



MAGIC PATTERNS IN PREVENTIVE PERIODONTICS- LOOPS, WHORLS AND ARCHES

Dental Science

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ABSTRACT

Background: A Finger print is an impression left by the friction ridges of a human finger. Dermatoglyphics refers to the study of fingerprints. Periodontal diseases have multifactorial etiology. The genetic determinants that exist could be suggestive of a specific dermatoglyphic pattern. However, it is still in its infancy in the world of dentistry. The correlation between dental conditions and dermatoglyphic patterns can be determined.

Aim: The present study was aimed at comparing the palmer dermatoglyphics features in chronic periodontitis patients vis-a-vis periodontally healthy individuals.

Materials and Methodology: 80 subjects were selected from the Department of periodontology. They were randomly divided into 2 groups, group 1 and group 2. Group 1 included subjects with chronic periodontitis and group 2 included periodontally healthy subjects. Finger prints were recorded using Ink Stamp pad method on a record sheet and magnifying glass was used to read and analyse the finger print patterns.

Statistical Analysis: The data obtained was recorded, tabulated, and subjected to Statistical Analysis. A p value ≤ 0.05 was considered to be statistically significant.

Result: The number of whorls were in greater frequency in chronic periodontitis patients as compared to the periodontally healthy individuals.

Conclusion: Within the limitations of the study, it was found that whorls were in greater frequency in chronic periodontitis patients. However, further studies with larger sample size are required to arrive at a conclusive report linking dermatoglyphic patterns in chronic periodontitis.

KEYWORDS:

dermatoglyphics, periodontitis, loops, whorls, arches

INTRODUCTION

The study of the human hand and fingerprints has always been fascinating, not only to anthropologists and physicians, but also to psychologists, writers, painters, sages and chiromancers as fingerprints are unique for every individual and they remain unchanged for an entire lifetime.

Dermatoglyphics is the study of dermal ridge configurations on palmar and plantar surfaces of hands and feet. The term was coined by Cummins and Midlo in 1961¹. The word "Dermatoglyphics" is derived from the Greek word "Derma" meaning skin and "glyphic" meaning carvings. It is the term applied to the study of the topography of the little epidermal ridges that run parallel to one another on the palmar surface of the hand and feet and it also refers to the friction ridge formations which appear on the palms of the hands and soles of the feet which begin to appear during the third and fourth month of foetal development²

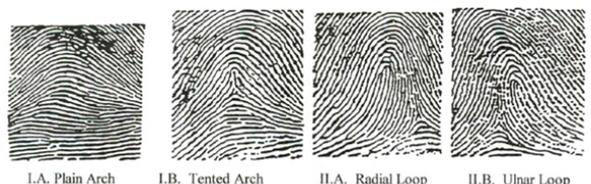
The ridge patterns on the distal phalanges of the fingertips are divided into three groups: **Arches, Loops and Whorls (FIGURE 1)**.

Arches are formed when the ridges run from one side to the other of the bulb of the digit without making any backward turn or twist. The arch pattern is subdivided into two types. The simple (or plain) arch (**I.A**) is composed of ridges that cross the fingertip from one side to

the other without recurring. If, however, the ridges meet at a point so that their smooth sweep is interrupted, a tented arch (**I.B**) is formed.

The most common pattern on the fingertip is a loop. When there is a single backward turn, but no twist it is called as loop. In this configuration, a series of ridges enters the pattern area on the same side. If the ridge opens on the ulnar side the resulting loop is termed an ulnar loop (**II.B**) whereas if it opens toward the radial margin it is called a radial loop. (**II.A**)

The point of confluence of the ridges is called as a triradius because ridges usually radiate from this point in three different directions. A whorl is any ridge configuration with two or more triradii. One triradius is on the radial and the other on the ulnar side of the pattern. In simple words when there is a turn through at least one complete circle it is a whorl; they are also considered to include all duplex spirals.³ (**III.A – III.D**)



I.A. Plain Arch I.B. Tented Arch II.A. Radial Loop II.B. Ulnar Loop



III.A. Plain Whorl III. B. Central Pocket Whorl III.C. Double Loop III.D. Accidental Whorl

The current status of dermatoglyphics is such that the diagnosis of some diseases can now be done on the basis of dermatoglyphic analysis alone and certain researchers also claim a high degree of accuracy in their prognostic ability.⁴

Periodontitis is defined as an inflammatory disease of the supporting tissues of the teeth caused by specific microorganisms or groups of specific microorganisms, resulting in progressive destruction of the periodontal ligament and alveolar bone with pocket formation, recession, or both. Periodontitis is further classified into chronic periodontitis, aggressive periodontitis, and periodontitis as a manifestation of systemic diseases. Chronic periodontitis is the most common form of periodontitis.

Dermal ridges and craniofacial structures are both formed during 6-7th week of intra-uterine life, therefore hereditary and environmental factors leading to dental and periodontal diseases may also cause peculiarities in fingerprint patterns.⁵

Hence this study was conducted to compare the palmer dermatoglyphics features in chronic periodontitis patients vis-a-vis periodontally healthy individuals.

MATERIALS AND METHOD

The present study was conducted in Department of Periodontology, Dr G.D. Pol foundation Y.M.T dental college. Prior to the start of study, the study proposal was sent to the institutional ethical committee (IEC), in a prescribed format, once reviewed & approved by IEC the main study was conducted. A total of 80 subjects were part of the present study. Group 1 (test group) comprised of 40 subjects diagnosed with chronic periodontitis & Group 2 (control group) comprised of 40 periodontally healthy subjects. All the participants recruited from out-patient department met the following inclusion criteria.

INCLUSION CRITERIA FOR TEST GROUP (GROUP1)

- Age group of 30-60 years of either sex.
- Subjects with a probing depth ≥ 5 mm.
- Subjects in whom $> 30\%$ of the sites are involved.
- Systemically healthy and co-operative subjects.

INCLUSION CRITERIA FOR CONTROL GROUP (GROUP2)

- Age group of 30-60 years of either sex.
- Periodontally healthy subjects.
- Systemically healthy and co-operative subjects.

Smokers & Tobacco chewers (AHA Guidelines), Pregnant or lactating women and women using oral contraceptive pills, subjects undergoing orthodontic therapy & subjects with a history of use of medications or nutritional supplements in the past six months were not recruited for the study.

Subjects were explained about the procedure in a language best understood by them. Informed written consent duly signed by the subject was taken prior to study.

Fingerprint patterns were recorded using Cummins & Midlo method. For all the 80 subjects the same protocol was followed to record fingerprints. Fingertips were scrubbed thoroughly using clinical spirit and were allowed to dry (FIGURE 2). Following which right and left hand digits were guided by the investigator on to the ink stamp pad (FIGURE 3). The dermatoglyphic patterns for all 10

palmar digits were recorded on a prepared format (FIGURE 4). All the patterns obtained were analysed using a magnifying glass (FIGURE 5) and number of observed patterns (whorls, loops or arches) were noted down. The maximum observed pattern for each subject was also noted down.



FIGURE 2- Step 1: Scrubbing of the finger tips with clinical spirit



FIGURE 3- Step 2: Placing fingers on the ink pad



FIGURE 4- Step 3: Recording the finger prints on a prepared format



FIGURE 5 – Step 4 : Analysing the finger prints using a magnifying glass.

STATISTICAL ANALYSIS

The data obtained was recorded on MS Office excel sheet (v 2010, Microsoft Corp.) tabulated, and was subjected to statistical analysis using statistical package for social sciences (SPSS, v. 22.0, IBM) p ≤0.05 was considered to be statistically significant

Correlation was found by using chi square test.

FIGURE/TABLE6 shows comparison of maximum observed pattern in chronic periodontitis and control group. **FIGURE 7** shows diagrammatic representation of maximum observed dermatoglyphic pattern. p value for presence of whorls, loops in test & control group was found to be 0.046, 0.050 respectively which is statistically significant. p value for arches was, 0.068 which is not statistically significant.

		GROUPS		
		CHRONIC PERIODONTITIS	CONTROL	TOTAL
MAXIMUM OBSERVED PATTERN	WHORLS	27	16	37
	LOOPS	19	21	40
	ARCHES	0	3	3
	TOTAL	40	40	80

FIGURE/TABLE 6 shows comparison of maximum observed pattern in chronic periodontitis and control group

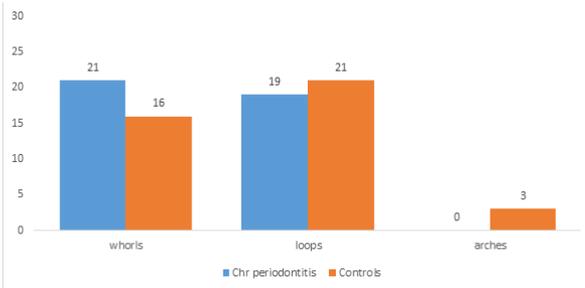


FIGURE 7 (bar diagram) - diagrammatic representation of maximum observed dermatoglyphic pattern in chronic periodontitis and control group

RESULTS:

Out of the 40 subjects in Group 1, 21 subjects and 19 subjects showed whorls and loops respectively and in Group 2; 16, 21 and 3 subjects showed whorls, loops and arches respectively. No subject had an arch type of fingerprint in Group 1. The number of whorls in Group 1 (chronic periodontitis) were significantly greater as compared to Group 2 (control) (p=0.046).

DISCUSSION

Over the last thirty years or so, more than four thousand papers have been published on the significance of skin-ridge patterns. While many of these have been restricted to the study of genetic or congenital disorders, not all of them have been related solely with chromosomal disorders. Significant investigations have also been carried out into the dermatoglyphic indicators of congenital heart disease, leukemia, cancer, coeliac disease, intestinal disorders, rubella embryopathy, Alzheimer's disease, schizophrenia as well as other forms of mental illness. The current state of medical dermatoglyphics is such that the diagnosis of some illnesses can now be done on the basis of dermatoglyphic analysis alone and currently, several dermatoglyphic researchers claim a very high degree of accuracy in their prognostic ability from the hand's features.⁶

Periodontal diseases are infectious diseases caused due to a multifactorial process. This multifactorial etiology revolves around the host, microorganism, duration and substrate. Genetic

susceptibility also 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 Pr22.5.⁶

M. Atasu et.al (2005), in their comparative study between periodontally healthy patients and patients suffering from periodontitis, noticed that

- There was decreased frequency of twinned and transversal ulnar loops on all fingers of the patients with juvenile periodontitis (JP),
- A decreased frequency of double loops on all fingers and an increased frequency of radial loops on the right second digits of the patients with rapidly progressing periodontitis (RPP),
- An increased frequency of concentric whorls and transversal ulnar loops on all fingers of the patients with adult periodontitis (AP),
- An increased frequency of t'' triradii on the palms of the patients with JP,
- The increased frequencies of IV and H loops and t'' triradii on the palms of the patients with RPP and
- An increased frequency of e triradii on the soles of the patients with JP were found.⁷

However in the present study, an increased frequency of whorls were found in patients with chronic periodontitis as compared to increased loops in the study done by M. Atasu et.al.

Devishree G (2015) compared finger-tip prints of 15 patients with aggressive Periodontitis and 15 periodontally healthy subjects. The fingertip patterns were analysed with the help of Automated Finger print Identification System (AFIS). An increased frequency of ulnar loops were found on all fingers of patients with aggressive periodontitis.⁸

Padma et al. (2011) in their study evaluated the dermatoglyphic peculiarities and caries experience of deaf and mute children and found an increased frequency of whorls in the caries group and the frequency of loops were more in caries free group.⁹

Tikare S et al. (2010) assessed the relationship between fingerprints and malocclusion among a group of 696 high school children aged 12-16 years and it revealed a statistical association between whorl patterns and classes I and II malocclusion.¹⁰

Kiran K et al (2010) found that, in a comparative study among 100 children (50-healthy, 50-mentally challenged) an increased frequency of loops and transverse palmar crease line among the mentally challenged children were observed.¹¹

Sharma A and Somani R (2009) found highly significant difference in loops between the subject (Caries) and control groups, and also observed significant difference between subject and control groups for microbial growth.¹²

Venkatesh E et al. (2008) determined the dermatoglyphic pattern in subjects with leukoplakia and oral squamous cell carcinoma, was found that among 30 patients diagnosed with leukoplakia, 30.70% had whorls, 63.0% had loops and 6.30% had arches type of finger prints respectively and in oral squamous cell carcinoma patients it was found that 60.70% had loop, 32.30% had whorl, and 7.0% had arches pattern of fingerprints.¹³

Polat HM et al. (2004) investigated 29 patients with oral tumors for their dermatoglyphic patterns and found that there was an increased frequency of arch pattern on their fingertips.¹⁴

Polat HM et al. (2000) found an increased frequency of whorls and a decrease in frequency of ulnar loops was seen in patients with bruxism than the controls. They also demonstrated a lower frequency of angle than controls.¹⁵

R.S Balgir (1992) in his study among 69 cases with cleft lip with or without cleft palate observed, an increased frequency of ulnar and radial loops than arches and whorls.¹⁶

The present study was conducted on 40 subjects with chronic periodontitis and 40 periodontally healthy individuals. The finger print patterns were assessed using a magnifying glass. The assessment revealed an increased frequency of whorls among the chronic periodontitis patients and an increased frequency of loops among the periodontally healthy individuals.

Dermatoglyphics is an upcoming integral part of medicine and forensic science. The correlation of dermatoglyphics with dental abnormalities is still in its nascent stages and presently it is safe to say that the various finger print patterns can be considered as an indicator for the occurrence of congenital abnormalities. Dermatoglyphics has moved from obscurity to acceptability as a diagnostic tool. In the future it may serve as an important tool that can predict the future health of a person.¹⁷

CONCLUSION

Within the limitations of the study, it was found that whorls were in greater frequency in chronic periodontitis patients. However, further studies with larger sample size are required to arrive at a conclusive report linking dermatoglyphic patterns to chronic periodontitis. This short term study just adds a cornerstone to the existing research work. It's not the end but an opening to a new arena, where in the near future detecting these diseases at an early stage will be possible using dermatoglyphics as a diagnostic tool.

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