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Dermatoglyphics and Periodontics: An Assessment of Fingerprints with Periodontal Disease in School Children

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Abstract: *Aim: The aim of this study is to compare and correlate the stages of periodontal diseases and the patterns of finger tips. Materials and Methods: A total of 100 students aged 13-16 years with all permanent teeth erupted were examined for periodontal disease stages like bleeding on probing, presence of calculus based on Community Periodontal Index (CPI). The fingerprints of all fingers and two thumbs of both right and left hand of each student were recorded and studied using the magnifying glass. The data collected was analysed statistically. Results: An increased frequency of loops was seen in students with healthy gums whereas increased frequency of whorls was found in students with presence of calculus. Conclusion: A possible relation between dermatoglyphics and periodontal disease stages exists as seen in different studies and further research with larger sample size will yield a conclusive result to correlate fingerprint patterns with periodontal disease.*
Keywords: *Dermatoglyphics, Fingerprints, Periodontal diseases.*

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I. Introduction

With multifactorial aetiology and stages or symptoms ranging from mild gingivitis to destructive stage involving bone loss and loss of teeth, periodontal disease is a unique dental disease. [1]

Dermatoglyphics means study of palmar and plantar dermal ridges. This term, given by Harold Cummins and his associate Midlo in 1926, is derived from the Greek word "Derma" meaning skin and "glyphic" meaning curve. Human fingerprints are detailed, nearly unique, difficult to alter, and durable over the life of an individual, making them suitable as long-term markers of human identity. [2]

During the 6th and 7th weeks of intrauterine life, quickly following the loss of webbed appearance of hand, the foetal pads are seen. Foetal pads are from mesenchymal tissue origin, situated on tip of the finger, also on the distal palm between the fingers and hypothenar territory of the palm. In the twelfth week of intrauterine life, the core patterns are seen on skin surface. At about 19th week of intrauterine life, the final fingerprint patterns are established.[3]

Unique fingerprint patterns can be considered as hereditary marker for dental diseases as both the enamel of tooth and epithelium of finger buds are derived from ectoderm and, both are created simultaneously in intrauterine life. [4]

There are 3 basic types of ridge patterns found in the distal phalanges of the digits – whorl, loop, and arches (**Fig. 1**).

Figure 1: Basic patterns found in the distal phalanges of the digits

Arch is shaped by an arrangement of pretty much parallel edges, which navigate the patterns from one side and exit from opposite side shaping an arch- like bend at focus. Two major types: Simple and Tented.

Simple arch has ridges cross the fingertip from one side to the opposite side without repeating, whereas in tented arch, ridges normally transmit from a particular point in three distinct ways known as tri-radius.

A whorl (W) is an in-excess of two edge structure where one triradius is on the radial and another on the ulnar side of the central pattern.

In loop pattern, a sequences of ridges enter the pattern region on the ipsilateral side. On the off chance that the ridge opens on the ulnar side, the subsequent loop is alluded to as a ulnar loop, while in the event that it opens toward the outspread (radial) side, it is known as a radial loop. [5]

II. Materials and Methods

This study was conducted, as a part of pilot study of Ph.D. research project, in the schools which were located in Amran town of Morbi district as well as in Jamnagar, Ahmedabad and Gandhinagar cities of Gujarat state.

All the students were informed about the study process, their parents were also informed about the study parameters and informed consent was taken. The study was approved by Institutional Ethical Committee of Karnavati School of Dentistry, Uvarsad, Gandhinagar.

A total of 100 students aged 13-16 years with permanent dentition and fully erupted second molars were included in this study. The children who had undergone oral prophylaxis in last 6 months were excluded from this study. The oral examination was carried out during the normal working hours of the schools and the children were examined for periodontal diseases using *Community Periodontal Index (CPI)*. (TABLE 1) (Fig. 2)

Table 1: Community Periodontal Index (CPI) (Courtesy: Essentials of Preventive and Community Dentistry, Soben Peter. 3rd Edition.)

Score	Findings
0	Healthy gums
1	Bleeding gums – directly or by using a mouth mirror, after probing
2	Calculus detected during probing, but all of the black band on the probe visible
3*	Pocket 4-5 mm (gingival margin within the black band on the probe)
4*	Pocket 6 mm (black band on the probe not visible)
X	Excluded sextant (less than two teeth present)
9	Not recorded

For subjects under the age of 20 years, only six index teeth 16, 11, 26, 31, 36, and 46 are examined. This modification is done to avoid scoring the deepened sulci associated with eruption as periodontal pockets.
*In our study, due to rule of CPI, pockets were not recorded and only bleeding and presence of calculus were recorded.

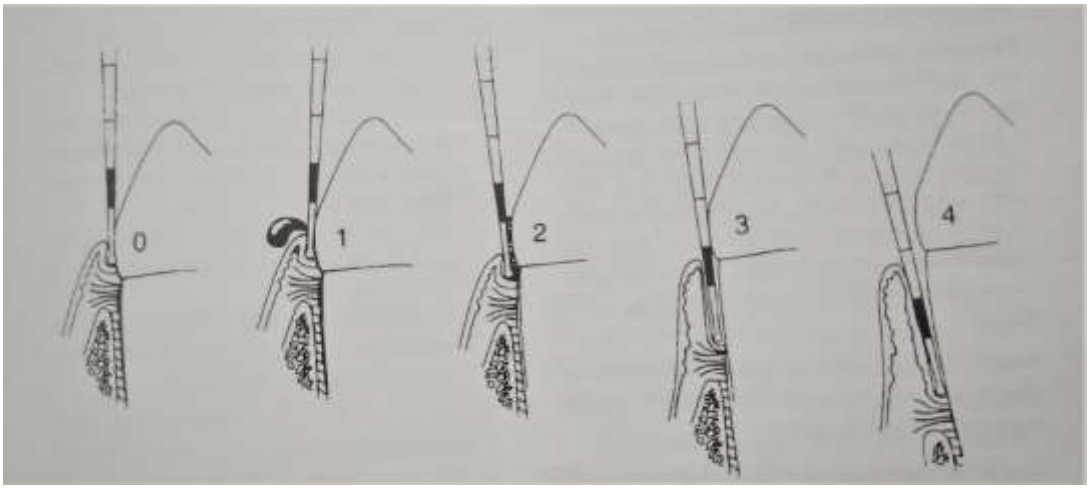

Figure 2: Examples of coding according to the Community Periodontal Index (CPI) showing position of the CPI probe. (Courtesy: Essentials of Preventive and Community Dentistry, Soben Peter. 3rd Edition.)

The method of recording of fingerprint patterns of the study subjects was achieved by ink – stamp method given by Harold Cummins and his associate Midlo in 1926. Using this method, the finger-tip patterns (thumb and four fingers), of both, right and left hand were recorded.

At the onset, hands were cleaned with soap water, followed by scrubbing with an alcoholic rub hand disinfectant and allowed to dry. Following this, right hand fingers and left hand fingers were directed by researcher to ink stamp pad and pressed firmly on white paper which was placed on flat surface. (Fig. 3)

Figure 3: Recording of fingerprints using ink-stamp pad method

III. Observations and Results

The data obtained were statistically analysed using SPSS software version 24 and Microsoft Excel 2016. The frequencies of all pattern types on fingertips of students with healthy gums, bleeding and presence of calculus were assessed. (TABLE 2)

Table 2: Frequencies of pattern types seen on fingertips of students with healthy gums, bleeding gums and presence of calculus.

		WHORLS	LOOPS	ARCHES
COMMUNITY PERIODONTAL INDEX (CPI)	HEALTHY GUMS	104	158	28
	BLEEDING	188	102	50
	CALCULUS	268	71	31
	P value	<0.005		

IV. Discussion

The unique patterns of palmar and plantar surfaces are powerful tools for diagnosis of genetic and psychological conditions. Considering the research papers published in last 3 decades, Dermatoglyphics have proven significant role in diagnosis of various medical and dental conditions as well as crime detection, personal human identification and in fields of anthropology and statistics. [6]

Advantages of dermatoglyphics include being fully developed at birth, remains unchanged throughout life, easy to record for study purpose, inexpensive and convenient as well as atraumatic to the patient and researcher both. [7]

There is a vast diversity among different types of patterns observed on fingertips and this is because of the influence of genes during the formation of the dermal ridges. [8]

The earliest documented study of dermatoglyphics and periodontal diseases dates back to 1993 when Yilmaz et al. studied 70 individuals with early onset periodontitis, adult periodontitis and healthy periodontium. This study established the first evidence of role of hereditary in the development and progress of diseases of periodontium.[1]

Atasu M et al.[9] conducted a study to analyse the fingerprint patterns that would help to identify patients with diseases of periodontium. According to this study, decreased frequencies of ulnar loops in juvenile periodontitis patients and increase frequencies of whorls and transverse loops in acute periodontitis patients was observed.

In the present study, whorl pattern was found to be higher in students with calculus whereas loops were found to be higher in students with healthy gums and healthy periodontium. The results of our study were in accordance with the studies done by Astekar et al.[10] and Vaidya P et al.[7] and in partial accordance to the results of Kochhar et al.[11]

The intergroup data was analysed using Pearson Chi square test at 5% level of significance and p value was calculated. On analysis of intergroup data of right and left hand for each finger separately, with scores of CPI, it was found that patterns of ring finger of left hand had statistically insignificant correlation with the stages of periodontal diseases with p=0.131. Thumb of right hand also showed non-significant correlation with periodontal diseases with p=0.209. Remaining all fingers of right hand and thumb, index finger, middle finger as well as little finger of left hand showed significant correlation between fingerprint patterns and stages of periodontal diseases with values of p<0.05. (TABLE 3)

Table 3: The intergroup data analysed using Pearson Chi square test at 5% level of significance (p<0.05 = significant)

	Right				Left		
	Healthy gums	Bleeding	Calculus		Healthy gums	Bleeding	Calculus
Thumb				Thumb			
Whorls	13	18	23	Whorls	10	21	29
Loops	14	13	8	Loops	17	10	5
Arches	2	3	6	Arches	2	3	3
P value	0.209			P value	0.003		

Index finger	Healthy gums	Bleeding	Calculus	Index finger	Healthy gums	Bleeding	Calculus
Whorls	9	16	28	whorls	10	17	26
Loops	16	14	7	Loops	18	12	6
arches	4	4	2	arches	1	5	5
P value	0.008			P value	0.004		

Middle finger	Healthy gums	Bleeding	Calculus	Middle finger	Healthy gums	Bleeding	Calculus
whorls	8	19	22	whorls	12	19	28
Loops	19	10	9	loops	14	8	7
arches	2	5	6	arches	3	7	2
P value	0.010			P value	0.016		

Ring finger	Healthy gums	Bleeding	Calculus	Ring finger	Healthy gums	Bleeding	Calculus
whorls	10	20	29	whorls	13	20	28
Loops	15	9	8	loops	13	10	7
arches	4	5	0	arches	3	4	2
P value	0.003			P value	0.131		

Little finger	Healthy gums	Bleeding	Calculus	Little finger	Healthy gums	Bleeding	Calculus
whorls	8	18	25	whorls	11	20	30
Loops	18	8	9	loops	14	8	5
arches	3	8	3	arches	4	6	2
P value	0.002			P value	0.005		

V. Conclusion

Several factors are responsible for occurrence and survival of periodontal pathogens in oral cavity. The reasons for occurrence and survival are still not understood completely even after so many years of research. Anything, that is mysterious, is ultimately leading researchers to look for genetic causes of that particular disease and that is where dermatoglyphics plays an important role. Patient's compliance and expertise of researcher in recording dermatoglyphic patterns are the two main adverse scenarios that may come as hindrance in promoting dermatoglyphic analysis as a predictor of oral as well as systemic diseases. Public awareness and further research on a larger scale in this area of fingerprint analysis will yield better and significant results in days to come.

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Conflict of Interest None

References

[1]. Yilmaz S, Atasu M, Kuru B. A genetic and dermatoglyphic study on periodontitis, *Journal of Marmara University Dental Faculty* 1993;*1*: 297‐ 306.
[2]. Maltoni D, Maio D, Jain AK, & Prabhakar S, *Handbook of Fingerprint Recognition* (Springer Science & Business Media, New York 2003)
[3]. Mulvihill JJ and Smith DW: The genesis of Dermatoglyphics *The Journal of Pediatrics* October 1969: *75:4:* 579-589.
[4]. Sharma A and Somani R. Dermatoglyphic interpretation of dental caries and its correlation to salivary bacteria interactions: An in vivo Study. *Journal of Indian Society of Pedodontics and Preventive Dentistry* 2009: *27*: 17-21.
[5]. Shyamala K, Hemavathy S, Girish HC. Dermatoglyphics in aggressive periodontitis: A genetic analysis. *Indian Journal of Dental Science* 2015; *7(5)*:40-3.
[6]. Prabhu N, Issrani R, Mathur S, Mishra G, Sinha S. Dermatoglyphics in health and diseases‐ A review. *Journal of Research and Advancement in Dentistry* 2014;*3:2:*20‐ 26.
[7]. Vaidya P, Mahale S, Badade P, Warang A, Kale S, Kalekar L. Dermatoglyphics in periodontics: An assessment of the relationship between fingerprints and periodontal status – A cross-sectional observation study. *Indian Journal of Dental Research* 2017;*28*:637-641.
[8]. Thaker M and Dodiya D. Dermatoglyphics and its relation with various dental diseases. *International Journal Of Advances in Science Engineering and Technology* 2017;*5:2:2*: 11-15.
[9]. Atasu M, Kuru B et al. Dermatoglyphic findings in periodontal diseases. *International Journal of Anthropology* January, 2005;*20:1:2* : 63-75.
[10]. Astekar S, Garg V, Astekar M, Agarwal A, Murari A. Genetic association in chronic periodontitis through dermatoglyphics: An unsolved link?. *Journal of Indian Academy of Oral Medicine and Radiology* 2017;*29:*195-199.
[11]. Kochhar GK,Shahi P,Advani S,Singh P, Kaushal S,Nangia T. Dermatoglyphics of dental caries and Periodontal diseases in Children of North India. *Journal of Pharmaceutical and Biomedical Sciences* 2014; *04(07)*: 658-663.

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