

Correlation between Dermatoglyphics and Dental Caries: A Study in Punjab Population

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Abstract

Aim: To find the relationship between dermatoglyphics pattern and dental caries in punjab population. **Materials and Methods:** This study was conducted on the total of 100 subjects, 50 females, 50males in age group between 15- 20 years and persons with dental caries in 3 or more teeth based on DMFT index were included in the study. The fingerprints were recorded and statistical analysis was performed. **Results:** 1. Fingerprints of male showed more no of loop patterns. 2. Based upon caries index male population was found to have more caries as compared to females. 3. A significant increase in dental caries was associated with loop pattern. **Conclusion:** Dermatoglyphics can prove to be an extremely useful tool for preliminary investigations.

Keywords: Dermatoglyphics; Dental Caries; DMFT Index.

Introduction

The word "Dermatoglyphics" is derived from the Greek word "Derma" meaning skin and "glyphic" meaning carvings. Dermatoglyphics is a study of palmar and plantar dermal ridge carvings on the hands and feet. The terminology was coined by Harold Cummins and Midlo in 1926, and Cummins is regarded as the "Father of dermatoglyphics [1]." Recently, the field of dental dermatoglyphics has gained momentum through recognition of irregular fingerprints among individuals with periodontitis, dental caries, and certain congenital anomalies such as cleft lip and palate [2].

Dermatoglyphics is a useful tool for preliminary investigation of conditions with a suspected genetic basis. Hereditary factors contribute to many of the caries risk/resistance factors including pit and fissure morphology, enamel structure and composition, tooth eruption time, salivary flow and composition, arch form, dental spacing, immunologic function, and

dietary preference [3,4]. The basis of considering dermatoglyphic pattern as genetic marker for dental caries is that the primary palate develops during 6-13th week of intrauterine life. Epithelium of finger buds and enamel has ectodermal origin and both develop at the same time of intrauterine life [5].

The Sir Francis Galton in 1892 gave the basic nomenclature of the types of finger prints. They are grouped as loops, whorls and arches. The whorls differ from the loop in the aspect of concentric arrangement of ridges. In the entire pattern the simplest pattern seen are the arch pattern [6].

So, this study was undertaken to compare and analyze the significance of dermatoglyphics in predicting the susceptibility to develop dental caries in Punjab population.

Materials and Methods

A cross-sectional study was performed on 100 patients, 50 male and 50 female patients belonging to the age group between 15-20 years by the Department of Conservative Dentistry and Endodontics, Genesis Institute of Dental Sciences and Research, Ferozepur, Punjab, India. Institutional ethical clearance was obtained to carry out the study. Informed written

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consent was obtained from the patient.

Inclusion Criteria

Patients with dental caries in 3 or more teeth based on DMFT indices performed were selected.

Materials used for Study

The armamentarium used in the study included basic diagnostic instruments needed for recording decayed, missing, and filled teeth (DMFT) index and the materials needed for recording handprints. They were as follows:

1. Basic diagnostic instruments [Mouth mirror, Probe, Tweezer]
2. Duplicating printing ink
3. A4 size bond sheet
4. Magnifying glass (2×Power)

Recording of Caries Index

Brief case history (medical and dental history) with clinical examination and DMFT index were recorded. The oral examination was done using the basic diagnostic instruments.

Recording of Finger Patterns

The Patients whose index sheet was reversed and the finger prints were taken. The thumb was pressed on the ink pad and slight pressure was given and the thumb placed on the sheet and impression taken and the thumb prints were marked. The obtained hand prints were then checked for the various patterns using a 2x magnifying glass.

Statistical Analysis

The data obtained were entered in a Microsoft Excel SpreadSheet (MS Office 2010) and then subjected to statistical analysis using the Mann whitney test.

Results

The data obtained by analyzing the fingerprints of male and female patients were entered in primary data sheet. Fingerprints of male showed more no of loop patterns. Based upon caries index male population was found to have more caries as compared to female (Figure 1). A significant increase in dental caries was associated with loop pattern.

Table 1: Mean DMFT between male and female patients

| Gender | N | DMFT Mean ± SD | P value |
|--------|----|----------------|---------------------|
| Male | 50 | 4.14 ± 2.18 | 0.174 ^{NS} |
| Female | 50 | 3.54 ± 2.05 | |

NS: p > 0.05; Not significant

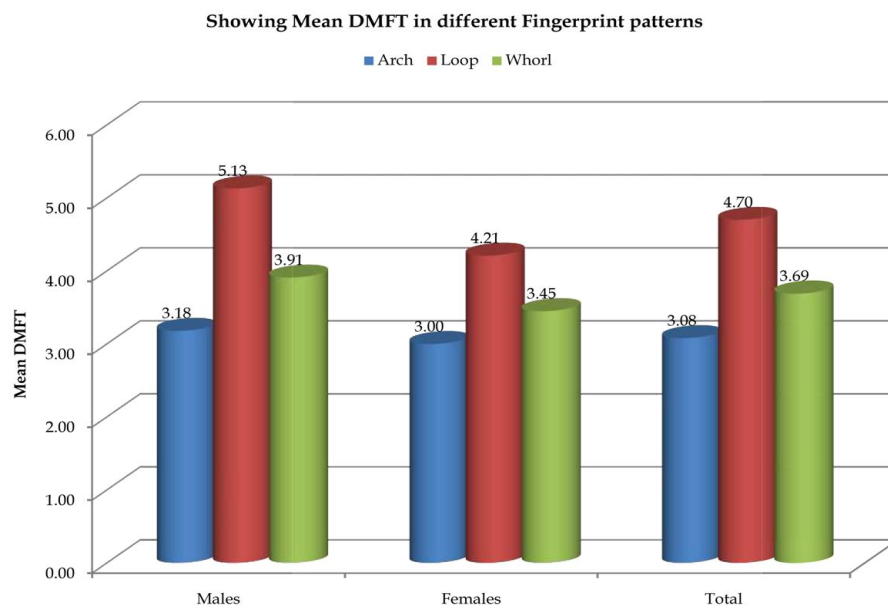


Fig. 1: Correlating different fingerprint pattern with mean DMFT

Mean DMFT index between male and female patients is not significant (Table 1).

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. Dental 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. Dental caries is a chronic, complex, multifactorial disease for which a multitude of etiologies like host and environmental factors have been proposed [7]. The relative roles of heredity and environmental in the pathogenesis of dental caries has intrigued clinical and basic researchers for decades. There are numerous host resistance and risk factors for dental caries that are genetically determined [8].

The pattern of dental caries is similar in members of the same family over several generations and hence, inheritance of this susceptibility is suspected. There are inherited traits that alter the susceptibility to dental caries in humans. Genetic variations in the host factors may contribute to increased risks for dental caries. Environmental factors, such as diet, oral hygiene habits also play a large role in causing dental caries. The type of fingerprints is unique and is based on the genetical characteristics of each individual. These dermal patterns once formed remain constant throughout life.

Earlier a study was conducted in a very small group comprising only 24 patients by *Metin Atasu* (1992) to analyze the dermatoglyphic patterns in dental caries [9]. We designed and undertook this study to evaluate and analyze the dermatoglyphic patterns in patients with dental caries. From our results we can conclude that the dermatoglyphic patterns varied significantly among the patients with dental caries and healthy individuals.

The mean DMFT score in our study for 15-20 years male patients was 4.14 and females was 3.54 (Table 2). Another study done by *Ajami et al* observed that caries prevalence in 6-7 year old deaf children with mean dmft score of 7.35 in 13 special school of irans.. The caries prevalence in 11-12 year old deaf children was 93% with a mean DMFT of 5.12 [10].

Basically, the pattern of the skin lines on the finger is formed in the second trimester of the fetus and it does not change for each individual during the life. The dermal ridges develop in relation to the volar

pads, which are formed by the 6th week of gestation and reach maximum size between 12 and 13th week. The epidermal ridges of the fingers and the palms as well as facial structures like lip, alveolus, palate and tooth bud are also formed from the same embryonic tissue (ectomesenchyme) during the same embryonic period (6-9 weeks). The genetic message in the genome whether normal or abnormal is deciphered during this period and is reflected by dermatoglyphics. Thus, with genetic susceptibility and added environmental factors the proneness 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 [7,9,13]. Hence, dermatoglyphics could indicate a genetic susceptibility to dental caries. In the recent decades, a considerable improvement has been achieved in the concept of correlation between the types of pattern of lines on the fingers and some individual disorders. The pattern of lines on the hand finger has been documented in medicine as a method of diagnosis [14,15].

Conclusions

The dermatoglyphic patterns may be utilized effectively to study the genetic basis of dental caries. These patterns may represent the genetic make up of an individual and therefore his/her predisposition to certain diseases. Dermatoglyphics can prove to be an extremely useful tool for preliminary investigations.

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