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Predicting the Association of Dental Caries with Dermatoglyphics Pattern in the Children of Melmaruvathur, Tamilnadu

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ABSTRACT-

AIM: To predict the association of dental caries with dermatoglyphicspattern in the children of Melmaruvathur, Tamilnadu.

MATERIALS AND METHODS: A Total number of 200 children of age group of 4 to 13 years were selected and divided into two groups as caries free group and caries active group with 100 children in each. Midlo and Cummins method were used to record the handprintand DMFT score proposed by Klein et al was used to record the Dental caries**.**

RESULTS: The significant difference in proportions was examined using the Chi-square test. In order to compare means, analysis of variance was used. SPSS version 11.0 is used. The numbers of loops were found to be more in caries – free cases while the numbers of whorls were found to be more in caries – active cases and there was no discernible difference between the groups (p=0.69).

CONCLUSION: The association of dental caries with dermotoglyphic pattern in the children was observed in caries free and caries active children.Dermatoglyphics can be utilised as a non-invasive screening approach for dental caries in children that will allow for early detection and effective preventive care.

KEYWORDS- Dental caries, Dermatoglyphics, whorl, loop and arch pattern

I. INTRODUCTION

The study of skin surface markings is known as dermatoglyphics which is derived from the Greek word derma means skin and glyph means carving[1]. The term Dermatoglyphics was first coined by Harrold Cummins (Father of Dermatoglyphics) along with Midlo[2,3]. Whorls, loops, and arch patterns are among the three main types of ridge patterns according to Gallon[4]. These patterns correlate with the imprints of the hand "Chakra, Shankya and Padma" ridge patterns which is called as "Samudra Shastra" in Ancient India[5].The development of the ridge begins about the 13thweek of prenatallife, and the patterns are finished by the 19thweek[6]. Once developed, these Dermal patterns remains persistent throughout lifeand remains unique for all individuals[1][2].

Grew was the first person to study dermatoglyphics[7]. The dermatoglyphics play an essential role in forensic sciences [8].In India, William Hershelmake use of handprints for the individuals personal identification[5]. The dermal ridges can be used to anticipate genetically associated problems such as Down syndrome, Alzheimer's disease, multiple sclerosis, cleft lip and palate, periodontal diseases, bruxism, and malocclusion because they are genetically determined[9-14].

Dental caries is the multifactorial disease which affects the children worldwide, countless adults. The demineralization of enamel and/or dentin is the result of interactions between the host, agent, and environment[15]. In addition, the lesion's progressive nature might cause pain and make it difficult for the child to speak and masticate the food[16].

The etiopathological causes of dental caries and hereditary factors are interrelated. This explains how dermal ridges and teeth are related to epidermal ridges since they both arise from the same germ layerectoderm between the sixth and seventh weeks of intrauterine life.If any disturbance is seen during this period,it impacts on the interlinked genetic information[17].

In order to predict the relationship between dental caries and dermatoglyphics, this study compared the fingerprint patterns of children with and without dental caries. This inexpensive, non-invasive screening method aids in the primary prevention of caries in paediatric cases, thereby preventing the disease from progressing to an advanced stage and further tooth loss.

II. MATERIALS AND METHODS

The present study was conducted in the children reporting to the Department of Pediatric and Preventive Dentistry in Adhiparasakthi dental college and hospital, Melmaruvathur. Before the study began, the parents and the children were informed of the procedure and their consent was obtained. The ethical clearance of the institution was also acquired.

STUDY DESIGN

The present study was conducted on 200 children between the age group of 4 to 13 years with no systemic disorders. The total sample size were divided into two groups as the caries active group and the caries free group with 100 children in each group. In either group there were 50 males and 50 females. DMFT index was used to record the caries and caries with DMFT/deft score ≥ 1 is included in the caries active group and caries with DMFT/deft score = 0 is included in caries free group. The exclusion criteria of the present study includes mentally or physically handicapped children, children with Cleft lip and palate, patient undergoing orthodontic treatment, children who had skin disorders or trauma to the fingertips, uncooperative children and children whose parents/guardians did not give consent.

METHOD OF COLLECTION OF DATA

Children were selected and divided based on their DMFT/deft scores while evaluating caries for the DMFT/deft index using a sterilised mouth mirror, right angle probe (no. 17), and shepherd probe (no. 23).

METHOD OF RECORDING FINGERPRINT

Midlo and Cummins[18] method was used to record the thumb prints by using Indiana ink (stamp pad) and printing paper.

First, the hands of the children were scrubbed using soap water to remove any dirt and then allowed to dry. After this, the hands of the children were pressed on the stamp pad and the thumb print was recorded on the printing paper which is attached to a hard board to keep the paper firm. Right thumb print was recorded followed by left hand print. The thumb prints were recorded in a single impression and the clarity of the thumb print was evaluated using magnifying lens (X2 magnification).

EVALUATION OF FINGERPRINT

The three patterns of the thumbprints which includes whorl, loop and arch patterns were assessed.

A loop pattern is described as a collection of epidermal ridges that begin on one side of the finger, recurve sharply, and leaveon the same side. It is subdivided into ulnar loop and radial loop based on the bone towards which the loop faces. A whorl pattern is recognised as epidermal ridges that are circular or spiral in shape and have a number of subtypes including concentric whorl, elongated whorl, spiral whorl, double loop whorl, imploding whorl, peacock's eye whorl, composite whorl and variant whorl. In an arch pattern, the epidermal ridges begin on one side of the finger, rise in the middle to form an arch and then depart on the other side. There are two categories of arches: simple or low arch and tented or high arches based on their shapes.

III. STATISTICAL ANALYSIS

The correlation between dental status and dermatoglyphic pattern was evaluated using the chi-square test. In order to compare means, analysis of variance was used. Using SPSS version 11.0 to analyse the data, a p value<0.05 was considered statistically significant.

IV. RESULT

The numbers of loops were found to be more in caries – free group while the numbers of whorls were found to be more in caries – active group [Table 1 and Figure 1]

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Table 1: Distribution of patterns in caries free and caries active group

DESCRIPTION	CARIES FREE	CARIES ACTIVE
WHORL PATTERN	37	54
LOOP PATTERN	74	43
ARCH PATTERN	9	4

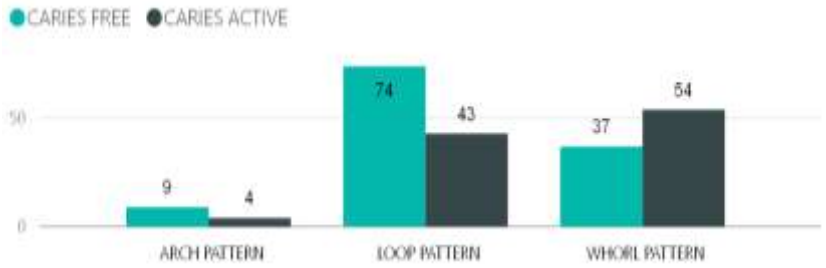

Figure 1: Distribution of patterns in caries free and caries active group

In caries free group, the loop pattern was found to be more in both males and females [Table 2] and loop pattern is also found more in both right and left hand in caries free group [Table 3].

Table 2: Distribution of patterns in caries free group according to gender

DESCRIPTION	MALE	FEMALE
WHORL PATTERN	23	14
LOOP PATTERN	41	33
ARCH PATTERN	3	6

Table 3: Distribution of patterns in caries free group in relation to hand

DESCRIPTION	RIGHT HAND	LEFT HAND
WHORL PATTERN	**31**	**30**
LOOP PATTERN	**70**	**71**
ARCH PATTERN	**9**	**7**

In caries active group , the loop pattern was found to be more in males and whorl pattern is found to be more in females [Table 4 and Figure 2] and whorl pattern is found to be more in both right and left hand in caries active group [Table 5 and Figure 3].

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Table 4: Distribution of patterns in caries active group according to gender

DESCRIPTION	MALE	FEMALE
WHORL PATTERN	24	30
LOOP PATTERN	24	19
ARCH PATTERN	2	2

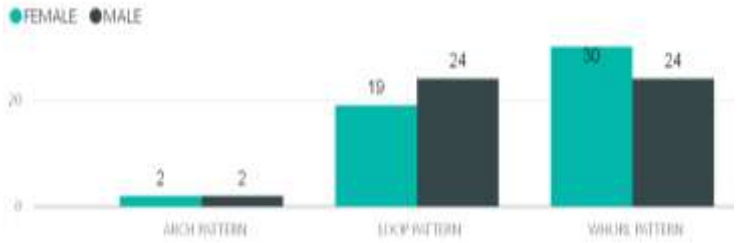

Figure 2: Distribution of patterns in caries active group according to gender

Table 5: Distribution of patterns in caries active group in relation to hand

DESCRIPTION	RIGHT HAND	LEFT HAND
WHORL PATTERN	53	49
LOOP PATTERN	44	45
ARCH PATTERN	4	3

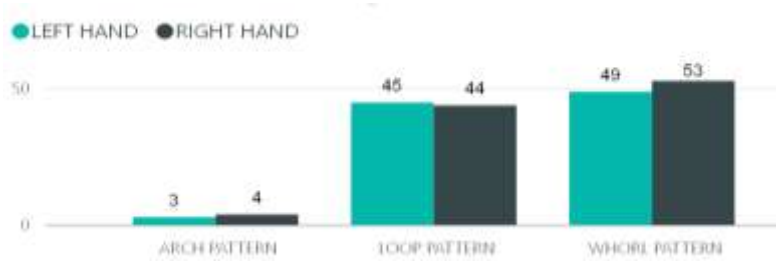

Figure 3: Distribution of patterns in caries active group in relation to hand

On comparing the whorl and loop pattern in caries free and caries active group and there was no statistical significant difference **(p= 0.69**) was found [Table 6].

Table 6: Comparison of no. of whorls and loops in caries-free and caries-active groups

	CARIES FREE			CARIES ACTIVE			P-Value
	SUM	MEAN	STD	SUM	MEAN	STD	
Whorl pattern	37	18.5	32.60	54	27	26.27	0.69
Loop pattern	74	37	45.96	43	21.5	27.57	

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Arch pattern	9	4.5		4	2		

In caries free group, there was no statistically significant difference was found between thumb patterns based on gender and also based on right and left hand [Table 7 and 8]

Table 7: Comparison of whorls and loops pattern in caries – free group according to gender

	MALE			**FEMALE**			**P- Value**
	SUM	MEAN	STD	SUM	MEAN	STD	
Whorl pattern	23	11.5	19.01	14	12	13.86	0.3
Loop pattern	41	20.5	19.01	33	17.6	13.86	
Arch pattern	9	4.5	19.01	6	3	13.86	

Table 8: Comparison of whorls and loops pattern in caries – free group in relation to hand

	RIGHT HAND			**LEFT HAND**			**P- Value**
	SUM	MEAN	STD	SUM	MEAN	STD	
Whorl pattern	53	26.5	26.08	49	24.5	25.48	0.4
Loop pattern	44	22	28.28	45	22.5	29.69	
Arch pattern	4	2		3	1.5		

In caries active group, there was no statistically significant difference was found between thumb patterns based on gender and also based on right and left hand [Table 9 and 10]

Table 9: Comparison of whorls and loops pattern in caries – active group according to gender

	MALE			**FEMALE**			**P- Value**
	SUM	MEAN	STD	SUM	MEAN	STD	
Whorl pattern	24	12	12.7	30	15	14.1	0.9
Loop pattern	24	12	12.7	19	9.5	14.1	
Arch pattern	2	1	12.7	2	1	14.1	

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Table 10: Comparison of whorls and loops pattern in caries – active group in relation to hand

	RIGHT HAND			LEFT HAND			P- Value
	SUM	MEAN	STD	SUM	MEAN	STD	
Whorl pattern	53	26.5	26.08	49	24.5	25.48	0.4
Loop pattern	44	22	28.28	45	22.5	29.69	
Arch pattern	4	2		3	1.5		

V. DISCUSSION

Dental caries is a multifactorial illness that demineralizes the inorganic portion of the tooth as well as destroys the organic material. Dental caries is the most common dental disease seen in children. Thereare various causes for the dental caries [19].One of them is the contribution of genetics. That may be the cause of the same family's comparable pattern of dental caries being passed down through the generations [20].That's why we have to predict the dental caries by using dermatoglyphics.Dermatoglyphics is the study of the patterns of epidermal ridges on the fingers, palms and soles. Dermatoglyphics helps in the early detection of caries.Dermatoglyphics information can be utilised to investigate the genetic propensity of a few disorders, such as dental caries [21].In this study, we used the fingerprint of an individual which has a hereditary predisposition. The dermal patterns in the fingerprint are specific to an individual and are constant throughout their lifetime [22, 23]. Dermatoglyphics was used for evaluating the prevalence of caries in this study.

In this study, the fingerprints of 200 children having whorl pattern and loop pattern were taken to study the caries prevalence. The results indicated that higher number of whorl pattern is seen in caries active group .This results are similar to the study done by DevangAgravat et al (2014)[24] found that there is positive correlation with the whorl pattern and dental caries and Sanghani et al (2016)[25]concluded in his study that there is definite correlation between whorl pattern and dental caries.The number of loop pattern is more in caries free group that is similar to the study of Veeresh et al[26]investigated the correlation between dermatoglyphics, dental caries and salivary pH and concluded that the frequency of loops is more in caries free group and highly decay score is more in the whorl pattern.They also reported that the people with higher DMFT scores(decayed missing filled teeth) had a higher total ridge count.

The result of this study indicated that whorl patterns are more common in caries-active groups and loop patterns are more common in caries-free groups. to the result of Madan N et al (2011) in his study on palmistry concluded that whorl pattern is more in caries group whereas loop pattern is more in non caries group [3].The results that also similar to the result of Ekta Singh et al (2016) – Preschool Children of Lucknow – whorl pattern is more in children with DMFT (<3) and arch pattern seen with DMFT (less than 2)[27].

The total finger ridge count of whorls in children with active caries was very statistically significant, whereas the total finger ridge count of loops in children with inactive caries was highly statistically significant.These findings agreed with the results of Sengupta et al. [28] In this study, it was noted that a correlation between the number of whorls in a pattern and the DMFT score was seen. The findings are consistent with research by Singh et al.[27] and Anitha et al.[29]

In the current study, more whorls were discovered in instances with caries active, whereas more loops were discovered in cases freegroup. The study's findings are comparable to those of research by Bhat et al.[30]and Anitha et al.[29].Also, it is consistent with research conducted by Atasu[31]and Sharma and Somani[32], which showed that individuals without dental caries had more loops and patients with dental caries had a higher frequency of whorls.

In this study, that in whorl pattern, caries active females(mean-15) and right hand(mean-26.5) are the majority and in loop pattern,caries free males(mean-20.5) and left hand(mean-35.5) are the majority,this results are similar to the study done by Bazmi et al.,[33] They found that females with caries had considerably greater whorls and also similar to the study of Sharma et al.[34] investigation into the relationship between dental caries and dermatoglyphics. They found that whorl patterns were more common in caries patients than loop patterns were in non-caries patients. They also observed that the amount of Lactobacilli and

Streptococcus mutans decreased as the number of loops increased, whereas the amount of Lactobacilli and Streptococcus mutants increased as the number of whorls increased.

VI. CONCLUSION

Dermatoglyphics can be used as a non invasive screening method for early detection and to provide proper preventive treatment for dental caries in the children. It serves as an initiation of oral health measures at an early stage because the major challenge in children is always maintaining a good oral hygiene. Dermatoglyphics has proved to be aneconomical, non invasive and useful tool for diagnostic purpose which makes it a great advantage to be used in the children. So we have used Dermatoglyphics in this study to predict the association of dental caries in the children. This study concludes that the frequency of whorl pattern(right hand, female) is more in caries active group and loop pattern(left hand, male) is more in caries free group.

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