

Dermatoglyphic Study: A Predictor For Early Childhood Caries

Dr. Abhay kumar¹, Dr. Tuhin Bharthuar², Dr. Daya Shankar³

¹Senior Resident, Department of Dentistry. Patna Medical College & Hospital, Patna, Bihar

²Senior Lecturer, Department of conservative dentistry & Endodontics. Buddha Institute of Dental Sciences & Hospital, Patna, Bihar

³Assistant Professor, Department of Dentistry. Patna Medical College & Hospital, Patna, Bihar

ABSTRACT

Dermatoglyphic analysis is now beginning to prove itself as an extremely useful tool for preliminary investigations into condition with a suspected genetic basis. In many respects, it has been used as an adjunct to other disciplines, serving as a vehicle to resolve broader biomedical problems as well as in dentistry too. This study is was undertaken to determine whether specific dermatoglyphics patterns exists which help in predicting its correlation with early childhood caries (ECC) and assessing the caries risk. Herby our study concluded that variation in dermatoglyphics pattern may have role in identifying individual either with or without ECC.

INTRODUCTION

Dermatoglyphics are dermal ridge configurations/pattern on digits, palm, sole. Cummins in 1926 first introduced the term “dermatoglyphics” which refers to the study of the naturally occurring patterns of the surface of the hands and feet¹. These patterns are fully formed 16 weeks after conception and do not change till the rest of life. Widespread interest in epidermal ridge developed only in the last several decades when it became apparent that many patients with chromosomal aberration had unusual ridge formation. Unusual ridge configuration have been source to exist not only in patient with chromosomal defect but also in patient with precancerous and cancerous condition^{2,3}. The application of dermatoglyphics pattern to dental diseases, such as dental caries, is rationalized due to similarities of environmental and genetic factors between teeth and skin during their development. The aim of this study was to determine the correlation between dermatoglyphics patterns and dental caries by analyzing the finger patterns of individual with or without dental caries i.e Early Childhood Caries (ECC).

MATERIALS AND METHODS

The present cross sectional study was carried out on the individuals who attended the different private clinic for their dental needs. 100 school going individuals were selected, all the procedures being explained regarding study and consent from parents was obtained prior to the commencement of the study.

Study population: Study individuals included children attending the school belonging to age group of 36- 72 months of age were selected. The duration of study was 3 months and the sample collection was conducted during individuals attending various dental clinics for different dental needs.

Exclusion criteria was patients with scars or any injury to palms and patients with any systemic diseases. A structured format was designed, which consisted of demographic data, detailed history of habits, medical history, Subjects were asked to wash their hands with soap and water to remove any dirt or oil. Palmer prints were taken by using standard ink method proposed by Strong by using blue impression ink (Camel India Limited, Mumbai) as in fig.1, Thick white printing paper

(Berga image, A4 size, 100 g/m²) in fig.2, roller, glass inking slab and sponge pad⁴. The finger and palmer prints (fig.2) were analyzed qualitatively and quantitatively using Cummins, Mildo and Penrose method^{5,6}.

Analysis of fingertip patterns:

Predominantly three parameters for dermatoglyphics pattern of fingertip print patterns, were studied. (1) Arch pattern (2) Loop pattern (3) Whorl pattern (4) ATD angle and (5) Total ridge count {TRC}.

- (1) Arch Pattern : This is the simplest pattern and constitute about 5 % of the world population normally. If is formed by succession of more or less parallel ridges, which traverse the pattern area and curves that is concave proximally and crosses the fingertip from one side to other without recurving. These patterns usually do not show the presence of triradii, except when the tented arch is present that will have triradii point near its midline.
- (2) Loop Pattern : it is most common pattern on the fingertip and constitute about 60% of the world population has this fingertip pattern. A series of ridges enter the pattern area on one side of the digit, recurve abruptly and leave the pattern area on the same side. A loop has a single triradius or confluence point of ridges.
- (3) Whorl Pattern : About 35 % of the world population has this whorl pattern and hence ridges form circle or spiral patterns. A whorl differs from loop in the aspect of concentric arrangement of the ridges, with two or more triradii in the latter.
- (4) ATD angle : A feature of the palm that capture the relative positive of three triradii, usually located distal palm just inferior to the 2nd and 5th fingers, respectively and whose location can vary on the proximal can vary on the proximal palm from just distal to the wrist, up to the center of the palm. ATD angles were measured for each palm print by drawing two drawing two single lines through the “a” and “t” triradii compared and assessed for increase or decreases in mean frequencies between the groups.
- (5) Total Ridges Count: A ridges count is made by drawing a line from the triradius to the center of the pattern (core) and the determining the number of the intersected ridges between these two points. Arches scores zero because they because they have no triradii and thus there are no ridges to count. A loop has one triradius.

Statistical Analysis: the statistical analysis is done using SSPS(version 16). A chi square test was used to test the association between dental status and dermatoglyphics pattern of hand, “p” value of less than 0.05 was accepted as indicating significance.

RESULT

The evaluation and comparison of patterns in children with ECC and caries in both right and left hands {table .1} showed a statistically significant ($p < 0.0001$) increase in number of whorls in ECC group when compared with control group whereas higher number of loops was found in control group as compared to ECC group in both hands, which was statistically significant ($p < 0.0001$).

Table 1: Comparison of patterns in Children with ECC and caries free individual

Pattern	Group	Mean	Standard Deviation	Standard Error	Mean Difference	Z	P Value
RIGHT HAND							
Whorls	ECC	3.80	1.43	0.20	3.12	-7.41	<0.0001
	Control	0.68	1.30	0.18			
Arches	ECC	0.28	0.64	0.09	-0.34	-1.901	0.057
	Control	0.62	1.01	0.14			
Loops	ECC	0.92	1.32	0.19	-2.78	-2.78	<0.0001
	Control	3.70	1.47	0.21			
LEFT HAND							
Whorls	ECC	3.64	1.43	0.20	3.12	-7.41	<0.0001
	Control	0.64	1.30	0.18			
Arches	ECC	0.30	0.64	0.09	-0.34	-1.901	0.057
	Control	0.94	1.01	0.14			
Loops	ECC	1.062	1.32	0.19	-2.78	-2.78	<0.0001
	Control	3.42	1.72	0.24			

The mean ATD angle {table.2} was found to be higher in control group when compared to ECC group in both hand, which was statistically significant ($p < 0.0001$). Higher TRC {table.3} of average 151.90 was found in the control group as compared to average 130.90 in the ECC group which was statistically significant ($p < 0.0001$).

Table 2: Comparison of ATD angle in Children with ECC and caries free individual

Pattern	Group	Mean	Standard Deviation	Standard Error	Mean Difference	Z	P Value
RIGHT HAND							
ECC	48.4	3.42	0.48	-8.63	-7.34	<0.0001	
Control	57.05	3.33	0.47				
LEFT HAND							
ECC	1.062	3.89	0.55	-6.27	-6.643	<0.0001	
Control	1.062	3.10	0.44				

Table 3: Comparison of TRC

Pattern	Group	Mean	Standard Deviation	Standard Error	Mean Difference	Z	P Value
ECC	130.90	12.77	1.81	-21.00	-6.509	<0.0001	
Control	151.90	14.56	2.06				

DISCUSSION

Dental caries is a chronic, complex, multifactorial, multibacterial disease for which a number of causative agents like host and environmental factor interplay for its occurrence. There are numerous host factors for dental caries that are genetically determined⁷. The dermatoglyphics pattern can be used as an early predictors for detection of caries in children⁸. Dermatoglyphics interpretation of pattern in the digits of caries-free children in this study showed maximum loops followed whorls and arches in both right and left hands, whereas the ECC group showed maximum occurrence of whorls followed by loops and arches. These findings are in accordance with studies done by Atasu⁸, Sharma and Somani⁹, Madan et al. who found an increases frequency of ulnar loops in caries free children and increase frequency of whorls in children with dental caries. The Axial t triradius (ATD) was wider in the control group ($>56^\circ$) than ECC group (between 45° and 56°); this is agreement with Atasu & Ahmed et al⁸. The quantitative analysis of TRC in caries free was higher when compared to ECC group. Similar finding were reported by Atasu⁸ & Madan et al.

Also, there was statistically significant total finger ridges count of whorls in caries active children while there was highly significant total finger ridge count of loops in caries free children and is concordance with study of Sengupta et al¹⁰.

CONCLUSION

The present dermatoglyphics study found that there was a significant association between fingerprint patterns and ECC. It prove to non invasive anatomical tool which could be used for screening for early childhood caries and clinically will enable an early detection & prevention of the diseases.

REFERENCES

- [1]. Cummins H, Midlo C. Fingerprints, Palms and Soles: An Introduction to Dermatoglyphics. New York: Dover Press; 1961. p. 319.
- [2]. Venki E. Palmar dermatoglyphics in oral leukoplakia and OSC patients : Reviewed at Rajiv Gandhi Institute Of Medical Science. Karnatka ; 2000-2006
- [3]. Umana U et al. Dermatoglyphics and cheiloscopy pattern in cancer patients;a study done in ABUTH Zaria,Nigeria; Current Research Journal of Biological Sciences.2013; 5(5): 220-225,

- [4]. Strong AM. An improved method of palm printing. Science 1929;69;250-1
- [5]. Penrose LS. Memorandum on dermatoglyphics nomenclature. Birth Defects orig. artic search. 1969;6:72-84
- [6]. Penrose LS. Fingerprints and palmistry. Lancet 1973;1:1239-42
- [7]. Wahdan M. Elkwatchly, Abdel R A. Dermatoglyphics as a Non invasive anatomical marker in ECC. Int. Jr. Of Dentistry And Oral Sciences. 2016 ; 3(11): 366-71
- [8]. Atasu et al. Dermatoglyphics finding in dental caries. Jr Clin Ped Dent. 1998; 22: 147-49
- [9]. Sharma et al. Dermatoglyphics finding in dental caries & correlation with salivary infection. Jr Of Ind Soc Pedo Prev Dent. 2009; 27: 17 -21
- [10]. Sengupta AB et al. Cross sectional study of dermatoglyphics and dental caries in bangalii. Jr Of Ind Soc Pedo Prev Dent. 2003; 31: 245-48.