all fingers in patients with chronic periodontitis was found. It is known that ABO blood types indicate differences in terms of their proportion according to races. It is also known that periodontal diseases show proportional differences in distribution among races. When this point is taken into consideration, the question arises whether or not the proportion of ABO blood subgroup distribution is effective on the proportion of distribution of periodontal disease in various societies. Surprisingly, little investigation has been made to explore the ABO blood groups and the incidence of oral and dental diseases. In the earliest investigation on this matter, Suk suggested that particular blood groups and a tendency towards caries might be constitutional characters and they were not particularly related to race, though the O group and good teeth were less common in civilized people than in primitive races. Suk's investigation was followed by a study carried out by Aitchison and Carmichael, which revealed a relationship between the patient's susceptibility to caries and his blood group.

A study carried out by Arowojolu *et al*, stated that there was a relationship between juvenile and nonjuvenile periodontitis and hemoglobin type A. The influence of ABO blood types on the risk of developing oral diseases have been the subject of discussion. Some authors claimed that, ABO blood types constituted an increased risk for the development of oral diseases whereas a small group of researchers failed to find this increased risk. Above mentioned studies provided preliminary data concerning the association between ABO blood groups and periodontal diseases. (Arowojolu *et al*., 2002) This study is in accordance with Turgut demir, 2007 who investigated the relationship between periodontal disease and ABO blood group. He found a higher percentage of blood type A in patients with gingivitis and a higher percentage of blood type O in patients with periodontitis (Demir *et al*., 2007). 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. Suk found that ABO blood types have an increased effect on the risk for the development of oral diseases (Gawrzewska, 1975). The present study researched the relationship between ABO blood subgroups and periodontal diseases in the light of the above data, there is increased prevalance of patients with O positive blood group showed inclination towards chronic periodontitis, where as patients with A positive blood group inclined towards healthy periodontium.

Conclusion

This study just adds a cornerstone to the existing research work. It's not the end but an opening to a new arena tool. Within the limitations of the study there is correlation between periodontal disease, fingerprints and ABO bloodgroups with Rh factor. However, further studies are required to arrive at a conclusive report linking dermatoglyphic patterns in chronic periodontitis.

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