Study of Fingerprints in Relation to Dental Caries

Maitrayee Dutta Swargiary[1], Bhanukul Barman[2]

[1]Assistant Professor, Assam Don Bosco University, Tapesia Gardens, Sonapur,
[2]B.Sc 4th Semester, Science College, Kokrajhar

Abstract

Fingerprints of 40 individuals of age group 4-18 years were sampled from Agyaram Kherbari L.P. School, D. L. P School and J.N. M. E school (Dhubri District) to study the pattern of fingerprints and their relation with dental caries as they may be associated with the disease and serve as a predictor for early detection of it. Analysis was carried out in the affected individuals and it was found that the per centage of ulnar loop is highest (23.75%) in females and also in males (19.7%) and per centage of lateral loop is lowest (1.25% and 1.24%), whereas the control had more per centage of ulnar loop in both males and females. The study shows an association of dermatoglyphic pattern of fingerprints and prevalence of dental caries.

Key Words: *Fingerprint patterns, Dental caries*

Introduction

Fingerprints are impressions of skin ridges which are formed in the early embryonic life and remain permanent in each and every person including twins throughout life except changes during serious accidents. The physical attributes and its functions serve to identify a person and serve as a visible marker to predict different diseases. Fingerprints can be acquired from the fingers, toes, palm of hands and soles of feet and deployed in forensic as well as non forensic applications including identification and association of different diseases such as Diabetes mellitus, hypertension, congenital heart disease etc., from the authentication based on individual peculiarities and their unique individual specificity [12,7,8].They are heritable and noted to play a significant role in human biology, research, medical field to study leukemia, breast cancer, in the field of dentistry, etc. Fingerprints can be a diagnostic tool in various pathologies of oral cavity and serve as a useful tool for preliminary investigations as it is heritable. Dactylography is a powerful diagnostic tool for fingerprint analysis to study psychological, medical and genetic conditions of individual. Since it is heritable it can be considered as a window for congenital abnormalities and an indicator of future diseases and one of the best available diagnostic tools to study genetic disorders. Due to their macrofeatures they can be classified variously and the important ones are arch, whorl, loops and composite types because the ridges are differentiated in their definitive form during third to fourth month of the fetal life which remains permanent throughout the whole life. The development of fingerprints is under genetic control and dermatoglyphics shows clear resemblance among related persons. Since dermatoglyphic features are genetically determined it can be now used as a tool to diagnose genetic disorders and to evaluate the relationship between different diseases whose relation may probably help us to identify an individual with high risk of developing a disease. As every part of the body is unique and synchronous with different parts, the distinctive fingerprint pattern can be a potential diagnostic tool for preliminary investigations for studying various diseases. It can be used as a screening tool for identifying patients who are likely to develop disease. Since different genes influence the enamel by its chemistry or morphology, fingerprints can be considered as an indicator of dental abnormalities [10, 13] So the present study was carried out for studying the dermatoglyphic patterns of fingerprints of different age groups and to find the association of dermatoglyphic patterns with dental caries

Corresponding Author:
Dr. Maitrayee Dutta Swargiary,
Assistant Professor, Department of Life Science,
Assam Don Bosco University, Tapesia Gardens,
Sonapur- 782402
Email: maitrayee.zoo@gmail.com

Material & Method

A total number of 40 school students in the age group of 4-18 years were selected from Agyaram Kherbari L.P. School, D. L. P School and J.N.M. E School (Dhubri District). A tabular chart was prepared before taking the fingerprint and clean finger imprints was taken for both hands on an A4 size paper by using a stamp pad for the Ink Method [3]. Sample fingerprints was then dried and studied with a magnifying lens with prior reference to identify the fingerprints. The fingerprint patterns were then classified according to the topological method [5, 3] for fingerprint identification.

Results

Among the 40 students, 20 students suffered from dental carries, out of which 10 were control girls and 8 were affected girls, and 7 were control males and 12 were affected males.

Fingerprints in control students

Table 1. establishes that in all control students, the highest per centage of fingerprint pattern in both hands was observed for radial loops (30.5%), followed by ulnar loop (28.5%), plain whorl (8%), double cored, plain whorl (7.5%), double loop (5.5%), spiral whorl (5%), tented arch (4.5 %), plain arch (3.5%), central pocket loop whorl (2.5%), elliptical whorl (1.5%), lateral pocket loop (1%) and accidental whorl (1%). The left hand shows a higher per centage (30.5 %) radial loop count in control and the ulnar loop count is 28.5% for right hand.

Fingerprints in affected students

The highest per centage of fingerprint pattern as shown in **Table 1.** for both hands was observed for ulnar loop (21%), followed by radial loop (20%), spiral whorl (18.5%), double cored whorl (9%), elliptical whorl (8%), plain arch (7.5%), plain whorl (7%), double loop (4.5%), tented arch (2%), central pocket loop whorl (2%) and lateral pocket loop (0.5%) in affected students. The left hand shows a less per centage (20 %) radial loop count in affected individuals results with no occurrence of radial loop. The right hand shows highest ulnar loop count (28.5%) and in affected the count is 21 %.

The fingerprint patterns of affected female and male students are graphically represented in **Fig.1** and **Fig. 2. Table 1.** also shows the fingerprint per centage of control female and affected female.

Fingerprints in control female students

The fingerprints of control female in **Table 2.** shows radial and ulnar loop (28%), plain whorl (11%), double cored whorl and tented arch (7%), spiral whorl (5.4%), double loop (3.9%), central pocket loop whorl and plain arch (3%), accidental whorl (1.54%) and lateral pocket loop (1.54%), elliptical whorl (0.8%).

Fingerprints in affected female students

The fingerprints of affected female shows ulnar loop (23.75%), radial loop (22.5%), spiral whorl (17.5%), plain arch (10%), double cored whorl (8.75%), plain whorl (6.5%), tented arch (3.75%), double loop (2.5%), central pocket loop whorl (1.25%), lateral pocket loop (1.25%). However accidental whorl is not observed in affected female (**Table 2)**.

Fingerprints in control male students

As observed in **Table 2** in control male the highest per centage of fingerprint is found in radial loop (35.72%), followed by ulnar loop (30%), double cored whorl (8.57%), double loop (8.6%), spiral whorl (4.2%) and plain arch (4.2%), plain whorl (2.85%) and elliptical whorl (2.85 %), central pocket loop whorl (1.43%). However, accidental whorl and tented arch is not observed in control male.

Fingerprints in affected male students

In affected male ulnar loop is found to be highest (19.17%), followed by radial loop (18.33%), spiral whorl (19%), elliptical whorl (13%), double cored whorl (9%), plain whorl (6.67%), double loop (5.9%), plain arch (5.9%), central pocket loop whorl (2.5%), tented arch (0.84%). Accidental whorl is not observed (**Table 2)**.

Table 1 - Comparative study of fingerprint patterns of control and affected students

Sl. No	Fingerprint patterns	Left Hand				Right Hand				Both Hands			
		No of Control	Control (%)	No of Affected	Affected (%)	No of Control	Control (%)	No of Affected	Affected (%)	No of Control	Control (%)	No of Affected	Affected (%)
1	Radial loop	61	30.5	40	20	0	0	0	0	61	30.5	40	20
2	Ulnar loop	0	0	0	0	57	28.5	42	21	57	28.5	42	21
3	Lateral pocket loop	1	0.5	0	0	1	0.5	1	0.5	2	1	1	0.5
4	Double loop	4	2	6	3	7	3.5	3	1.5	11	5.5	9	4.5
5	Plain whorl	7	3.5	5	2.5	9	4.5	9	4.5	16	8	14	7
6	Spiral whorl	7	3.5	20	10	3	1.5	17	8.5	10	5	37	18.5
7	Double cored whorl	7	3.5	11	5.5	8	4	7	3.5	15	7.5	18	9
8	Elliptical whorl	0	0	5	2.5	3	1.5	11	5.5	3	1.5	16	8
9	Central pocket loop whorl	2	1	1	0.5	3	1.5	3	1.5	5	2.5	4	2
10	Accidental whorl	1	0.5	0	0	1	0.5	0	0	2	1	0	0
11	Plain arch	4	2	9	4.5	3	1.5	6	3	7	3.5	15	7.5
12	Tented arch	6	3	3	1.5	3	1.5	1	0.5	9	4.5	4	2

Table 2. Comparative study of fingerprint patterns of control and affected female and male students

Sl. No	Fingerprint patterns	Difference in percentage					
		Normal individuals (%)	Affected individuals (%)	Normal Female (%)	Affected Female (%)	Normal Male (%)	Affected Male (%)
1	Radial loop	30.5	20	28	22.5	35.72	18.33
2	Ulnar loop	28.5	21	28	23.75	30	19.17
3	Lateral pocket loop	1	0.5	1.54	1.25	0	0
4	Double loop	5.5	4.5	3.9	2.5	8.6	5.9
5	Plain whorl	8	7	11	6.5	2.85	6.67
6	Spiral whorl	5	18.5	5.4	17.5	4.2	19

Cont.... **Table 2. Comparative study of fingerprint patterns of control and affected female and male students**

7	Double cored whorl	7.5	9	7	8.75	8.57	9
8	Elliptical whorl	1.5	8	0.8	0	2.85	13
9	Central pocket loop whorl	2.5	2	3	1.25	1.43	2.5
10	Accidental whorl	1	0	1.54	0	0	0
11	Plain arch	3.5	7.5	3	10	4.2	5.9
12	Tented arch	4.5	2	7	3.75	0	0.84

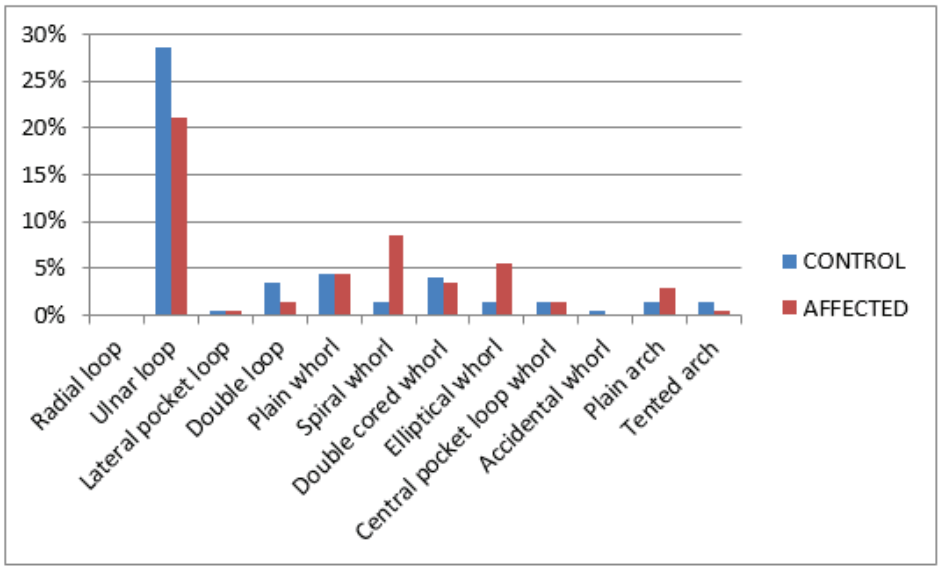

Fig. 1. Study of fingerprints of control and affected females.

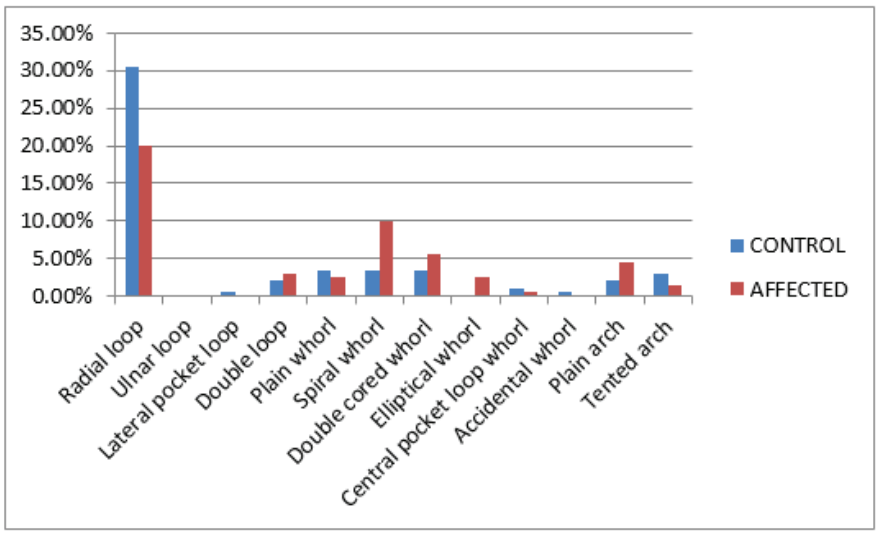

Fig. 2. Study of fingerprints of control and affected males.

Discussion

Our study reveals, the fingerprint patterns varied among the students affected with dental caries. The loop pattern of fingerprint was found to be the highest and more prevalent in students having dental caries [9, 11] compared to fingerprint patterns in normal unaffected students. This study also clarifies that among the loops, ulnar loop (21%) was the most prevalent.

As per our findings per centage of loops are followed by whorls in affected individuals and our study is in contrast to the other observations [6, 4] wherein, prevalence of dental carries was highest among students with whorl pattern compared to other fingerprints.

In this study the left hand of individuals showed a higher per centage (30.5%) radial loop count in control compared to affected individuals (20%) with no occurrence of radial loop in the left hand. The results are in accordance with workers [11] who also found radial loops among the control and the results are also at par with some similar works [2] as more number of radial loops is considered as a negative indicator for dental caries. The right hand however, shows highest ulnar loop count (28.5%) in control individuals and lowest in affected (21 %) individuals, which may indicate that the radial loops are more abundant in left hand compared to right hand. Our study also reveals higher percentage of ulnar loops (21 %) compared to radial (20%) when both hands are compared and ulnar loop fingerprint pattern can be a predictor for dental carries which however contradicts certain results [2] where it was found that whorl pattern shows positivity for dental caries prediction.

Comparative study between normal female and affected female also shows more number of ulnar loops (23.75%) in students affected with dental caries compared to normal females who had equal per centages of radial loop (28%) and ulnar loop (28%). The results of this study also shows similarity with the affected males with the highest per centage of ulnar loop (19.17%) followed by radial loop (18.33%) compared to control males with radial loop (35.72%).Thus ulnar loops may be an indicator to assess the susceptibility of an individual to dental carries.

Comparative studies also show a difference in the per centage of whorl fingerprint pattern. Spiral whorl pattern has a difference in which the per centage of affected is more (37%) and in case of normal it is very less (5%). Similarly, elliptical whorl for affected is 8% and for normal it is 3%, accidental whorl is present in unaffected individuals but is absent in affected individuals. Our result corroborates the results [2] which established the prevalence of dental caries with whorl pattern.

Conclusions

It is hereby concluded from our research that

1. Frequency distribution of fingerprint patterns among normal students differs from affected students.

2. Frequency of ulnar loop pattern is more prevalent followed by radial loop pattern in individuals with dental caries, with no occurrence of accidental whorls. This may serve as a predictor between fingerprint patterns and dental caries. The frequency of ulnar loop is more in right hand compared to left hand followed by the radial loop pattern. More radial loops are a negative indicator for dental caries. Spiral whorls can also be a predictor for dental caries as it is followed by the ulnar loop in affected individuals.

3. Out of the 40 individuals, 10 males and 10 females were affected which may indicate equal occurrence in both and this might be genetical or oral hygiene in the age groups of 6-14 years students which however, require further study.

4. Thus dermatoglyphics gives a hope in the prediction of dental caries much before its initiation giving a sufficient time to implement preventive measures. So further studies is required to be carried out in the field of medicine with their related genetical studies and more comparative studies with large samples

Conflict of Interest: None Declared.

Source of Support: Nil

Ethical Clearance- Taken from Biosafety Committee

References

1. Agarwal S, Rajput S, Kalburgi V, Thakur S. Journal of Orofacial Research. 2015: 5(4): 134-137
2. Agravat D, Agarwal N, Patel P. Dermatoglyphics: A Tool for Dental Caries Prediction, Journal of Advanced Medical and Dental Sciences Research. 2014; Vol. 2(3): 66-69
3. Cummins. Revised methods of interpretation and formulation of palmar dermatoglyphics. American

Journal of Physical Anthropology. 1929; 12: 415-502

4. Chinmaya BR**,** BV Smitha**,** Shourya T**,** Charu K. Dermatoglyphics: An indicator of dental caries in humans. 2016; Vol. 14 (3): 272-275
5. Galton F. Finger Prints. London: Macmillan and Co. 1892; p. 3-5
6. Khokhar V, Ghavri T, Pathak A. Dermatoglyphics Interpretation of Dental Caries: An In Vivo Study Int J Dent Med Res. 2014; Vol 1(6), pp: 54-56
7. Lakshmi P.J, Thenmozhi R. (A Short Review on Dermatoglyphics. Journal of Pharmaceutical Sciences and Research. 2014. Vol. 6(4): 200-202
8. Madhura MG. Dermatoglyphics in oral diseases – A review, Int J Cur Res Rev. 2015; Vol 7(7):72-74
9. Madhusudan K, Patel HP, Umesh K, Chavan S, Patel R, Rajesh GN. Relationship between dermatoglyphics, Chiloscopy and Dental Caries among dental students of Visnagar town, Gujarat. International Journal of Advanced Research. 2015; Vol. 3(7): 952-959
10. Narang D, Das A , Kumar P, Sahani M, Tripathi V, Sur J, et al. Dermatoglyphics (finger prints) as predilection marker for impacted teeth: A randomized blind trial, International Jounal of Bioassays.2016; 5.9, pp: 4851-4857
11. Rathod S, Maske S, Kolte A, Wanikar I., Role of dermatoglyphic features associated with periodontal diseases. *Journal of ICDRO* diseases. 2018; Vol.10(2): 61-64
12. Rashad MN. Dermatoglyphic traits in patients with cardiovascular disorders. American Journal of Physical Anthropology. 1975; Vol. 42(2): 281-283.
13. Thaker M., Dodiya D. Dermatoglyphics and its relation with various dental diseases. International Journal of Advances in Science Engineering and Technology. 2017; 5 (2), pp: 11-15