

Dermatoglyphics-A New Diagnostic Tool in Detection of Dental Caries among Deaf and Mute Children.

Padma K. Bhat,¹ Bhumika Kamal Badiyani,² Aruna C.N.,³
Sandhya Chengappa,⁴ Nithin N.Bhaskar⁵

ABOUT THE AUTHORS

1. Dr.Padma K.Bhat

Professor and Head of Department of Public Health Dentistry. Rajarajeshwari Dental College And Hospital, Bangalore ,Karnataka ,India

2.Dr. Bhumika Kamal Badiyani,

Final year post graduation student [M.D.S] in Department of Public Health Dentistry , Rajarajeshwari Dental College AndHospital,Bangalore ,Karnataka, India

3. Dr.Aruna C.N.

Reader in Department of Public Health Dentistry, Rajarajeshwari Dental College And Hospital, Bangalore, Karnataka, India

4. Dr.Sandhya Chengappa

Associate professor in Department of Public Health Dentistry Rajarajeshwari Dental College And Hospital, Bangalore, Karnataka, India

5. Dr.Nithin N.Bhaskar

Senior Lecturer in Department of Public Health Dentistry Rajarajeshwari Dental College AndHospital, Bangalore, Karnataka, India

Corresponding Author:

Dr. Padma K. Bhat

549, 12th cross. Ideal homes
Rajarajeshwari nagar ; City-
Bangalore Pin code- 560098
Phone nos: +919886580298
,+919243575939

E-mail address:

padma549@gmail.com,
dr.bhumikab@gmail.com

Abstract

Introduction: Dermatoglyphics is the study of dermal ridge configurations on palmar and plantar surfaces of hands and feet. Dermal ridges and craniofacial structures are both formed during 6-7th week of intra-uterine life, therefore hereditary and environmental factors leading to dental caries may also cause peculiarities in fingerprint patterns.

Objective: This study evaluates the dermatoglyphic peculiarities and caries experience of Deaf and Mute children.

Design: A total of 100 school children aged 6-16 years were selected using purposive and simple random sampling. Their fingerprints were recorded with duplicating ink and caries experience was clinically assessed by dmft/DMFT index.

Results: Mann-Whitney test revealed statistical association between whorl patterns and loop patters in caries and caries free group (P<0.001). The frequency of whorls was found to be more in caries group and the frequency of loops more in caries free group.

Conclusion: Dermatoglyphics could be an appropriate method to explore the possibility of a non-invasive and an early predictor for dental caries and hearing impairment in children so as to initiate the preventive oral health measures at an early age.

KEYWORDS: Dermatoglyphics, Dental caries, Deaf and mute children

Introduction

The study of the human hand has always been fascinating, not only to anthropologists and physicians, but also to psychologists, writers, painters, sages and chiromancers. It was in 1926 that Cummins introduced the term "Dermatoglyphics".^{1, 2} It is the term applied to the study of the topography of the little epidermal ridges that run parallel to one another on the volar 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 development.¹ Dental caries has a high prevalence worldwide. Its etiology is complex and multifactorial, however the question of a possible true genetic predisposition toward dental caries has piqued the minds of dental investigators for decades.^{3,4} The basis of considering dermatoglyphic patterns as genetic marker for dental caries is that the primary palate develops during 6-13th week of intrauterine life.⁵ Epithelium of primary palate as well as finger buds develop from the same site and are of ectodermal origin.² The other point which needs to be mentioned is epithelium of finger buds as well as enamel have ectodermal origin, and both develop at the same time of intrauterine life.^{5,6} Similarly development of dermal ridges and congenital deafness seems to be interlinked as they develop at around the same time. It is estimated that about 50% of cases of childhood hearing impairment of moderate to profound degree are genetically determined.⁷ Studies have also shown that caries has been high in the deaf and mute children. Dental treatment is the greatest unattended health need of these children.⁸⁻¹¹ Thus when combined with other clinical and investigative features dermatoglyphics can serve to strengthen as a diagnostic tool. The purpose of the

study was to find correlation between dermatoglyphic pattern and caries in deaf and mute children.

MATERIAL AND METHODS

PARTICIPANTS: 1 Deaf and mute school was selected using purposive sampling method where 100 school children (50 children having caries and 50 not having caries) within the age group of 6-16 years were selected using simple random sampling method. Consent from parents/guardians was obtained before the commencement of the study.

Children with skin disorders; trauma to fingertips; uncooperative children and children whose parents/guardians didn't give consent were excluded from the study.

PROCEDURE: Dermatoglyphic patterns of all 10 palmar digits were recorded using Cummins and Midlo (1943) method. The hands were cleaned with soap and water and then scrubbed thoroughly with an antiseptic lotion (Savlon) and allowed to dry. This was done to enhance the quality of the dermatoglyphic prints, by removing sweat, oil or dirt from the skin surface. The student's right palm was pressed in the ink pad followed by pressing it firmly against the bond paper 2-3 times; since the second or third recording was satisfactory and readable. The same procedure was repeated for the left hand. In this way, a total of 1000 digital prints (dermatoglyphic patterns) were obtained.

The obtained dermatoglyphic patterns for finger tips i.e presence of arches, loops and whorls were assessed with the help of a magnifying glass (10x). Caries experience of deaf and mute children was measured using dmft/DMFT Index.

STATISTICAL METHODS: The data collected was subjected to statistical analysis. Mann-Whitney test was used to determine the comparisons between the caries and the caries free groups among deaf and mute children using SPSS Software version 13.

RESULTS

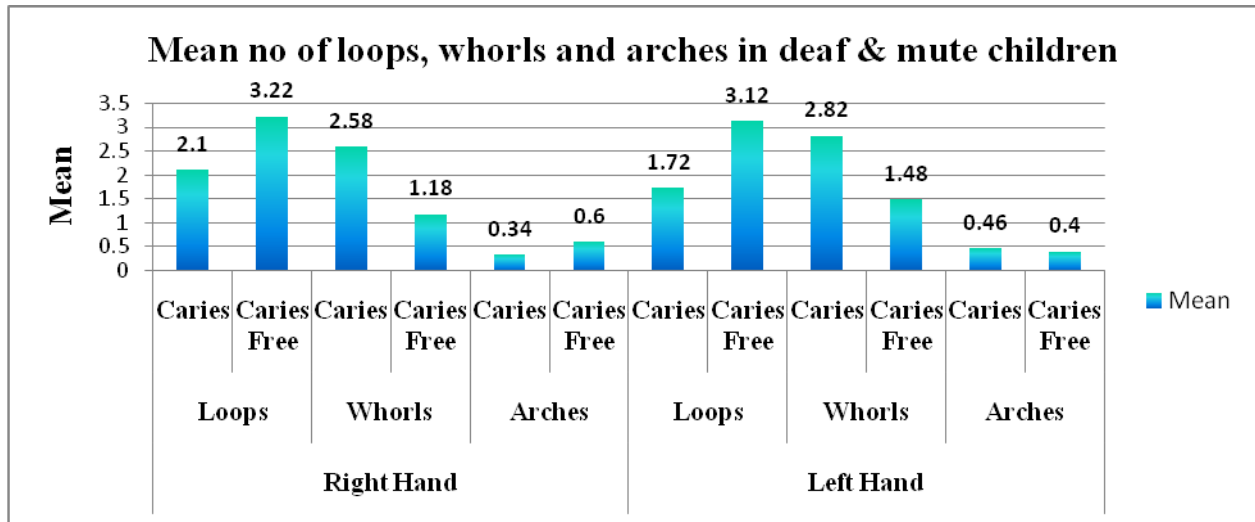
The results showed a significant change in the dermatoglyphic pattern between the caries and the caries free group in deaf and mute children. The frequency of whorls was found to be more in caries group and the frequency of loops more in caries free group. A statistically significant difference was observed between caries and caries free group with respect to loops and whorls in right and left hand. No significant difference was observed with respect to arches between caries and caries free group in right and left hand (Graph 1). The mean dmft score for the 6-12 years old was 5.56, the mean DMFT score for the 6-12 years old was 4 and the mean DMFT score for 13-16 years old was 4.58 in Deaf and mute children (Table 1).

DISCUSSION

Dermatoglyphics has been used to unveil oral diseases like dental caries, oral cancer, bruxism, malocclusion, anomalies of teeth, cleft lip, cleft palate, periodontal disease, dental fluorosis and also in unveiling truth with forensic odontology.^{2, 5, 12-23}

In this study, the frequency of whorls were found to be more in caries group and the frequency of loops more in caries free group. These obtained results are in line with a study done by Metin Atasu among Dental students in Marmara University, Turkey.¹² Similarly a study done by Sharma A and Somani R in Ghaziabad among 3-6 years old children showed decreased frequency of loops in caries group compared to caries free group.⁵ A study was conducted at Dayanand Medical College and Hospital, Punjab, to compare the dermatoglyphic patterns in established congenitally deaf cases with that of control healthy individuals.⁷ It was found that the frequency of whorls was more in deaf and mute group. In the present study frequency of whorls was seen higher only in the caries group. In the present study the mean dmft score for the 6-12 years old was 5.56, the mean DMFT score for the 6-12 years old was 4 and the mean DMFT score for 13-16 years old was 4.58 in Deaf and mute children (Table 1). These results were parallel to a study done by Behjat Almoolook Ajami, Mahboobeh Shabzendedar, Yar Ali Rezay, Mohammad Asgary in 13 special schools of Iran it was observed that the caries prevalence in the 6-7-year-old deaf children with a mean dmft score of 7.35. The caries prevalence in 11-12-year-old deaf children was 93% with a mean DMFT of 5.12.¹¹ Another study conducted by Z Al-Qahtani and A H Wyne in the 6-7-year-old and 11-12-year-old blind, deaf and mentally retarded female children registered with the Presidency of Girls' Education schools in Riyadh, showed the caries prevalence in deaf 6-7-year-olds was 95.7% with a mean dmft score of 7.35. The caries prevalence in 11-12-year-old deaf children was 93% with a mean DMFT of 5.12 thus proving that the Caries experience and severity in deaf and mute children was high.¹⁰ A study of handicapped children attending special schools in Birmingham, UK showed mean DMFT as 1.76 in 11-12 year old children which showed that children with impaired hearing and communication problems had better oral hygiene than other handicapped children.²⁴ Caries prevalence amongst handicapped children of South Canara district in Karnataka showed the mean dmft score in the primary dentition was found to be 3.06 +/- 3.14. The mean dmft and DMFT in the mixed dentition were 3.32 +/- 2.82 and 1.14 +/- 1.08 respectively and the mean DMFT in the permanent dentition was 4.51 +/- 3.17.²⁵

Graph 1 Comparison Of Loops, Whorls And Arches Between Caries And Caries Free Groups In Deaf And Mute Children



(P<0.05)

Table 1: Comparison of dmft/DMFT Scores Among Deaf & Mute Children.

Age Group	Index	Mean	Standard Deviation
6 Years-12 Years	dmft	5.56	1.52
6 Years-12 Years	DMFT	4	1.27
13 Years-16 Years	DMFT	4.58	1.03

A study was conducted to know the dentition status and treatment needs among deaf and mute children in Udaipur, India which showed that the mean dmft in children of 5-8 year age group was 2.17, in 9-12 year age group it was 1.59 and in 13-17 year age group it was 0.16. Similarly the DMFT score in 5-8 year age group was 0.50, in 9-12 year age group it was 1.76 and in 13-17 year age group it was 2.95.⁸ A study showing similar results was conducted among disabled children and young adults in Kuwait showed dmft in 3-12 years old children was 5.3 and DMFT was 5 indicating the caries experience was higher among the disabled population than among the healthy children.²⁶

CONCLUSION

Dermatoglyphics can prove to be a useful and cost-effective tool for preliminary investigations into

conditions with a suspected genetic base. There is a definite correlation between dermatoglyphics and Dental caries. A statistically significant correlation was found in relation to the increased frequency of the whorls in deaf and mute having caries. It can serve to strengthen the diagnostic impression of the disease right from an early age and preventive oral health measures can be obtained. In addition, the oral hygiene habits of individuals with disabilities can be improved by close monitoring and periodic dental check-ups. The current status of dermatoglyphics claims a very high degree of accuracy in the diagnosis and prognosis towards oral diseases. Although dermatoglyphic examination is technique sensitive, but once applied, can give new dimension and reliable parameter to Dental Science.

RECOMMENDATIONS

We recommend more comparative studies in different geographical areas to identify the dermatoglyphic patterns in patients with hearing impairment in various conditions since the dental health of handicapped children should be brought up to, and maintained at, the level of that provided for healthy children.

REFERENCES

1. Naffah J Dermatoglyphic analysis: anthropological and medical aspects. Bull N Y Acad Med. Oct 1977;53(8):681-92.
2. Mathew L, Heqde AM, Rai K Dermatoglyphic peculiarities in children with oral clefts. J Indian Soc Pedod Prev Dent. 2005 Oct-Dec;23(4):179-82.
3. Ahmed RH, Aref MI, Hassan RM, Mohammed NR Dermatoglyphic Study on Patients with Dental Caries Who Wearing Dental Fillings and its Correlation to Apoptosis that Induced by Using Dental Fillings Nature and Science 2010;8(10):54-57.
4. Tyagi R, Khuller N, Sharma A, Khatri A Genetic Basis of Dental Disorders: A Review J Oral Health Comm Dent Oct 2008;2(3):55-6.
5. Sharma A, Somani R. Dermatoglyphic interpretation of dental caries and in correlation to salivary bacteria interactions: an in vivo study. J Indian Soc Pedod Prev Dent. 2009 Jan-Mar;27(1):17-21.
6. Kiran K, Rai K, Heqde AM. Dermatoglyphics as a noninvasive diagnostic tool in predicting mental retardation J. Int Oral Health 2010;2(1):95-100.
7. Sharma A, Singh P, Sood V Palmar And Digital Dermatoglyphics In Congenitally Deaf Subjects Journal Of The Punjab Academy Of Forensic Medicine & Toxicology 2007;7(1)10.
8. Jain M, Mathur A, Kumar S, Daqli RJ, Duraiswamy P, Kulkarni S Dentition status and treatment needs among children with impaired hearing attending a special school for the deaf and mute in Udaipur, India J Oral Sci. 2008 Jun;50(2):161-5.
9. Gupta DP, Chowdhury R, Sarkar S Prevalence of dental caries in handicapped children of Calcutta J Indian Soc Pedod Prev Dent. 1996 Mar;14(1):23-7.
10. Al-Qahtani Z, Wyne AH Caries experience and oral hygiene status of blind, deaf and mentally retarded female children in Riyadh, Saudi Arabia. Odontostomatol Trop. 2004 Mar;27(105):37-40.
11. Ajami BA, Shabzendedar M, Rezay YA, Asgary M Dental Treatment Needs of children with Disabilities JODDD 2007 1(2) 93-8.
12. Atasu M Dermatoglyphic findings in dental caries: a preliminary report. J Clin Pediatr Dent. 1998 Winter;22(2):147-9.
13. Singh N, Sharma A, Goel D, Singhal A, Khera T, Sharma A Is dermatoglyphics a reliable criteria for quantifying oral and systemic diseases- A review Indian Journal of Forensic Medicine & Toxicology 2010 4(2):41-4.
14. Sharma A, Palvi, Kapoor D Dermatoglyphics, Dentistry and Diagnosis-A Review Baba Farid University Dental Journal 2010 1(2):45-8.
15. Tikare S, Rajesh G, Prasad KW, Thippeswamy V, Javali SB Dermatoglyphics--a marker for malocclusion? Int Dent J. 2010 Aug;60(4):300-4.
16. Reddy S, Prabhakar AR, Reddy VV A dermatoglyphic predictive and comparative study of Class I, Class II, div. 1, div.2 and Class III malocclusions. J Indian Soc Pedod Prev Dent. 1997 Mar;15(1):13-9.
17. Karqül B, Alcan T, Kabalay U, Atasu M. Hypohidrotic ectodermal dysplasia: dental, clinical, genetic and dermatoglyphic findings of three cases. J Clin Pediatr Dent. 2001 Fall;26(1):5-12.
18. Atasu M, Biren S. Ellis-van Creveld syndrome: dental, clinical, genetic and dermatoglyphic findings of a case. J Clin Pediatr Dent. 2000 Winter;24(2):141-5.
19. Atasu M, Cimilli H. Fusion of the permanent maxillary right incisor to a supernumerary tooth in association with a gemination of permanent maxillary left central incisor: a dental, genetic and dermatoglyphic study. J Clin Pediatr Dent. 2000 Summer;24(4):329-33.
20. Yilmaz S, Atasu M, Kuru B A genetic and dermatoglyphic study on periodontitis. J Marmara Univ Dent Fac. 1993 Sep;1(4):297-306.
21. Atasu M, Ozbayrak S, Eryilmaz A. Generalized microdontia and associated anomalies: a clinical, genetic, radiologic and dermatoglyphic study. J Clin Pediatr Dent. 1996 Winter;20(2):161-72.
22. Polat MH, Azak A, Evlioğlu G, Malkondu OK, Atasu M The relation of bruxism and dermatoglyphics. J Clin Pediatr Dent. 2000 Spring;24(3):191-4.

23.Kobayashi ET, Maruyama Y, Kobayashi K.A
longitudinal evaluation of craniofacial growth in
a patient with Kabuki make-up syndrome: a case report.
Eur J Orthod. 2001 Apr;23(2):205-13.

24.Shaw L, Maclaurin ET, Foster TD. Dental study of
handicapped children attending special schools in
Birmingham, UK.Community Dent Oral Epidemiol. 1986
Feb;14(1):24-7.

25.Rao DB, Heqde AM, Munshi AK. Caries prevalence
amongst handicapped children of South
Canara district, Karnataka. J Indian Soc Pedod Prev
Dent. 2001 Jun;19(2):67-73.

26.Shyama M, Al-Mutawa SA, Morris RE, Sugathan
T, Honkala E. Dental caries experience of
disabled children and young adults in Kuwait.Community
Dent Health. 2001 Sep;18(3):181-6.