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ORIGINAL RESEARCH

Utility of Dermatoglyphic Pattern in Prediction of Caries in Children of Telangana Region, India

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ABSTRACT

Introduction: Dermatoglyphics is an extremely useful tool as a preliminary investigation method for diagnosing suspected genetic disorders. Caries being a multifactorial disease with the influence of genetic pattern, early identification of caries risk children with dermatoglyphics can help in using effective and efficient caries preventive measures.

Aims and objectives: The study was undertaken to record and know the frequency of occurrence of fingerprint patterns among children with caries and in children without caries.

Materials and methods: A total of 400 schoolchildren in the age group of 5 to 12 years were selected from a private school, Warangal, Telangana, India. Of 400 schoolchildren, 200 children were with caries group and 200 children were in caries-free group. Children with dental caries in five or more teeth based on the decayed, missing, filled teeth index performed were considered as study group, and the control group was normal healthy children without any dental caries. The fingerprints of each child were recorded using stamp pad method, and type of dermatoglyphic pattern of each digit was recorded based on Cummins and Midlo method. Data obtained were put for statistical analysis; $p < 0.001$ was considered statistically significant.

Results: Although the frequency of whorl pattern was more prevalent in caries group, it was statistically significant on the left hand third digit of females and on the right hand third digit and the left hand fourth digit of males. Fingerprints of female caries-free group showed maximum of ulnar loop and males showed maximum of arches. There was a decrease in total ridge count in caries group, especially in males.

Conclusion: Dermatoglyphics could be an appropriate method to explore the possibility of a noninvasive and an early predictor for dental caries.

Clinical significance: Dermatoglyphics has a future role in identifying people with or at increased risk for dental caries so that risk reduction measures or earlier therapy may be instituted.

Keywords: Dental caries, Dermatoglyphics, Fingerprints.

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INTRODUCTION

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. It is the most prevalent chronic disease affecting the human race. It is five times more common than asthma and seven times more common than hay fever. It is said that once it occurs, the scars persist throughout life even though the lesion is treated. Nowadays, all experts on dental caries agree that it is a multifactorial disease and also an infectious and communicable disease.[1] There are practically no geographic areas in the world whose inhabitants do not exhibit some evidence of dental caries. It affects both sexes, in all races, all socioeconomic strata, and in every age group, though some people are more prone to it.[2] The cost involved in treating the disease in terms of manpower and the hours spent is enormous. Furthermore, the excruciating pain experienced by the patient can affect the patient as much as esthetic problem it poses. Systemic complications, such as subacute bacterial endocarditis, have also been documented with caries.[3] Caries in infants and young children has long been recognized as a clinical syndrome and described as early as middle of last century.

Beltrami characterized this pattern of early caries in young children in 1930 as "*les dents noire de tout petis*" or literally translated "black teeth of the very young."[4] There are various methods to diagnose early childhood caries. But so far, there is no method to predict the same. The epithelium of finger buds as well as enamel, which is the most susceptible dental tissue to dental caries, has ectodermal origin and both develop at the same time of intrauterine (IU) life. Several studies have shown that dermatoglyphic patterns are genetically determined. Hence, any problem at this particular period will have its effect on both the enamel and on the dermatoglyphic patterns.

Dermatoglyphics – the study of pattern traceries of fine ridges of fingers, palm, and sole – has been a useful tool. It proved important due to the fact that (1) unlike most human tracts, dermal ridges and configurations formed by them are not affected by age; (2) detailed structure of individual ridges is extremely variable; and (3) throughout postnatal life they are not affected by environment.[5] The first "official" mention of fingerprints (1684) was put forward by Dr Nehemiah Grew in his lectures to the Royal College of Physicians of London about the interesting markings found on human fingertips. The first classification of fingerprints was put forward by John E Purkunje, Professor of Anatomy at the University of Breslau in 1823. He classified fingerprints into nine basic patterns. The usage of fingerprints for criminal investigation was first done by Dr Henry Faulds Tsukji Hospital, Tokyo, in 1880. In 1892, Sir Francis Galton, anthropologist, cousin of Charles Darwin, published "Finger Prints," which is one of the landmark publications. If Cummins is the father of dermatoglyphics, Galton is the "inventor." He put forward the first practical method of fingerprint identification responsible for basic nomenclature (arch, loop, whorl).[6-8] Dermatoglyphics is still not considered as an independent field of study, though there are bodies of theories, methods, and applications. It is still considered as an adjunct to other disciplines, serving as a vehicle to resolve broader biomedical problems.

Dermatoglyphics in the present era is proving itself as an important aid for preliminary investigations in conditions with a suspected genetic basis.[3,9] In the present work, the study was undertaken to record and know the frequency of occurrence of fingerprint patterns among children with caries and in children without caries.

MATERIALS AND METHODS

Case Selection

Details of the Pilot Study

A pilot study was conducted to determine the sample size of the study population based on the results obtained and to check the feasibility of the study and note any difficulties encountered during the examination. This pilot study helped in exacting the predesigned pro forma and to make modifications wherever necessary to design the final pro forma. The pilot study subjects were not included in the main study. After conducting the pilot study, the prevalence of caries was assessed and the sample size was attained as follows:

$$N = \frac{Z^2 \times P\,(1-P)}{d^2}$$

D is the precision = 5%

P is the prevalence = 15%

Z is the level of confidence = 95%

The sample size is estimated to be 196, which can be approximated to 200.

Children in the age group of 5 to 12 years were examined and the decayed, missing, filled teeth (DMFT) recording was done with mouth mirror by natural illumination. In the study, 400 patients (200 controls + 200 tests) participated. School principal gave permission to conduct the study, and ethical clearance was obtained from ethical review committee of the institution. A week before the study, parents were intimated. Assurance was given that children's fingerprint will be maintained confidentially and used only for this study. After taking permission, children were included in the study. A sample number was designated for each child and that same number was used for identification on their recording sheet and separate sheet was used to write DMFT index along with their sample number. The study group included children with dental caries in five or more teeth based on DMFT index and control group consisted of children without any dental caries.

Inclusion Criteria

Children with dental caries among age group of 5 to 12 years were selected from Shine High School, Warangal, Telangana, India, for the study.

Exclusion Criteria

Children with skin disorders, systemic disease, physical and mental incompatibility, and uncooperative patients were excluded from the study.

Dermatoglyphic Pattern Recording and Interpretation

Recording of fingerprint patterns of the study subject was achieved with a rolling impression technique using printer's ink, as similarly done by Tikare et al.[10] To avoid duplication of fingerprints, the fingers were numbered from 1 to 5 for left little finger to the thumb, and from 6 to 10 for right thumb to right little finger of the hand

respectively. The hands were cleaned with soap and water and then scrubbed thoroughly with an antiseptic lotion (Savlon) and allowed to dry. This was done to enhance the quality of fingerprints by removing sweat and dirt from the skin surface.

The ink stamp pad method was used to record the handprints. First, handprints of four digits were taken together. Thumb does not provide proper prints since humans have an opposable thumb, thus a different spatial orientation with other fingers. Hence, thumbs were recorded separately.

The fingerprints were then verified and the whole procedure was repeated to ensure proper recording of the fingerprints. The obtained dermatoglyphic patterns for fingertips, i.e., presence of arches, loops, and whorls, were assessed with the help of magnifying glass (×10) with respect to available standards and data were tabulated.

Total Ridge Count

The total ridge count was done by marking two landmarks that are "core" and "triradii" of the pattern. The ridges crossing core and triradii were counted, whereas the ridges terminating prior to touching the line were excluded from the study. The ridges of core and triradii were not included. If a ridge bifurcates before reaching the line, they are counted as two ridges.

RESULTS

This study was undertaken to evaluate the fingerprint patterns of patients diagnosed with dental caries and caries-free children. A total of 400 schoolchildren were included in the study after obtaining informed consent for participation in the study. Among caries group, 115 (58%) were boys and 85 (42%) were girls and similarly 115 (58%) were boys and 85 (42%) were girls in the control group. Chi-square test was done to know the frequency of fingerprint pattern in each digit of boys and girls in caries and caries-free group. Mann–Whitney U test was used to evaluate the fingerprint patterns among caries and control group; p-value (<0.001) was calculated, and the results obtained were tested for statistical significance.

Fingerprint Pattern in Boys

In caries group of boys on the left fourth digit, 79.1% had whorls, 14.8% had ulnar loop, 5.2% had arch, and 0.9% had radial loop, whereas caries-free group of boys showed 31.3% of arch, 30.4% of ulnar loop, 22.6% of radial loop, and 15.7% of whorls, which was statistically significant (<0.001). On the left third digit of caries group of boys, 33.9% had whorls and ulnar loop, 13.1% had radial loop, and 19.1% had arch, whereas caries-free group of boys showed 27% and 22.6% of whorls and ulnar loop, 38.3% of arch, and 12.2% of radial loop, which was not statistically significant (0.012); 30.4% of caries group boys and 22.6% caries-free group of boys had whorls and ulnar loop on left second digit. However, it was statistically not significant (0.01) (Table 1).

In caries group of boys on the left second digit, 30.4% had whorls, 27.0% had ulnar loop, 27.8% had arch, and 14.8% had radial loop, whereas caries-free group of boys showed 48.7% of arch, 22.6% of ulnar loop, 10.4% of radial loop, and 18.3% of whorls, which was statistically not significant (0.01). In caries group of boys on the left first digit, 33.0% had whorls, 23.5% had ulnar loop, 27% had arch, and 16.5% had radial loop, whereas caries-free

Table 1: Frequency of fingerprint pattern in boys

Digit	Fingerprint pattern	Caries group n (%)	Caries-free group n (%)	p-value
Left 4th digit	Whorls	91 (79.1)	18 (15.7)	<0.001
	Ulnar loop	17 (14.8)	36 (30.4)	
	Radial loop	1 (0.9)	26 (22.6)	
	Arch	6 (5.2)	35 (31.3)	
Left 3rd digit	Whorls	39 (33.9)	31 (27.0)	0.012
	Ulnar loop	39 (33.9)	26 (22.6)	
	Radial loop	15 (13.1)	14 (12.2)	
	Arch	22 (19.1)	44 (38.3)	
Left 2nd digit	Whorls	35 (30.4)	21 (18.3)	0.01
	Ulnar loop	31 (27.0)	26 (22.6)	
	Radial loop	17 (14.8)	12 (10.4)	
	Arch	32 (27.8)	56 (48.7)	
Left 1st digit	Whorls	38 (33.0)	17 (14.8)	0.024
	Ulnar loop	27 (23.5)	27 (23.5)	
	Radial loop	19 (16.5)	19 (16.5)	
	Arch	31 (27.0)	52 (45.2)	
Left thumb	Whorls	33 (28.7)	18 (15.7)	0.22
	Ulnar loop	27 (23.5)	33 (28.7)	
	Radial loop	24 (20.9)	20 (17.4)	
	Arch	31 (27.0)	44 (38.3)	
Right 4th digit	Whorls	38 (33.0)	28 (24.3)	0.087
	Ulnar loop	29 (25.2)	24 (20.9)	
	Radial loop	18 (15.7)	17 (14.8)	
	Arch	30 (26.1)	46 (40.0)	
Right 3rd digit	Whorls	87 (75.7)	9 (7.8)	<0.001
	Ulnar loop	19 (16.5)	29 (25.2)	
	Radial loop	5 (4.3)	12 (10.4)	
	Arch	4 (3.5)	65 (56.5)	
Right 2nd digit	Whorls	39 (33.9)	15 (13.0)	0.096
	Ulnar loop	23 (20.0)	44 (38.3)	
	Radial loop	21 (18.3)	12 (10.4)	
	Arch	32 (27.8)	44 (38.3)	
Right 1st digit	Whorls	26 (22.6)	16 (13.9)	0.284
	Ulnar loop	36 (31.3)	35 (30.4)	
	Radial loop	17 (14.8)	24 (20.9)	
	Arch	36 (31.3)	40 (34.8)	
Right thumb	Whorls	34 (29.6)	21 (18.3)	0.237
	Ulnar loop	33 (28.7)	34 (29.6)	
	Radial loop	14 (12.2)	15 (13.0)	
	Arch	34 (29.6)	45 (39.1)	

group of boys showed 45.2% of arch, 23.5% of ulnar loop, 16.5% of radial loop, and 14.8% of whorls, which was statistically not significant (0.024). In caries group of boys on left thumb, 28.7% had whorls, 23.5% had ulnar loop, 27% had arch, and 20.9% had radial loop, whereas caries-free group of boys showed 38.3% of arch, 28.7% of ulnar loop, 17.4% of radial loop, and 15.7% of whorls, which was statistically not significant (0.22). On the right fourth digit of boys in caries group, 33% had whorls, 25.2% had ulnar loop, 15.7% had radial loop, and 26.1% had arch; 24.3% of whorls, 20.9% of ulnar loop, 14.8% of radial loop and 40% of arch were noticed in caries-free group. However, it was statistically not significant (0.087).

However, there was significant difference noticed on the right third digit; 75.7% caries group had whorls, 16.5% had ulnar loop, 4.3% had radial loop, 3.5% had arches and in caries-free group, 7.8% had whorls, 56.5% had arch, 10.4% had radial loop, and 25.2% had ulnar loop. On the right second digit of boys in caries group, 33.9% had whorls, 20% had ulnar loop, 18.3% had radial loop, and 27.8% had arch; 13% of whorls, 38.3% of ulnar loop, 10.4% of radial loop, and 38.3% of arch were noticed in caries-free group. However, it was statistically not significant (0.096).

On the right first digit, 31.3% had arch and ulnar loop pattern, 22.6% had whorls, and 14.8% had radial loop in caries group of boys, whereas in caries-free group, 34.8% had arch, 30.4% had ulnar loop, 13.9% had whorls, and 20.9% had radial loop, which was statistically not significant (0.284); 29.6% of arch and whorls, 28.7% of ulnar loop, and 12.2% of radial loop was seen on the right thumb of caries group, whereas in caries-free group, 39.1% had arch, 29.6% had ulnar loop, 18.3% had whorls, and 13% had radial loop. However, it was statistically not significant (0.237).

Fingerprint Pattern in Girls

In caries group of girls on the left fourth digit, 23.5% had whorls, 38.8% had ulnar loop, 16.5% had radial loop, and 21.2% had arch, whereas in caries-free group 10.6% had whorls, 49.4% had ulnar loop, 7.1% had radial loop, and 32.9% had arch, which was statistically not significant (0.014) (Table 2).

On the left third digit of caries group of girls, 72.9% had whorls, 17.6% had ulnar loop, 0% had radial loop, and 9.4% had arch; 47.1% of ulnar loop, 25.9% of arch, 24.7% of whorls, and 2.4% radial loop were seen in caries-free group, which was statistically significant. On the left second digit of caries group of girls, 22.4% had whorls, 35.3% had ulnar loop, 15.3% had radial loop, and 27.1% had arch; 54.1% of ulnar loop, 15.3% of arch, 23.5% of whorls, and 7.1% radial loop were seen in caries-free group, which was statistically not significant (0.033).

Table 2: Frequency of fingerprint pattern in girls

Digit	*Fingerprint pattern*	*Caries group n (%)*	*Caries-free group n (%)*	*p-value*
Left 4th digit	Whorls	20 (23.5)	9 (10.6)	0.014
	Ulnar loop	33 (38.8)	42 (49.4)	
	Radial loop	14 (16.5)	6 (7.1)	
	Arch	18 (21.2)	28 (32.9)	
Left 3rd digit	Whorls	62 (72.9)	21 (24.7)	<0.001
	Ulnar loop	15 (17.6)	40 (47.1)	
	Radial loop	0 (0.0)	2 (2.4)	
	Arch	8 (9.4)	22 (25.9)	
Left 2nd digit	Whorls	19 (22.4)	20 (23.5)	0.033
	Ulnar loop	30 (35.3)	46 (54.1)	
	Radial loop	13 (15.3)	6 (7.1)	
	Arch	23 (27.1)	13 (15.3)	
Left 1st digit	Whorls	28 (32.9)	26 (30.6)	<0.001
	Ulnar loop	16 (18.8)	46 (54.1)	
	Radial loop	20 (23.5)	2 (2.4)	
	Arch	21 (24.7)	11 (12.9)	
Left thumb	Whorls	33 (38.8)	35 (41.2)	<0.001
	Ulnar loop	15 (17.6)	45 (52.9)	
	Radial loop	15 (17.6)	0 (.0)	
	Arch	22 (25.9)	5 (5.9)	
Right 4th digit	Whorls	26 (30.6)	35 (41.2)	<0.001
	Ulnar loop	22 (25.9)	37 (43.5)	
	Radial loop	17 (20.0)	0 (.0)	
	Arch	20 (23.5)	13 (15.3)	
Right 3rd digit	Whorls	29 (34.1)	4 (4.7)	<0.001
	Ulnar loop	20 (23.5)	60 (70.6)	
	Radial loop	17 (20.0)	4 (4.7)	
	Arch	19 (22.4)	17 (20.0)	
Right 2nd digit	Whorls	26 (30.6)	7 (8.2)	<0.001
	Ulnar loop	22 (25.9)	49 (57.6)	
	Radial loop	15 (17.6)	0 (.0)	
	Arch	22 (25.9)	29 (34.1)	
Right 1st digit	Whorls	31 (36.5)	7 (8.2)	<0.001
	Ulnar loop	18 (21.2)	41 (48.2)	
	Radial loop	11 (12.9)	22 (25.9)	
	Arch	25 (29.4)	15 (17.6)	
Right thumb	Whorls	32 (37.6)	33 (38.8)	<0.001
	Ulnar loop	20 (23.5)	38 (44.7)	
	Radial loop	11 (12.9)	13 (15.3)	
	Arch	22 (25.9)	1 (1.2)	

However, on the left first digit of caries group, 32.9% had whorls, 18.8% had ulnar loop, 23.5% had radial loop, and 24.7% had arch. In caries-free group, 54.1% had ulnar loop, 30.6% had whorls, 12.9% had arch, and 2.4% had radial loop, which was statistically significant. The left thumb of caries group of girls showed increase in frequency of whorls (38.8%), arch (25.5%), followed by ulnar loop and radial loop (17.6%); 41.2% of whorls, 52.9% of ulnar loop, 5.9% of arch, and 0% of radial loop were noticed in caries-free group, which was statistically significant. In caries group of girls on the right fourth

digit, 30.6% had whorls, 25.9% had ulnar loop, 20% had radial loop, and 23.5% had arch.

In caries-free group, 43.5% had ulnar loop, 41.2% had whorls, 0% had radial loop, 15.3% had arch, which was statistically significant. On the right third digit of caries group of girls, 34.1% had whorls, 23.5% had ulnar loop, 20% had radial loop, and 22.4% had arch; 70.6% of ulnar loop, 20% of arch, 4.7% of whorls, and 4.7% radial loop were seen in caries-free group, which was statistically significant. On the second right digit of caries group, 30.6% whorls, 25.9% ulnar loop and arch, and 17.6% radial loop were seen.

In caries-free group of girls, 57.6% had ulnar loop, 34.1% had arch, 8.2% had whorls, and 0% had radial loop, which was statistically significant. On the right first digit of caries group, 36.5% had whorls, 21.2% had ulnar loop, 12.9% had radial loop, and 29.4% had arch. In caries-free group, 48.2% had ulnar loop, 8.2% had whorls, 17.6% had arch, and 25.9% had radial loop, which was statistically significant.

The right thumb of caries group of girls showed increase in frequency of whorls (37.6%), arch (25.9%), followed by ulnar loop (23.5%) and radial loop (12.9%); 38.8% of whorls, 44.7% of ulnar loop, 15.3% of radial loop, and 1.2% of arch noticed in caries-free group, which was statistically significant.

Mean and Standard Deviation of Caries and Caries-free Group (Mann–Whitney U test)

The mean of whorls was 2.83 ± 1.36 standard deviation (SD) in caries group, whereas the mean of whorls was 2.02 ± 1.34 SD in caries-free group, which was statistically significant. The mean of ulnar loop was 3.04 ± 1.52 SD in caries group (Table 3).

The mean of ulnar loop was 3.63 ± 1.91 SD in caries-free group, which was statistically significant ($p < 0.001$). The mean of radial loop was 1.42 ± 1.11 SD in caries group and the mean of radial loop was 1.22 ± 1.10 SD in caries-free group, which was statistically not significant (p-value 0.068). The mean of arch in caries group was 2.71 ± 1.32 SD and the mean of arch in caries-free group was 3.13 ± 2.04 SD in caries-free group, which was statistically not significant (p-value 0.048).

Table 3: Mean and SD of caries and caries-free group (Mann–Whitney U test)

Fingerprint pattern	*Group*		
	Caries	Caries-free	
	Mean ± SD	Mean ± SD	*p-value*
Whorls	2.83 ± 1.36	2.02 ± 1.34	<0.001
Ulnar loop	3.04 ± 1.52	3.63 ± 1.91	<0.001
Radial loop	1.42 ± 1.11	1.22 ± 1.10	0.068
Arch	2.71 ± 1.32	3.13 ± 2.04	0.048

Table 4: Total ridge count

Group	*Percentage*
Caries males	21
Caries females	27
Caries-free males	29
Caries-free females	23

Total Ridge Count

The total ridge count in caries males was 21%, in caries females was 27%, caries-free females was 23%, and caries-free males was 29%. Caries group showed decreased total ridge count especially in males than caries-free group (Table 4).

DISCUSSION

For many years, the fingerprints have caught the interest of various scholars, laymen, and doctors. The interpretation of palms has gone through various phases like popular image of traditional palmist interpreting incantation language to various scientific research. Palm prints have proven to be a powerful tool in the diagnosis of various medical disorders.[11]

Congenital abnormalities and IU anomalies can be detected with the help of dermatoglyphics. Fingerprints are oral health markers that can detect the genetic predisposition of children to dental caries. This is due to genetic inheritance with morphology of tooth, flow, and pH of saliva and enzymes of saliva.

The epidermal ridges of hands and facial structures are formed from ectoderm during 6 to 9 weeks of IU life. Hence, any changes that influence genetic and environmental factors responsible for causing dental caries may also cause change in fingerprint pattern.[12]

Fingerprints are unique and are based on the genetic characteristics of each individual. These dermal patterns once formed remain constant throughout life. The pathogenesis of caries process is rather well understood today, and caries attack rate in humans is a consequence of various attributes. Genetically regulated process is identified as contributing to caries incidence including tooth eruption, tooth morphology, density, or structural integrity of the enamel, composition of the secretion of salivary glands and salivary flow, the immune response, and reduction in the clearance of the bacteria.[13]

Dental caries demonstrates the graded continuous variation pattern, where sharp distinction between the average and high afflictions is not possible. Henceforth, only two extreme differences, such as "no caries" and caries on "three or more teeth" may be expected to demonstrate noticeable variation. Hence, the subjects in our group were divided into caries and caries-free group. Children with syndrome were not included in the study

as they have a peculiar pattern, and oral hygiene maintenance is difficult in them as compared with healthy individuals.

The age group of 5 to 12 years was chosen to have a larger children base. Similar age group was selected by Vijender et al.[11] In this study, dermatoglyphic data were collected in accordance with the method given by Cummins and Midlo by rolling impression technique using ink stamp, as prescribed by the Kentucky State Police, USA. Another method of recording fingerprint is by taking alginate impression of hands and pour it in dye stone. However, this method is expensive. Scanners, biometric machines, and photographs are the other methods of recording fingerprints.[10]

Fingerprint sample and DMFT score were recorded separately and the examiner was blinded. To reduce interexaminer variability, a single examiner did reading of all fingerprints. In this present study, frequency of whorl pattern was more in both males and females caries group. However, the frequency of whorl was more on the right third digit of males and on the left third digit of females. Our findings are in accordance with the study conducted by Madan et al,[14] where whorls were seen more on the right third digit of males and on the left third digit of females.

Similar study conducted by Vijender et al[11] showed increased frequency of whorls and decreased frequency of loops in caries-free group. There was an increase in frequency of arch noted in caries-free group of boys and an increase in frequency of ulnar loop noted in caries-free group of girls. These findings are in accordance with the study conducted by Madan et al[14] where there was an increase in frequency of ulnar loop followed by whorl; arch and loop were noted in caries-free girls and arch pattern was noted in boys.

Similar study conducted by Vijender et al[11] showed increased frequency of loop in caries-free group, which was statistically significant. A study conducted by Bhat et al[15] among deaf and mute children showed the frequency of whorls to be more in caries group and loops in caries-free group. Similar study conducted among deaf and mute school children from Punjab showed an increased frequency of whorls in caries group.[16]

Abhilash et al[17] concluded that dental caries susceptibility of an individual increased with incidence of whorl pattern and decreased with incidence of loop pattern. Individuals with high resistance to dental caries had a specific immunoglobulin within saliva conveying immunity by lysing the cariogenic bacterial cells. It was suggested that this phenotype was inherited and transmitted as an autosomal dominant trait. Several reports and studies also had shown significant heritability for several microorganisms, including streptococci. Thus, genes and genetic abnormalities that lead to abnormal structural organization of teeth and its environment lead to increased susceptibility to dental caries. Few studies have also reported that study subjects with dental caries had lower frequency of loops and higher growth of *Streptococcus mutans* as compared with control group.[12]

The quantitative analysis of total ridge count was more in caries-free children than caries group. Similar findings were noticed in a study conducted by Atasu[18] and Madan.[14]

Limitations of the Study

Only one school from Warangal was considered, whereas large sample size would show more accurate results. It is difficult to say if genetic or environmental factor plays a dominating role in caries occurrence.

CONCLUSION

Based on our study, the results suggest that specific fingerprint pattern can be used for screening of dental caries and for guiding future research. Dermatoglyphics could be an appropriate method to explore the possibility of a noninvasive and an early predictor for dental caries.

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