



EVALUATION OF DERMATOGLYPHIC PATTERNS IN CHRONIC PERIODONTITIS PATIENTS: A CROSS-SECTIONAL STUDY.

Dental Science

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ABSTRACT

Introduction: Periodontal diseases have a multifactorial etiology but some risk factors like genetics also can be responsible for disease progression. These dermal ridge patterns remain unchanged throughout the life. They are unique for each individual, it can be considered as a beneficial tool for prediction of any congenital, intrauterine anomalies or other diseases which influenced by genetic alterations. Genetic determinants that exist could be suggestive of specific dermatoglyphic patterns for periodontitis. **Aim:** To analyze the palmar dermatoglyphic patterns of healthy and chronic periodontitis patients and to find any correlation between them. **Materials & Methods:** A total of 150 patients were equally divided into two groups comprising 75 patients in each group as follows: Group I-periodontally healthy, Group II-chronic periodontitis. The fingerprint patterns of all the patients in each group were obtained and analyzed with the help of magnifying glass. **Results:** There was a significantly higher percentage of whorls in Group II compared to Group I. There was no significant difference between both the groups for arch patterns. **Conclusion:** There can be a significant correlation between the dermatoglyphic pattern of healthy and the chronic periodontitis as whorl finger pattern predominates in chronic periodontitis patients. So it can be serve as predictor in identifying the risk group individuals of chronic periodontitis.

KEYWORDS

Dermatoglyphic pattern, chronic periodontitis, genetic, whorl pattern, arch pattern.

INTRODUCTION

Dermatoglyphics is a derived from a Greek word derma meaning skin and glyphic means curve, respectively. ^[1] Dermatoglyphics refers to the branch of science which studies the pattern of skin (dermal) ridges present on fingers, toes and soles of human. ^[2] Term coined by Dr. Harold Cummins in 1926, who was regarded as "Father of Dermatoglyphics". ^[3]

The finger and palm prints start to form during the 6th to 7th week of embryonic life and is completed after 10 to 20 weeks of gestation. The development of enamel and the finger buds both begins in the 6th week of intrauterine life, and hence, any dermatoglyphics can be used to predict the oral and dental diseases. These dermal ridge patterns remain unchanged throughout the life ^[4] and unique for each individual, it can be considered as a beneficial tool for prediction of any congenital, intrauterine anomalies or other diseases which are aetiologically influenced by genetic alterations. ^[5]

Finger ridge patterns were categorized by Sir Richard Henry (1897) into three forms as shown in figure -1 ^[6]

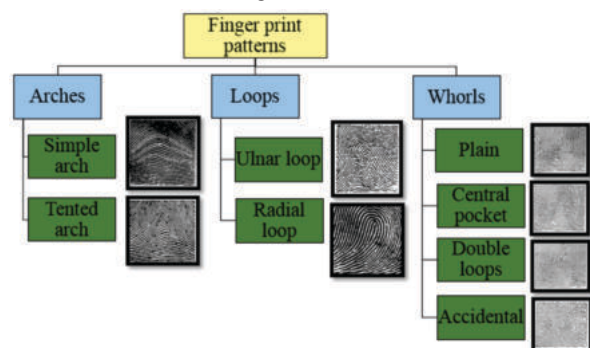


Figure 1 Different forms of finger print patterns

Arch-

Arch is the simplest type of fingerprint, formed by a sequence of more or less parallel ridges, which traverse the pattern from one side and exit from other side forming an arch-like curve at center. There are two types of arch pattern as follows: simple and tented arch. In the simple arch, ridges cross the fingertip from one side to the other side without recurring. In the tented arch, ridges usually radiate from a specific point in three different directions known as triradius. ^[7,8]

Loop-

series of ridges enter the pattern area on the ipsilateral side. If the ridge opens on the ulnar side the resulting loop is referred to as an ulnar loop, whereas if it opens toward the radial margin it is called a radial loop. Thus, the ulnar and radial loops differ in both the hands. ^[7,8]

Whorl-

A Whorls are formed by two or more confluence of ridges. The simplest whorl has ridges commonly arranged as a succession of concentric rings or ellipses, and is known as a Plain (Simple / concentric) whorl.

Double/Spiral whorl is a configuration in which ridges spiral around the core in either a clockwise or a counter clockwise direction. A Central pocket loop/whorl is a pattern containing a loop and a whorl, where a small whorl is enclosed by a loop. Accidentals/complex patterns are one in which patterns cannot be classified as one of the above patterns. ^[7,8]

Chronic periodontitis is an infectious disease and the most frequently occurring form of periodontitis. There are several etiological factors which attribute to the disease onset and progression, including genetics. Since the recent diagnostic methods used to determine the genetic basis of periodontitis are expensive and techniques sensitive, dermatoglyphics has been used to alleviate this predicament. ^[9] The present study was done to conform the hypothesis that a prenatal event such as dermal ridge formation can be a predictor for periodontitis. So

present study was conducted to compare and analyze the palmar dermatoglyphic patterns of healthy and chronic periodontitis patients and to find correlation between them.

MATERIALS AND METHODS

A cross-sectional study was conducted in the regular outpatient Department of Periodontology of GDCHJ. The study was approved by the Institutional Ethical Committee, M.P.Shah Govt. Medical College & Guru Gobind Singh Hospital, Jamnagar (Ministry of Health & Family Welfare Department Research, Jamnagar – EC/NEW/INST/2021/1896). The participants were explained about the study, and voluntary informed consent was obtained. A total of 150 Systematically healthy, 20 – 70 year old patients who diagnosed clinically and radiographically with chronic periodontitis having Russell's Periodontal Score (RPS) more than 4 (i.e. Score 6 and 8) with at least 20 teeth present excluding third molars were included in the study. Patients with systemic diseases and oral destructive habits were excluded from the study.

All the subjects were divided into two groups :

Group I (Control group): Periodontally healthy patients (n=75) and Group II (Test group): Chronic periodontitis patients (n=75).

Pattern Recording:

All the participants were asked to wash their hands with soap to remove all the dirt. Then, the fingertip patterns of each participant were recorded using standard ink method, using blue duplicating ink on a prepared recording format using blue ink pad. Fingerprint pattern analysis was done manually using an illuminated magnifying glass. The fingerprint patterns were then categorized into loops, whorls, and arches. The collected data were subjected to analysis.

RESULT

When the fingertip patterns of patients were compared there was a significantly higher percentage of whorls in Group II compared to Group I. Loop patterns are significantly more in Group I than Group II. There was no significant difference between both the groups for arch patterns. (Figure 2)

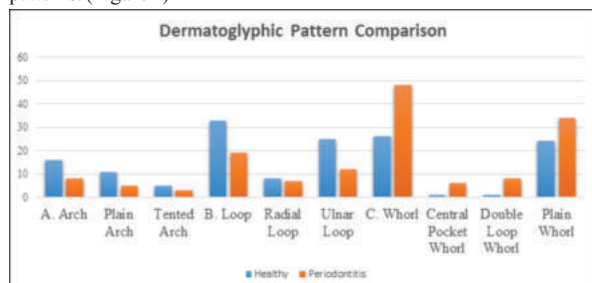


Figure 2 Comparison of different fingerprint patterns in healthy and chronic periodontitis group

Table -1 shows the data analysis to find out the association between fingerprint pattern in healthy and periodontitis group. It shows prevalence of periodontitis was 64.87% in patients who have whorl type of fingerprint which is higher significantly than loop and arch pattern. While in loop and arch pattern the prevalence was 36.54% and 33.33% respectively. Chi square test was applied for this analysis. The value of $\chi^2 = 12.98$ and p value = 0.0015, which is statistically significant.

Table 1-Distribution of Different fingerprint patterns in both groups using Chi-square test

Fingerprint Pattern	Healthy		Periodontitis	
	No.	%	No.	%
A. Arch	16	66.67	8	33.33
B. Loop	33	63.46	19	36.54
C. Whorl	26	35.13	48	64.87

Table -2 shows mean and standard deviation values of RPI index for Healthy and periodontitis group. The mean RPI was 5.688 and 0.055 for periodontitis group and healthy group respectively. The intergroup data were analyzed statistically using unpaired t test, where t value is 73.07 and p value is 0.0001 which shows statistical significant result. These values show that mean RPI is significantly higher in periodontitis group as compared to healthy group.

Table-2 Mean and SD values of RPI in both groups using unpaired t test.

Russel's Periodontal Index	Healthy	Periodontitis
Mean	5.688	0.055
SD	0.665	0.059
t value	73.07	
p value	0.0001	

DISCUSSION

These skin ridges are epidermal origin and develop on the volar surfaces. The primary ridge formation is responsible for the dermatoglyphic pattern. Ridges areas decompose the last after a person dies. These naturally patterns remain unchanged throughout the life and unique for each individual. The fingerprints are not even similar in monozygotic twins.^[10] So helps in personal identification, crime detection, identification of dead person in mass disaster, accidental exchange of new born babies and prediction of some medical and genetic disorders.^[11,12,13] The ectoderm gives rise to teeth, and thus any damage during the intrauterine stage to this structure may be manifested as a tooth anomaly. Dermatoglyphic patterns are genetically determined and can be considered as a window of congenital and intrauterine abnormalities.^[14] Rathod et al. (2018) stated that dermatoglyphics provides supportive evidence in diagnosis of hereditary disorder, but the mechanism of inheritance is still unknown.^[15]

Dermatoglyphics have proven its evidence in the field of anthropology, medicine, statistics and genetics.^[16] Specific dermatoglyphic patterns are significantly observed in some diseases which purely are genetic disorders, such as Down's syndrome, Turner's syndrome, Klinefelter syndrome, Edwards syndrome etc. Certain neurological diseases like Alzheimer's disease, schizophrenia, cerebral palsy, neurofibromatosis, epilepsy; heart disease like congenital heart disease, rheumatoid heart disease, coronary heart disease. Some unique fingerprint and ridge patterns are frequently seen in patients suffering from diabetes mellitus, cervical cancer, leprosy, essential hypertension, bronchial asthma, rheumatoid arthritis, tuberculosis, breast carcinoma and sickle cell anemia.^[17]

In dentistry, it has been studied to predict disorders such as cleft lip and cleft palate,^[18] periodontitis,^[19] dental caries,^[20] OSMF, malocclusion, and, bruxism, oral squamous cell carcinoma, oral leukoplakia and taurodontism.^[21,22,23,24,25] In the present study, the most frequent fingerprint pattern among periodontitis subjects was whorl pattern followed by loop pattern and the least was arch pattern. In the group I (control group), loop pattern found to be highest followed by whorl pattern and arch pattern. While in the group II (test group), whorl pattern found to be highest followed by loop pattern and arch pattern among the whorl patterns, plain whorl was the predominant one.

Devishree et al.^[29] compared the palmar dermatoglyphic features in aggressive periodontitis patients and periodontally healthy individuals and he concluded that significantly higher frequency of ulnar loops was observed on all fingers of patients with aggressive periodontitis. Atasu M et al^[19] agreed with the same findings.

This result was similar to the studies done by Reddy H, et al (2017)^[2], Elavarasu S, et al (2017)^[14], Atasu M, et al (2005)^[19] and Astekar S, et al (2017)^[26], who found decrease frequency of loop pattern, with a proportional increase in the whorl pattern among periodontitis patients as compared to controls. This result was dissimilar to the studies done by Vaidya Pruthi, et al (2017)^[27] and Kochhar GK, et al (2014)^[28] who found no significant whorl relation among periodontally compromised patients.

There are some advantages of this method like it is non-invasive, easy method, rapid and convenient, minimum equipments required, data can be preserved for longer duration.

Limitations

Interpretation of dermatoglyphic traits require good quality prints. Ink should be dispensed in adequate quantities to prevent thick or thin prints. Gross malformations of the limbs affect registration of prints.

CONCLUSION

Certain finger ridge patterns (whorls) were in greater frequency in chronic periodontitis patients, so it can be serve as predictor in identifying the risk group individuals of chronic periodontitis. So

dermatoglyphics act as a powerful tool for early diagnosis, treatment, and prevention of chronic periodontitis. However, further studies with larger sample size are required to arrive at a conclusive report to link dermatoglyphic patterns with periodontal diseases.

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