



DACTYLOSCOPY: A COMPARATIVE STUDY OF DERMATOGLYPHICS WITH ORAL *STREPTOCOCCAL MUTANS* COUNT

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ABSTRACT

Dental caries is defined as an irreversible disease of microbial origin which is related to every specialty of dentistry in one or the other way. Genetic susceptibility to dental caries is dependent on certain factors, which if evaluated, can help in estimating disease situation prematurely. Finger prints of an individual have been used as one of the vital parts of identification in both civil and criminal cases, because of their unique properties. Dermatoglyphic analysis is now beginning to prove itself as an extremely useful tool for preliminary investigations into conditions with a suspected genetic basis. On the other hand, modes of the inheritance patterns of dermatoglyphics traits and characters are hereditary hence the present study was done to estimate dermatoglyphics and its relation with dental caries. 60 subjects were evaluated. Dermatoglyphic interpretation was done using lipstick and *S. mutans* levels were estimated by culture of salivary samples. Mann-Whitney U test was used to find out the statistical significance for loops and *S. mutans* CFU between study and control group. Subject group had decreased frequency of loops and high *S. mutans* growth, whereas control group had an increased frequency of loops and low *S. mutans* growth. In the present study, there is a negative correlation between the number of loops and the Streptococcal counts (-0.19). Subjects showed decreased frequency of loops and high *S. mutans* growth exhibiting high caries activity and control group showed decreased *S. mutans* count and increased frequency of loops exhibiting low caries activity.

KEY WORDS: Dermatoglyphics, Enamel Structure, *Streptococcus Mutans*, Dental Caries.

INTRODUCTION

Dental caries is an irreversible disease of microbial origin which is related to every speciality of dentistry in one or the other way^[1]. Individual susceptibility to dental caries varied from genetic factors and environmental influences^[1]. Various studies like familial, pedigree and twin studies were carried out on dental caries to determine the etiologic factors for caries. The examination of print made from the finger tips is termed as dactyloscopy. Finger prints of an individual have been used as one of the vital parts of identification in both civil and criminal cases, because of their unique properties^[2].

Dermatoglyphics deals with the study of the epidermal ridges and their configurations on the fingers, palms and soles. The term was coined by Cummins and Midlo in 1961. The word “Dermatoglyphics” is derived from the Greek word “Derma” meaning skin and “glyphic” meaning carvings. Dermal ridge differentiation takes place early in foetal development. The resulting ridge configurations are genetically determined and influenced or modified by environmental forces^[3]. No two fingers are found to have identical prints, and it is an overwhelming mathematical probability that no two ever will be found to match. The ridge patterns are formed in the human fetus before birth and remain the same throughout a person’s life and even after death until they are lost through decomposition. The gender differences in epidermal ridge width, hence, ridge density are generally recognized by many finger print experts. These

differences have recently been studied with regard to those aspects that permit their application to gender identification^[4]. Dermatoglyphic analysis is now beginning to prove itself as an extremely useful tool for preliminary investigations into conditions with a suspected genetic basis. On the other hand, modes of the inheritance patterns of dermatoglyphics traits and characters are hereditary hence the present study was done to estimate dermatoglyphics and its relation with dental caries. The main aim of this study to determine if there is any substantial correlation between, dermatoglyphic interpretation, salivary bacterial interactions and dental caries.

MATERIALS AND METHODS

In the present study, 60 subjects between the age groups of 20 to 25 years were included, depending on the presence or absence of caries, subjects were divided into study group (30) and control group (30), informed consent was taken from patients before the commencement of the study. Caries detection: Dental caries was recorded using “DMFT” index with the help of right angle probe (no. 17), Shepherd probe (no. 23) and mouth mirror.

Dermatoglyphic pattern recording and Interpretation: Dermatoglyphic patterns of all 10 palmar digits were recorded as follows: Firstly, hands were scrubbed thoroughly with an antiseptic lotion (Savlon) and allowed to dry. After this, Fling, High Wattage no. 15 lipstick was applied to the right hand digits by the researcher and pressed

firmly against Whatman filter paper No. 1. As shown in fig 1. This was repeated for the left hand. In this way, a total of 600 finger prints were obtained from 60 subjects. These dermatoglyphic patterns were analyzed with the help of a magnifying glass with respect to available standards and data and the results were tabulated.

Estimation of salivary bacteria: For bacterial estimation, *S. mutans* was cultured as detailed below. Firstly, swabs from retromolar area were collected with the help of sterile cotton

swabs. The swabs were then transferred to the Himedia Mitis salivaris agar plates and streaked in a criss-cross pattern. Once streaked, the plates were incubated for 24 hours at 37 degrees centigrade. Following the growth of bacterial colonies on the agar plates as in fig 2, they were taken out from the incubator and colony growth was appreciated. *S. mutans* bacterial colonies were counted with the help of a digital colony counter.



FIGURE 1: Finger print recording



FIGURE 2: Bacterial growth on agar plate

RESULTS

Distribution of mean loops and microbial growth patterns between subjects and controls are shown in table 2, graph 1 and table 3 respectively. Table 1 shows comparison of loops and streptococcal colony forming unit (CFU) between subject and control group where the mean value of loops and Streptococcal count in control was observed to be 7.1±2.1 and 389.1±126.6 and that for study group was 5.0±2.6 and 650.5±139.6 hence control had higher loops and less CFU as compared to study group.

Mann-Whitney U test was used to find out the statistical significance for number of loops and *S. mutans* CFU between study and control group. A significant difference of P – 0.002 for loops was observed between study and control group and a highly significant difference of P – 0.000 for CFU between was obtained.

Assessment of relationship between loops and Streptococcal bacterial counts showed negative correlation of -0.19.

TABLE 1: comparison of loops and streptococcal colony forming unit (CFU) between study and control group:

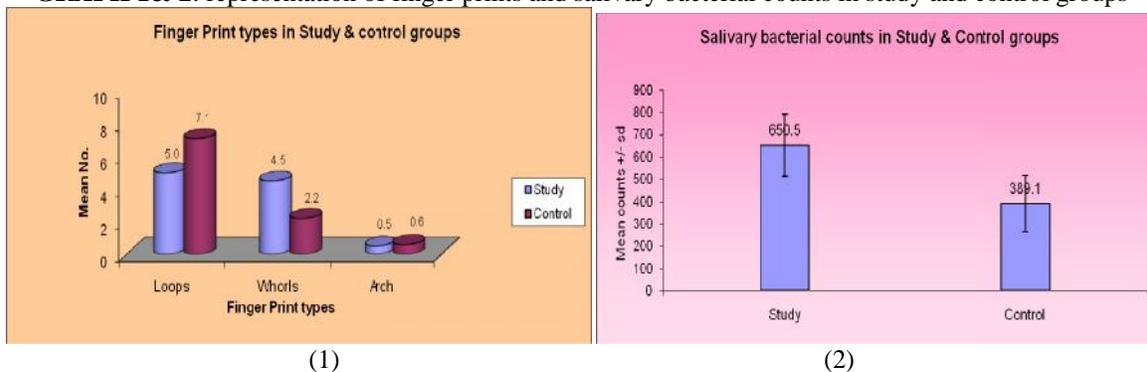
Variable	Groups	Mean +SD	Median	Study vs control P value
Loops	Study	5.0 ±2.6	4.5	0.002
	Control.	7.1 ±2.1	8.0	
CFU	Study	650.5 ±139.6	603	0.00
	Control	389.1 ±126.6	395	

TABLE 2: distribution of loops in subject and control group

No. of subjects	No. of loops	No. of controls
1	0	0
2	1	0
2	2	1
3	3	1
7	4	2
2	5	2
4	6	5
2	7	3
4	8	8
3	9	4
0	10	4

TABLE 3: microbial growth patterns in study and control group:

CFU	Study (n %)	Control (n %)
+1	0	1(3.3)
+2	0	15 (50)
+3	15 (50)	12 (40)
+4	15 (50)	2 (6.7)
TOTAL	30	30

GRAPH 1& 2: representation of finger prints and salivary bacterial counts in study and control groups

(1)

(2)

DISCUSSION

Dental caries is a localized pathological process that ends up in the destruction of hard dental tissue^[2]. Multifactorial etiology works as a processing unit in the causation of dental caries. In the present study, two important parameters were considered, one being dermatoglyphics and other being microflora to determine the relationship between the dermatoglyphics and the dental caries. The question of a possible true genetic predisposition toward dental caries has piqued the minds of dental investigators for decades^[5]. Numerous reports mention dental caries as a component of a well-defined inherited genetic syndrome with craniofacial phenotypes. These case reports and small sample surveys often document alterations in the morphology of teeth and formation of the enamel as well as the caries experience of the patient^[6]. In humans, the development of tooth enamel, palate, alveolar ridges and dermal ridges takes place at the same time during 6th–13th week of intrauterine life^[1]. This means that genetic message contained in the genome, normal or abnormal, is deciphered during this period and is also reflected by these structures. Hence in the formation of tooth leading increased susceptibility to caries may be depicted by the ridges found on the finger which needs advanced research to find out the genetic relation between the finger prints and caries occurrence.

S. mutans, is an acidogenic and aciduric microorganism colonizing the oral cavity. Different studies have shown a correlation between counts of *S. mutans* in the oral cavity and both the prevalence and incidence of caries^[2].

Significant investigations have been carried out into the dermatoglyphics indicators of congenital heart disease, leukemia, cancer, celiac disease, intestinal disorders, rubella, embryopathy, schizophrenia as well as other forms of mental illness.

Dermatoglyphic analysis is now beginning to prove itself as an extremely useful tool for preliminary investigations into conditions with a suspected genetic basis. On the other hand, modes of the inheritance patterns of dermatoglyphics traits and characters are hereditary^[7-10].

In our study, a significant difference of P-0.002 for loops and a highly significant difference of P-0.000 for CFU was observed between study and control group and a negative correlation of -0.19 was obtained between loops and Streptococcal bacterial counts.

CONCLUSION

In the present study subjects with decreased frequency of loops showed increased caries incidence and vice versa. Studies on determining the etiology of caries is an ongoing process. Further studies have to be carried out in order to determine the exact molecular basis with regard to the dermatoglyphics and their correlation with the genetic etiology of the dental caries.

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