

# Dermatoglyphics Interpretation of Dental Caries: An In Vivo Study

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## ABSTRACT

**Aim:** The study was undertaken to investigate and analyse the significances of dermatoglyphics in predicating the susceptibility of individual to develop dental caries. **Materials and method:** The study was conducted on 100 children in age group of 5 to 12 years from Government school, Patiala and divided into 2 equal groups i.e. caries active group (n=50) and caries free group (n=50). The caries active group included children with DMFT index 5 or more and caries free group consist of normal, healthy children without any dental caries. The finger prints of both hands were taken using a stamp pad method and pattern were analysed according to Cummins and Midlo method. Data obtained was put to statistical analysis. **Results:** There was increase in frequency of whorls and decrease in frequency of loops in caries active group when compared to caries free group. On the other hand caries free group showed decrease in frequency of whorls and increase in frequency of loops which was statistically significant ( $p \leq 0.05$ ). **Conclusion:** Dental caries susceptibility of an individual increased with incidence of whorl pattern and it decreased with incidence of loop pattern.

**KEYWORDS:** Dermatoglyphics, Finger prints, Dental caries.

## INTRODUCTION

Cummins and Midlo in 1926 coined the word dermatoglyphics. The term is composed of two words “dermi” meaning skin and “glyph” means curve.<sup>1,5</sup> Dermatoglyphics is a branch of science, which deals with the study of ridge patterns on fingertips, palms, soles and toes.<sup>2</sup> Dermatoglyphics is considered to be a window of congenital abnormalities. It is a sensitive indicator of intrauterine anomalies both dental as well systemic.<sup>14, 6, 10</sup>

By the seventh week of intrauterine life, the primary palate and lip develops in human embryo. Likewise the secondary palate development is completed by 12th week of intrauterine life. Also, by sixth week of gestation, the dermal ridges develop in relation to volar pads, and they reach a maximum size between 12-13th week. The epithelium of the primary palate, as well as, finger buds develop from the same site and are of ectodermal origin. Since it has been noted that the epithelium of finger buds, as well as, the enamel (most susceptible dental tissue to caries) have an ectodermal origin, and both develop at the same time of intrauterine life<sup>3</sup>. This implies that genetic message present in the genetic make up of a person, normal or abnormal, is transmitted during this period and is also reflected by dermatoglyphics. Thus, the resulting ridge configurations are genetically determined. Also, they are influenced or modified by environmental forces. Dermatoglyphic patterns are broadly classified into three major types<sup>4</sup>: whorl, loops, and arches, which are present at the tips of fingers, The major advantages of the dermatoglyphics are<sup>1,10</sup>

- The epidermal ridge of the palms fingers is fully developed at birth and thereafter remain unchanged for life.
- The impression recording or fingerprint can be accomplished rapidly, inexpensively and without causing any trauma to the patient. The recording is better in children as they are finely developed.

As dermatoglyphic patterns stay constant during life so it may sometimes play a significant role in the diagnosis of dental diseases like caries. Therefore, the present study was conducted in vivo to establish a unique correlation between the dermatoglyphics patterns: Loops and Whorls, and its correlation to dental caries.

## MATERIALS AND METHOD

**Source of data:** 100 children between ages of 5 and 12 years with no difference between the sexes were selected from Government School, Patiala. Selected children were divided into two equal group:- Caries-active group: consisted of 50 children with DMFT score more than or equal to 5 and Caries-free group consist of normal, healthy 50 children without any dental caries. The DMFT score for these group children was “0”.

**Exclusion criteria:** We did not include the dermatoglyphics of children with syndromes as they may show a peculiar pattern of development of dermal ridges.

**Method of collection of data:** Clinical examination of 100 children was done, and DMFT index was recorded. Firstly, hands were thoroughly cleaned and allowed to

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dry. After this, right hand four digits were guided by the researcher to the ink stamp pad and pressed firmly against the bond paper. The paper was stabilised on a hard smooth surface board. In this method, impressions were recorded 3-4 times, but third recording was satisfactory and readable. Then this was repeated for the thumb of the same hand. The same procedure was repeated for the left hand. These dermatoglyphic patterns (fig.1, fig.2) were analysed with the help of a magnifying glass (6 xs)

**Evaluation of patterns:** Dermatoglyphic patterns of all 10 palmar digits were recorded using Cummins and Midlo method (fig.3).<sup>2</sup> The data was recorded and was analysed statistically. using nonparametric tests and t-test to compare the dermatoglyphic pattern changes between the Caries- active group and the Caries- free group.

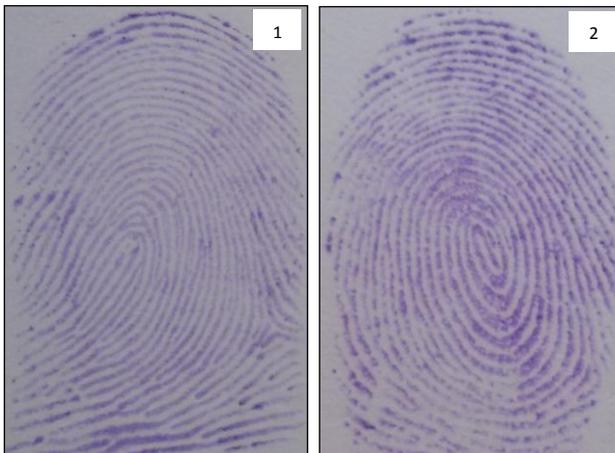


Fig1 . Dermatoglyphics pattern: Loop, Fig 2. Dermatoglyphics pattern: Whorl



Fig 3. Method of ridge counting

## RESULTS

The comparison of mean values of loops for both groups is shown in [Table 1 chart 1]. The mean value of loops in Caries- active group was  $5.14 \pm 2.330$  and that for Caries-free group was observed to be  $8.30 \pm 1.359$ .

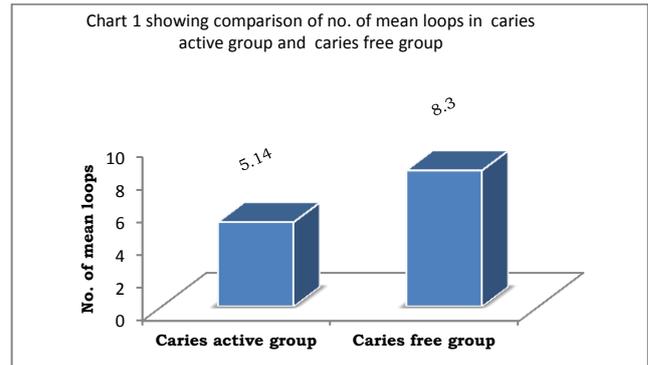
The comparison of mean values of whorls for both groups is shown in [Table 2 chart 2].The mean value of whorls in Caries- active group was observed to be  $8.26 \pm 1.509$  and that for caries free group it was  $5.34 \pm 2.066$ .

Caries- active group had an increased frequency of whorls and a decreased frequency of loops. Caries- free group had a decreased frequency of whorls and increased

frequency of loops. When both the group were compared, there was a statistically significant correlation ( $p \leq 0.05$ ).

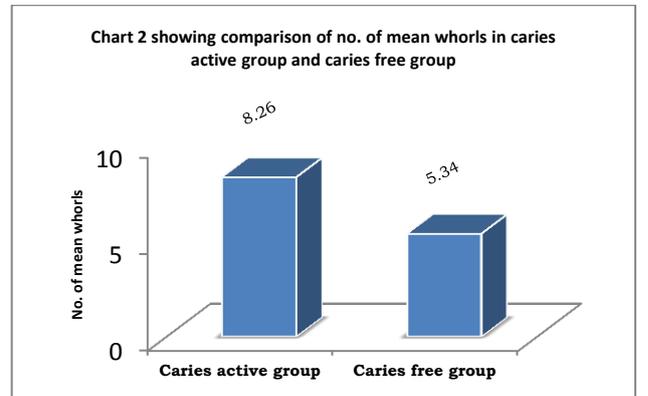
	Sample	Mean	Standard Deviation	Standard Error Mean
Caries- active group	50	5.14	2.330	0.330
Caries free group	50	8.30	1.359	0.192

Table no. 1 shown mean values of loops in Caries- active group and Caries- free group.



	Sample	Mean	Standard Deviation	Standard Error Mean
Caries-active group	50	8.26	1.509	0.213
Caries free group	50	5.34	2.066	0.192

Table no. 2 shown mean values of whorls in caries active group and caries free group.



## DISCUSSION

Dental caries is a chronic, complex, multifactorial disease for which a number of causative agents like host and environmental factors have been proposed. There are numerous host factors for dental caries that are genetically determined.<sup>6,9</sup> The pattern of dental caries has been found to be similar in members of the same family over several generations and hence, inheritance of this susceptibility is suspected. Genetic variations in the host factors may contribute to increased risks for dental caries. The dermatoglyphic patterns can be used as an oral health marker, which can determine the genetic predisposition of children to dental caries.<sup>2,8</sup> The type of fingerprints is

unique and is based on the genetic constitution of each individual. These dermal patterns once formed remain constant throughout life and also are considered to be unique for a person.<sup>16,7</sup>

The hand has come to be recognized as a powerful tool in the diagnosis of psychological, medical and genetic conditions.<sup>5,3</sup> The ink stamp pad method was used to record the handprints. Firstly, handprints of four digits were taken together. Often, it was noted that the thumb does not provide proper prints, since humans have an opposable thumb thus a different spatial orientation as compared to the rest of the fingers. So, a separate impression of the thumb was taken.

In a study conducted by Metin Atasu (1992)<sup>8</sup>, Caries-active group showed increased frequency of whorls as compared to frequency of whorls present in Caries-free group and also showed that Caries-active group had a decreased frequency of loops as compared to loops present in caries free group. The result of the present study is coinciding with this study. In comparison with the caries free group, Caries active group showed a positive correlation between increased frequency of whorls and dental caries ( $p \leq 0.05$ ). From our results, we can conclude that the dermatoglyphic patterns varied significantly among the patients with dental caries and healthy individuals.

Basically, the pattern of the skin lines on the finger is formed during the second trimester of the intrauterine life and it does not change for any individual during the life. It has been reported that the epidermal ridges of the fingers and the palms and facial structures like lip, alveolus, palate and tooth bud are formed from the same embryonic tissue (ectomesenchyme) during the same embryonic period (6-9 weeks).<sup>4</sup> The genetic constitution whether normal or abnormal is deciphered during this period and is reflected by dermatoglyphics. Thus, with genetic information, the susceptibility for caries due to abnormality in the tooth structures like alterations in dental hard tissues like structure of dental enamel, tooth eruption and development may be reflected in the dermatoglyphics namely whorl and loop patterns.<sup>8,16,17</sup> Hence, dermatoglyphics could be an indicator of genetic susceptibility of an individual to dental caries.

## CONCLUSION

These patterns may represent the genetic makeup of an individual and, therefore, his/her predisposition to certain diseases. We also conclude from our study that specific fingerprint patterns may be used as a potential non-invasive anatomical tool which could be used for screening for dental caries and for guiding future research. This may further seek to introduce of more

preventive, early diagnosis and effective treatment strategies in patients with dental caries. The results of this study will need further extensive research and studies in this field have to be done in order to determine, and to evaluate the significance of these variations in the dermatoglyphic features of patients with dental caries.

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