

## Dermatoglyphics and Dental Caries: A Comparative Study in Sikh and Non-sikh Population

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### Abstract

**Aim:** This study was undertaken to compare and analyze the significance of dermatoglyphics in predicting the susceptibility to develop dental caries in sikh and nonsikh population. **Materials and Methods:** This study was conducted on the total of 400 subjects, 200 sikh and 200 nonsikh in the age group between 5-13 years and children with dental caries in 3 or more teeth based on the df and DMFT index were included in the study. The fingerprints were taken using stamp pad and Statistical analysis was performed. **Results:** 1. On calculation of caries index nonsikh population were more susceptible to develop caries. 2. predominant finger print pattern was loop in sikh population whereas it was whorl in nonsikh population. 3. Dental caries susceptibility of an individual increases with an increase in the incidence of whorl pattern. **Conclusion:** There was an increased frequency of the whorls in nonsikh population having caries.

**Keywords:** Dermatoglyphics; Fingerprint pattern; Dental caries; Genetics.

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### Introduction

The patterned tracteries of the epidermal ridges on the palms and feet must have aroused interest long ago.[1] Harold Cummins and Midlo (1926) introduced the term "Dermatoglyphics where 'Derma'= skin and glyphics = carving.[2]

It is the term applied to the study of the epidermal ridges on the surface of hand and feet.[3]

The dermal ridges and the tooth bud originate in the 6-7<sup>th</sup> week of intra embryonic life and reach maximum size during 12<sup>th</sup> and

13<sup>th</sup> week. So the genetic message in the genome which is deciphered during this period is reflected by dermatoglyphics.[4]

So a study was undertaken to compare and analyze the significance of dermatoglyphics in predicting the susceptibility to develop dental caries in sikh and nonsikh population.

### Materials and Methods

A cross-sectional study was performed on 400 subjects, 200 sikh and 200 nonsikh, of age group ranging between 5-13 years during a school examination camp conducted by our institute in Paonta Sahib, Himachal Pradesh, India.

### Inclusion Criterion

Children with dental caries in 3 or more

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teeth based on the def and DMFT indices performed were selected.

Materials used were:

- PMT set
- Cotton
- Duplicating printing ink
- A4 size bond sheet
- Magnifying glass (2× power)
- Soap

An informed consent was taken from the Dean of the school before the onset of the study considering the ethical issue and confidentiality of fingerprints of patients.

- Brief case history with clinical examination and DMFT and def index were recorded.
- Subject's hand were cleaned and dried before imprinting.
- The finger prints of the subjects were taken using a stamp pad; a thin layer of stamp pad ink was applied to the fingers.
- An imprint of fingertips was recorded on an A4 size bond sheet.
- Prints were dried and studied using a magnifying lens to identify the finger patterns.

- After taking the imprints, ink was removed by using soap and water.

The various patterns of fingerprints were analyzed according to the standard guidelines given by Michael Kucken (2005). On the fingertips three main pattern types are discriminated: whorls, loops and arches.[5]

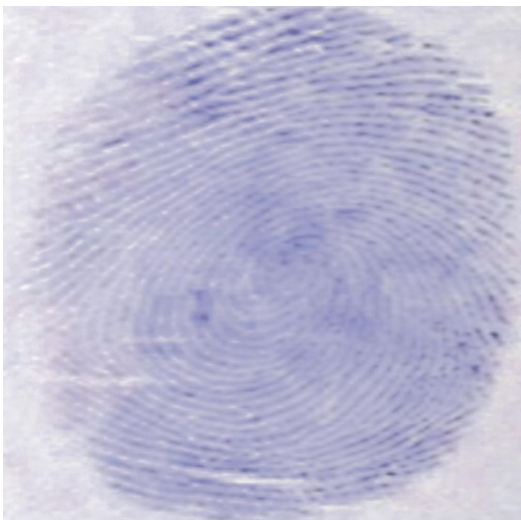
A whorl pattern has concentric arrangement of ridges. In loop pattern a series of ridges enter and exit on same side of digit after recurving abruptly. If the ridge opens on ulnar side (away from thumb), it is called as ulnar loop, and if it open toward the radial side (toward thumb), it is called as radial loop. Arch pattern shows the simplest ridge pattern and is formed by the succession of one or more parallel ridges which cross the finger without recurving.[6]

The data obtained was subjected to statistical analysis using the Mann whitney test.

### Results

The data obtained by analyzing the fingerprints of sikh and nonsikh group were entered in a primary data sheet. Fingerprints of sikh population showed more no. of loop

**Figure 1: Finger Print of a Child Taken During Study**



**Figure 2: Whorl Pattern**



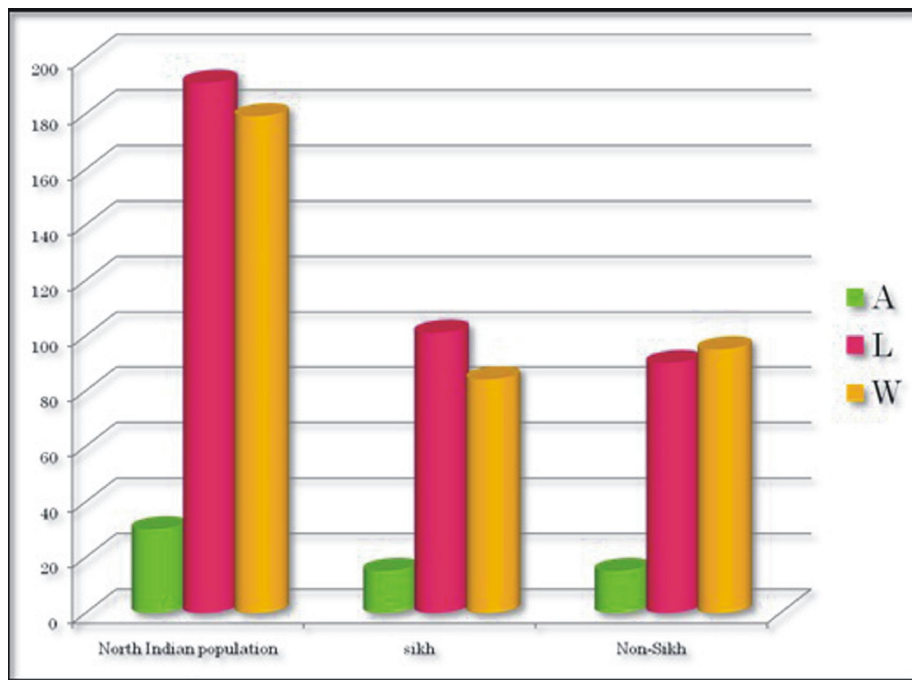
**Figure 3: Loop Pattern**



**Figure 4: Arch Pattern**



**Figure 5: Overall Fingerprint Pattern.**

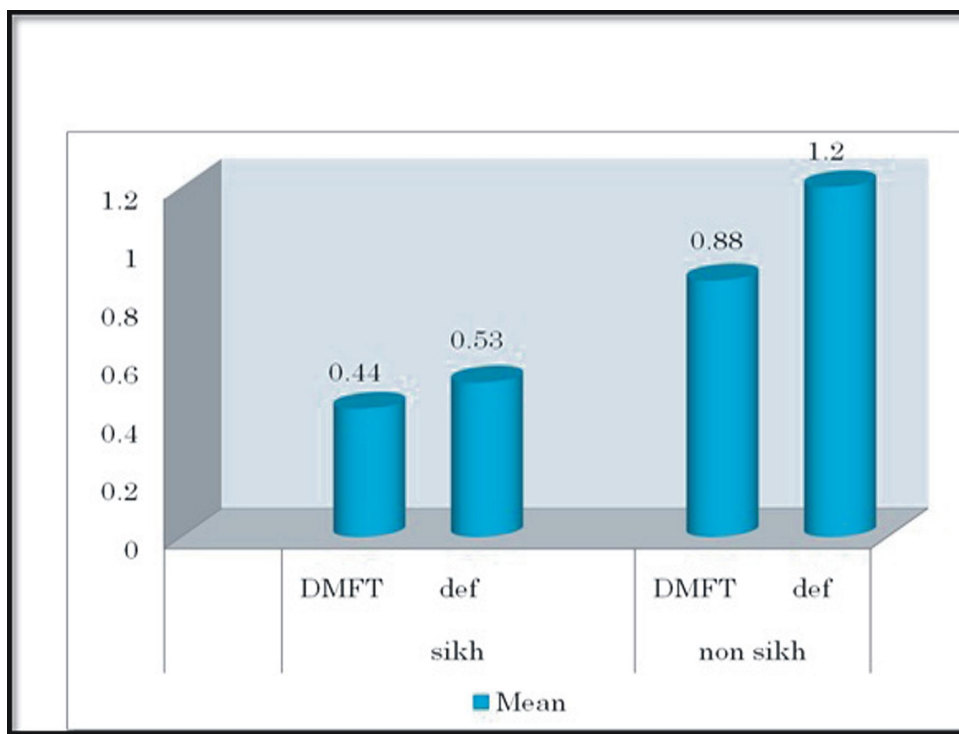


patterns whereas whorl pattern was found to be more prevalent in nonsikh population (Figure 5). On calculation of caries index non sikh population were found to have more caries as compare to sikh population (Figure 6). The overall correlation between DMFT and def with fingerprint pattern is given in (Table 1).A significant increase in dental caries was associated with whorl pattern.

### Discussion

Dental caries is a microbial disease of the calcified tissues of the teeth, characterized by demineralization of the inorganic portion and destruction of the organic substance of the tooth which often leads to cavitation. Dental

**Figure 6: Mean Caries Level in Sikh and Non-sikh Population**



**Table 1: Correlating DMFT and DF with Fingerprint Pattern**

FINGER PRINT PATTERN	DMFT /df					
	Sikh		Nonsikh		P-value	
	DMFT	df	DMFT	df	DMFT	df
Arch	97.30	119.77	76.03	80.43	.605	.292
Loop	98.31	95.28	95.22	96.01	.225	.065
Whorl	103.70	103.33	111.16	108.59	<b>&lt;.001</b>	<b>&lt;.001</b>

caries is the most common chronic disease of childhood and is unequally distributed in the population with most of the disease occurring in 20% of Children.[7]

The pattern of dental caries is similar over several generations in the members of same family and hence, inheritance of this

susceptibility is suspected. The type of fingerprints is also based on the genetical characteristics of each individual.[8] Thus specific fingerprint patterns may be used as a potential noninvasive anatomical tool for screening dental caries and for guiding future research.

The age group of 5-13 years was chosen to include the primary and permanent dentition. The def index given by Grubbel in 1944 is used for caries recording in primary dentition. It was modified to the df index as the "e" component of the index could not be recorded with utmost certainty. The modification, "df" index, was used in this study.

The mean df score in our study for the 5-13 years old sikh was 0.53 and nonsikh 1.2, the mean DMFT score for the 5-13 years old was 0.44 and 0.58. This study is parallel to study done by Jain M *et al* 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.[9] Another study done by Ajami *et al* observed that the caries prevalence in the 6-7-year-old deaf children with a mean dmft score of 7.35 in 13 special schools of Iran. The caries prevalence in 11-12-year-old deaf children was 93% with a mean DMFT of 5.12.[10]

The present study reported that with an increase in the whorl pattern, the patient had an increased susceptibility to dental caries. This result was in conformity to Engler *et al* (1982), who had analyzed dermatoglyphic patterns in breast cancer patients and concluded that the presence of six or more whorls on the fingertips of a person could indicate a high risk of obtaining breast cancer.[11]

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. The modern era has recognized human hand as a powerful tool in the diagnosis of psychological, medical and general condition.[2]

Dermatoglyphics is considered as a window of congenital abnormalities and is a sensitive indicator of intrauterine anomalies.[4]

The uniqueness of fingerprints falls under the larger umbrella of biological uniqueness. No two individual have yet been found to possess identical ridge characteristics and is based on the genetical characteristics of each individual.[8]

The dermatoglyphic patterns can determine the genetic predisposition of children to dental caries so can be use as a oral health marker. Similar pattern of occurrence of dental caries are observed in children and their parents due to genetic inheritance of salivary pH, enzymes, salivary flow and tooth morphology.[12]

Although conclusions could be drawn based on this study, digital dermatoglyphics may have a future role in identifying people either with or at increased risk for dental caries so that either risk reduction measures or earlier therapy may be instituted.

## Conclusion

A search of literature revealed that till now no study have been reported comparing sikh and nonsikh population. A statistically significant correlation was found in relation to the increased frequency of the whorls in nonsikh population having caries.

Dermatoglyphics can prove to be a useful and cost-effective tool for preliminary investigations into conditions with a suspected genetic base. It can serve to strengthen the diagnostic impression of the disease right from an early age and preventive oral health measures can be obtained. Although dermatoglyphic examination is technique sensitive, but once applied, can give new dimension and reliable parameter to dental science.

## References

1. Cummins H, Midlo. Finger prints, Palms and Soles: An introduction to Dermatoglyphics. New York: Dover Publications Inc.; 1943.

2. Blanka Schaumann and Mitton Alter. Dermatoglyphics in medical disorders. Newyork Springer Verlag, Berlin: 1976; 27-87.
3. Naffah J. Dermatoglyphic analysis: anthropological and medical aspects. *Bull N Y Acad Med.* 1977; 53(8): 681-92.
4. Mathew L, Hegde AM, Rai K. Dermatoglyphic peculiarities in children with oral clefts. *J Indian Soc Pedod Prev Dent.* 2005; 23: 179-82.
5. M Kucken, AC Newell. *Journal of Theoretical Biology.* 2005; 235: 71-83.
6. Gupta V, Kumar P, Dupare R, Datta SS. Dermatoglyphics and dental caries: A review. *Indian Journal of Forensic Odontology.* 2011; 4(3-4): 33-7.
7. Hassel TM, *et al.* Genetic influences in caries and periodontal diseases. *Oral Biol Med.* 1995; 6(4): 319-42.
- 8.. Abhilash PR, Divyashree R, Patil SG, Gupta M, Chandrasekar T, Karthikeyan R. Dermatoglyphics in Patients with Dental Caries: A Study on 1250 Individuals. *J Contemp Dent Pract.* 2012; 13(3): 266-274.
9. Jain M, Mathur A, Kumar S, Dagli 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; 50(2): 161-5.
10. Ajami BA, Shabzendedar M, Rezay YA, Asgary M. Dental Treatment Needs of children with Disabilities. *JODDD.* 2007; 1(2): 93-8.
11. Atasu M. Dermatoglyphic findings in dental caries: A preliminary report. *J Clin Pediatr Dent.* 1998; 22(2): 147-49.
12. Bixler D. Genetic aspects of dental anomalies. Chapt 6. In: Mc Donald RE, Avery DR, editors. *Dentistry for the child and adolescent.* St Louis: CV Mosby Co; 1988, 105-6.