Dermatoglyphic Patterns and Periodontal Diseases

Dr. Gargi Chatterjee,[1] Dr. Balaji Manohar,[1] Dr. Neema Shetty,[1] Dr. Aditi Mathur,[1] Dr. Barkha Makhijani[1]

[1]*Department of Periodontics, Pacific Dental College and Hospital, Debari, Udaipur, India.*

ABSTRACT

Background: Periodontal disease is initiated by bacterial accumulation but some risk factors like genetics also can be responsible for disease progression. Genetic determinants that exist could be suggestive of specific dermatoglyphic patterns for periodontitis. Hence, the present study was an attempt to find if there is any correlation between fingerprint patterns and periodontal diseases.

Aim: To compare the fingerprint patterns in generalised chronic periodontitis and chronic generalised gingivitis subjects.

Materials and methods: 800 subjects were included in the study. 437 subjects were diagnosed with generalised chronic periodontitis and 363 subjects were diagnosed with chronic generalised gingivitis. Fingerprint patterns were recorded and were analysed manually with illuminated 6X high powered magnifying glass. SPSS software was used for statistical analysis.

Results: An increased frequency of radial loop pattern (39.01%) was found in chronic generalised gingivitis subjects, whereas; in generalised chronic periodontitis subjects higher frequency of ulnar loop (37.53%) and central pocket whorl pattern (36.16%) was observed.

Conclusion: Dermatoglyphics could be used together with the other diagnostic aids for prediction of periodontal diseases.

Keywords: Dermatoglyphics; fingerprint patterns; genetics; periodontitis.

INTRODUCTION

Dermatoglyphics is a special branch of scientific studies which deals with the skin ridge patterns on the fingers, toes, palms of hands and soles of feet. The word dermatoglyphics originated from two Greek words: *derma* meaning skin and *glyphe* meaning carve and it was coined by Harold Cummins in 1926. 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. These dermal ridge patterns remain unchanged throughout the life.[1,2] As the type of finger print is a genetically unique characteristics of 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.[3] It is now well established that certain 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.[4-7] Variations in dermatoglyphic patterns are also noticed in 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.[8-23]

In recent times, recognition of irregular fingerprint patterns has become a point of interest in the field of dentistry. The work conducted by various authors showed there are some significant dermatoglyphic peculiarities in persons with dental problems such as periodontitis,[24] dental caries,[25] cleft lip and cleft palate,[23] oral submucous fibrosis, bruxism, oral squamous cell carcinoma, oral leukoplakia and taurodontism.[26-30]

There are three basic types of finger print patterns a) Arches b) Loops and c) Whorls. The arch pattern is subdivided into two types: plain arch and tented arch. Loop pattern is subdivided into ulnar loop and radial loop whereas; subtypes of whorl patterns include double loop whorl, plain whorl, central pocket whorl and accidental whorl (Figure 1).[31]

The most prevalent form of periodontitis, the chronic periodontitis is a slowly progressing inflammatory

Correspondence:

Dr. Gargi Chatterjee
Department of Periodontics,
Pacific Dental College and Hospital, Debari, Udaipur, India.
email: gargi.chat@rediffmail.com

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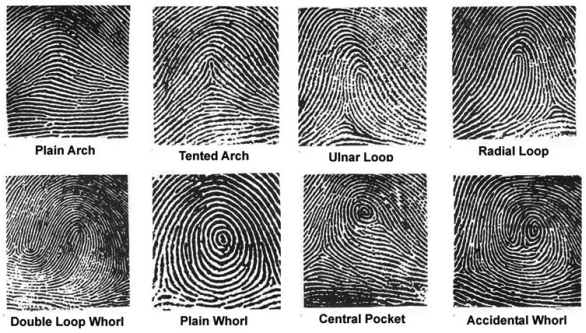


Figure 1: Fingerprint patterns and classifications.

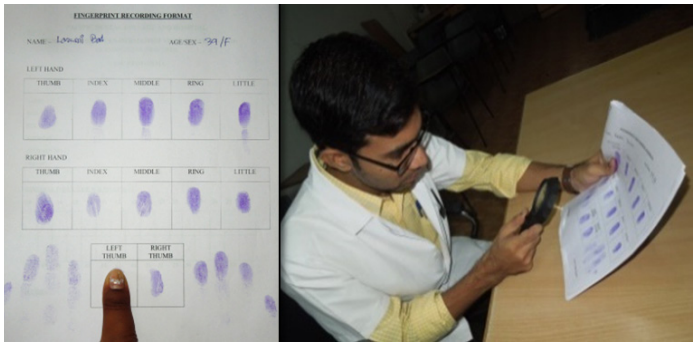


Figure 2: Fingerprint recording format and analysis.

disease involving the supporting tissues of the teeth causing progressive attachment loss and bone loss. Although, the aetiopathology of this disease is mostly influenced by microbiological factors, systemic diseases and immunological factors, genetic variations also play an important role in the aetiopathogenesis.[32] Role of host genes in the aetiopathogenesis of periodontal diseases have been useful in developing screening tools for identifying patients who are likely to develop disease.

With this background, the present study was conducted to find the possible link between specific finger print patterns and periodontal diseases. The present study aimed to compare the fingerprint patterns in generalised chronic periodontitis and chronic generalised gingivitis patients.

MATERIALS AND METHODS

Subjects for the study were selected from the regular outpatient Department of Periodontology. The subjects were explained about the study and were included after obtaining an informed consent. 800 subjects were enrolled in the study. Clinical evaluation was done, Gingival index (Loe and Silness), Oral hygiene index (Greene and Vermillion) and probing pocket depth were measured. Subjects with pocket depth ≥ 5mm in more than 30% sites were diagnosed as suffering from generalised chronic periodontitis. Among the 800 subjects, 437 subjects were diagnosed with generalised chronic periodontitis (Group I) and 363 subjects were diagnosed with chronic generalised gingivitis (Group II). Fingerprint patterns of all subjects were recorded on a prepared recording format using blue ink pad. Fingerprint pattern analysis was done manually using an illuminated 6X high powered magnifying glass (Figure 2). The obtained data were subjected to statistical analysis. SPSS software was used for statistical analysis. For qualitative analysis, Chi Square test was used.

RESULTS

Of the 800 subjects enrolled in the study, 437 (54.62%) were diagnosed with generalised chronic periodontitis and were placed in group I.

Of these 212 (48.51%) were males and 225 (51.48%) were females. The most common pattern of fingerprint observed was the ulnar loop pattern which was exhibited by 164 (37.53%) subjects. This pattern was exhibited by 82 (39.42%) males and 82 (35.81%) females. The second most common fingerprint pattern observed in group I was Central pocket whorl which was seen in 158 (36.16%) subjects. 81 (38.46%) males and 77 (35.37%) females had this type of fingerprint pattern. The least common type of fingerprint was the plain arch type of pattern seen in 6 (1.37%) of subjects and was seen to be present only amongst the male subjects (2.88%). None of the females exhibited this pattern. The second least common fingerprint type was seen to be the double loop whorl in 7 (1.60%) subjects and was seen to be present only in the female subjects (3.06%). None of the male demonstrated this pattern of fingerprint type. Plain whorl (39) followed by accident whorl (37), tented arch (15) and radial loop (11) were the other patterns of fingerprints seen in the order of occurrence.

363 (45.37%) subjects were diagnosed with chronic generalised gingivitis and were placed in group II. Of these 156 (42.96%) were males and 207 (57.02%) were females. The most common fingerprint pattern observed was the radial loop which was exhibited by 142 (39.01%) subjects. 58 (36.13%) males and 84 (40.38%) females exhibited this pattern of fingerprint. The second most common pattern of fingerprint observed in group II was double loop whorl pattern which was seen in 52 subjects (14.29%). 17 (10.97%) males and 35 (16.83%) females had this type of fingerprint pattern. The least common type of fingerprint was the plain arch type of pattern seen in 12 (3.30%) subjects and was seen to be present in 5 (3.23%) males and 7 (3.37%) females. The second least common fingerprint type was seen to be the central pocket whorl in 16 (4.40%) subjects and was seen to be present in 10 (4.52%) males and 6 (2.88%) females.

Accident whorl (43) followed by tented arch (35), ulnar loop (32), plain whorl (31) were the other patterns of fingerprints seen in the order of occurrence (Table 1, Figure 3, 4, 5).

Table 1: Dermatoglyphic pattern in generalised chronic periodontitis (Group I) and chronic generalised gingivitis (Group II) subjects.

Fingerprint patterns		Group I			Group II		
		Male	Female	Total	Male	Female	Total
PA	No	06	00	06	05	07	12
	%	02.88%	00.00%	01.37%	03.23%	03.37%	03.30%
TA	No	05	10	15	05	30	35
	%	02.40%	04.37%	03.43%	03.23%	14.42%	09.62%
UL	No	82	82	164	19	13	32
	%	39.42%	35.81%	37.53%	12.26%	06.25%	08.79%
RL	No	06	05	11	58	84	142
	%	03.85%	02.18%	02.52%	36.13%	40.38%	39.01%
DLW	No	00	07	07	17	35	52
	%	00.00%	03.06%	01.60%	10.97%	16.83%	14.29%
PW	No	13	26	39	20	11	31
	%	05.29%	11.35%	08.92%	15.48%	04.33%	08.52%
CPW	No	81	77	158	10	06	16
	%	38.46%	35.37%	36.16%	04.52%	02.88%	04.40%
AW	No	19	18	37	22	21	43
		07.69%	07.86%	08.47%	14.19%	11.54%	11.85%

Figure 3: Fingerprint patterns.

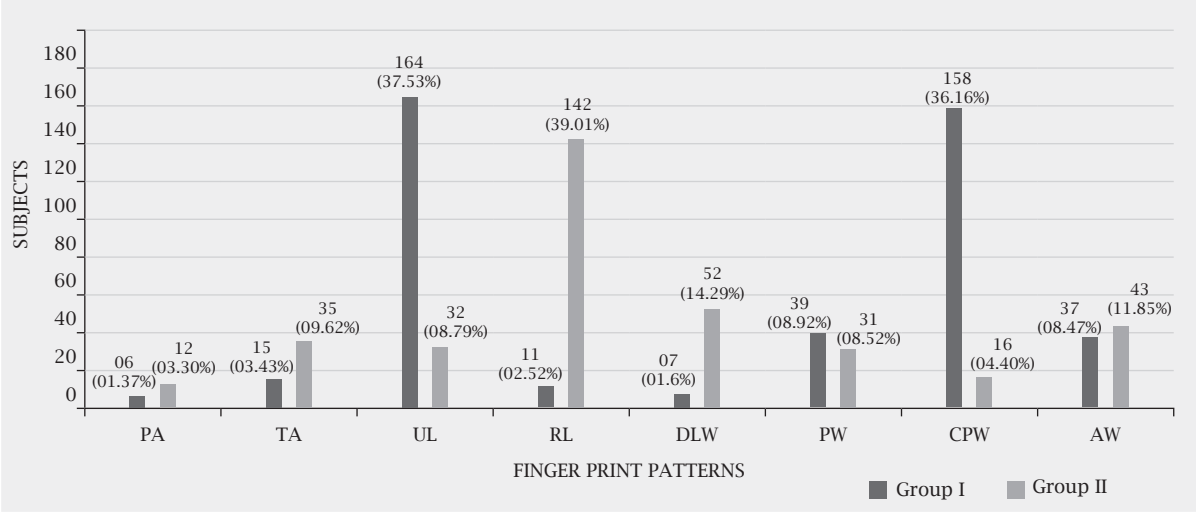


Figure 4: Fingerprint patterns in subjects with generalised chronic periodontitis.

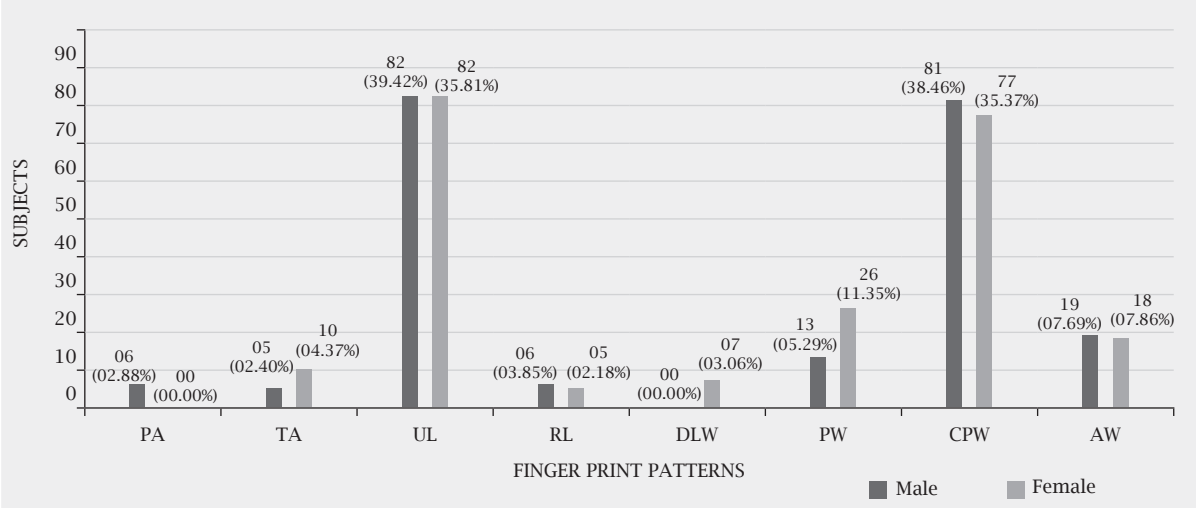
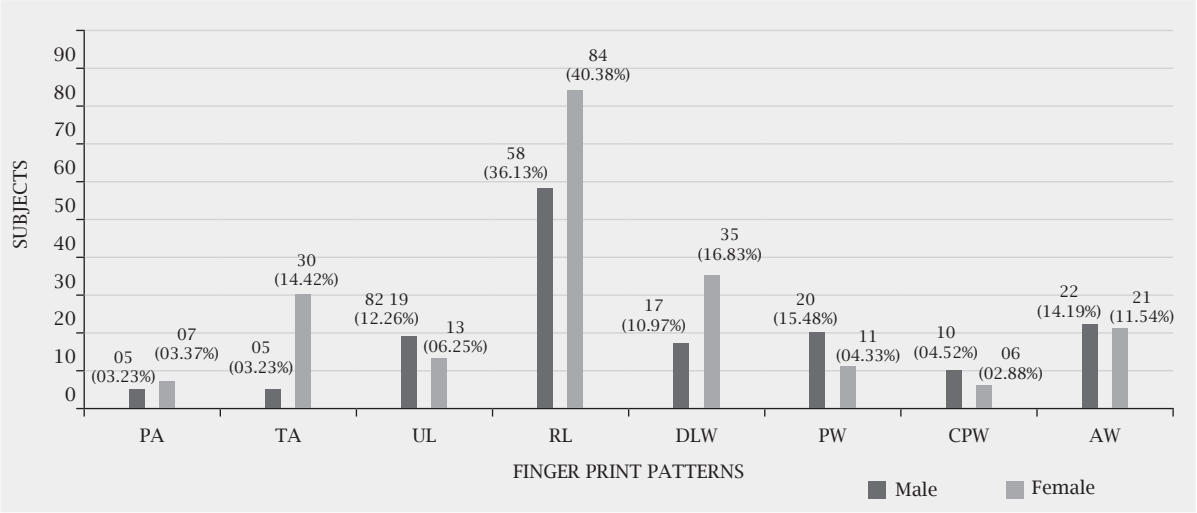


Figure 5: Fingerprint patterns in subjects with chronic generalised gingivitis.



DISCUSSION

Dermatoglyphic pattern analysis have been carried out as an advantageous tool in various research aspect of biology, medicine and genetics and has proven to be an effective key to predict occurrences and risks for biomedical events.

Yilmaz S et al.[33] conducted a study with 36 early onset periodontitis, 20 adult periodontitis patients and 20 periodontally healthy individuals. The study emphasized the diagnostic value of the quantitative and qualitative characteristics of patterns of ridged skin, and the effect of heredity on periodontal diseases were discussed. Shyamala K et al.[34] carried out a study to determine the specific dermatoglyphics pattern and establish the prevalence of a specific fingertip pattern that can act as a susceptible factor for aggressive periodontitis. The study included 30 patients, aged between 20 to 35 year, diagnosed with and treated for aggressive periodontitis (Study group) and 30 periodontally healthy individuals (Control group). Fingerprint patterns of all subjects were recorded for analysis and results showed there was increased frequency (60%) of double loop whorl on left and right thumb of study group and presence of single loop whorl (60%) on left ring fingers of study group.

Devishree et al.[35] compared the palmar dermatoglyphic features in aggressive periodontitis patients and periodontally healthy individuals. 15 patients with aggressive periodontitis and 15 periodontally healthy subjects were included and fingerprint patterns were obtained. Analysis of fingerprint patterns was done with the help of Automated Fingerprint Identification System (AFIS). Significantly higher frequency of ulnar loops was observed on all fingers of patients with aggressive periodontitis. Atasu M et al.[24] compared the finger-tip patterns of the juvenile periodontitis patients with those of periodontally healthy individuals. They reported decreased frequencies of twinned and transversal ulnar loops on all fingers of the patients with juvenile periodontitis, 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 and the increased frequencies of concentric whorls and transversal ulnar loops on all fingers of the patients with adult periodontitis, an increased frequency of e triradii on the palms of the patients with juvenile periodontitis, the increased frequencies of IV and H loops and tb triradii on the palms of the patients with rapidly progressing periodontitis and an increased frequency of e triradii on the soles of the patients with juvenile periodontitis.

The present study also showed an increased frequency of ulnar loop and central pocket whorl patterns of fingerprint in both males and females with generalised chronic periodontitis. The least common type of fingerprint was the plain arch and the second least common type of fingerprint was double loop whorl patterns. The plain arch pattern was present in only male subjects whereas, double loop whorl pattern was present in only female subjects. Increased frequency of radial loop fingerprint pattern was seen to be present in both females and males with chronic generalised gingivitis (Group II). The second most common type of fingerprint pattern was double loop whorl pattern and it is present in higher frequency in females than males. The least common type of fingerprint pattern was plain arch in both males and females and the second least common type of fingerprint was central pocket whorl. The finding of increased frequency of ulnar loop pattern in generalised chronic periodontitis group is similar to the study done by Devishree et al.[35] and Atasu M et al.[24] where significantly higher frequency of ulnar loop was observed in subjects with aggressive periodontitis and adult periodontitis respectively.

CONCLUSION

Within the limitations of the study, it was established that certain fingerprint patterns were in greater frequency in generalised chronic periodontitis patients. Dermatoglyphics could be used as an adjunctive aid in the prediction of subjects at risk of developing periodontal diseases along with other diagnostic aids. However, further studies with larger sample size are required to arrive at a conclusive report linking dermatoglyphic patterns in periodontal diseases.

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