SECRET BEHIND THE LIPS: CHEILOSCOPY AND ITS RELATION TO DENTAL CARIES AND MALOCCLUSION

Dental Science

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ABSTRACT

Introduction: Every person has certain features that make them distinct from others such as lip prints. Lip prints remain the same throughout life uninfluenced by injuries, diseases, or environmental changes. A possible genetic predisposition towards dental caries and malocclusion has piqued interest in the minds of dental investigators as lip and tooth enamel are derivatives of embryonic ectoderm.

Methodology: The study was conducted among 300 children aged 5-15 years in Bagalkot, Karnataka, India. Dental caries and malocclusion were recorded by using DMFT index and Angle's method respectively. Lip prints were recorded on cellophane tape and analysed by Tsuchihasi's classification.

Results: Prevalence of dental caries was higher among children with branched groove lip patterns and malocclusion among reticular lip patterns.

Conclusion: Cheiloscopy patterns may be utilized effectively to study the genetic basis of dental caries and malocclusion as it is a non-invasive and inexpensive tool for screening.

KEYWORDS

Cheiloscopy, Dental Caries, Malocclusion.

Introduction

Every person has certain features that make them radically distinct from others. One such feature is lip prints. Lip prints remain the same throughout life and are uninfluenced by injuries, diseases, or environmental changes. A possible true genetic predisposition towards dental caries and malocclusion has piqued interest in the minds of dental investigators for decades as lip, and tooth enamel are derivatives of embryonic ectoderm.[1]

Lip prints consist of normal lines and fissures in the form of wrinkles and grooves present in the zone of transition of human lip between the inner labial mucosa and outer skin. The study of lip prints is referred to as Cheiloscopy. The use of finger prints in personal identification and in criminal investigation is accepted part of forensic science. Similarly, in recent past several research studies had established that lip prints can be used as evidence in personal identification and criminal investigation in forensic dentistry.[2-6]

Dental caries is a chronic, complex, multifactorial disease for which a number of causative agents like host and environmental factors have been proposed. There are numerous host factors for dental caries that are genetically determined.[7] The pattern of dental caries has been found to be similar in members of the same family over several generations and hence, inheritance of this susceptibility is suspected. The lip patterns can be used as an oral health marker, which can determine the genetic predisposition of children to dental caries.[8]

The relationship between the skeletal malocclusions (Class I, II and III) and soft tissue facial morphology has been an arena of vast research in contemporary orthodontics. The lip prints are unique to an individual just like the fingerprints and shows strong hereditary pattern.[2]

This implies that genetic message present in the genetic makeup of a person, normal or abnormal, is transmitted during this period and is also reflected by Cheiloscopy. As Cheiloscopy pattern stay constant during life so it may sometimes play a significant role in the diagnosis of dental diseases like caries and malocclusions, which was the basis for undertaking of the present study.

Materials and Methodology

The study was conducted among 300 subjects aged 5-15 years in Bagalkot, Karnataka, India. Dental caries and malocclusion were recorded by using DMFT index and Angle's method respectively. Lip prints of the students were recorded on bond paper and analysed by Tsuchihasi's classification.

Exclusion criteria: Children with syndromes were excluded as they may show a peculiar pattern of development of cheiloscopic patterns.

Method of collection of data: Clinical examination of control group of 100 children was done, DMFT index and the type of malocclusion present was recorded using the Angle's classification. The most commonly used method i.e. lipstick-cellophane technique was adopted in the study.

The subjects were asked to sit in a relaxed position on a dental chair, and the lips of the subjects were cleaned with the help of wet cotton. The lipstick was applied on the lips of the children with a lip brush. The children were asked to rub both the lips together to spread the lipstick. Over the lipstick, the glued portion of the cellophane tape strip was placed and a lip impression was made by dabbing it first in the centre and then pressing it uniformly towards the corners of the lips. The cellophane strip was then stuck to the white bond paper for permanent record and the lip impressions were subsequently visualized with the use of a magnifying lens. Every measure was taken to prevent any cross contamination.

Application of lipstick with a brush with lip apart posture

Application of cellophane tape on the lips

Application of cellophane tapes on white paper for evaluation

Different types of lip patterns

Evaluation of patterns: The classification of lip print patterns as proposed by Tsuchihashi,[3]
- Type I : Clear-cut vertical grooves that run across the entire lips.

- Type I' : Similar to type I, but do not cover the entire lip.
- Type II : Branched grooves (branching Y-shaped pattern).
- Type III : Intersected grooves (criss-cross pattern, transverse grooves).

- Type IV : Reticular grooves.
- Type V : Undetermined (grooves do not fall into any of the type I-IV and cannot be differentiated morphologically).

Results The results were tabulated and subjected to statistical analysis using the Fisher's exact test.

		Lip prints							Total	Chi square test	
		Branched	Full	Half	Intersected	N	Reticular	Undetermined		Chi square value	p-value
Caries	N	30	29	23	17	1	34	18	152	2.65	0.85(NS)
		49.2%	58.0%	50.0%	45.9%	25.0%	52.3%	48.6%	50.7%		
	Y	31	21	23	20	3	31	19	148		
		50.8%	42.0%	50.0%	54.1%	75.0%	47.7%	51.4%	49.3%		
Crowding	N	49	45	38	32	4	49	33	250	6.95	0.33(NS)
		80.3%	90.0%	82.6%	86.5%	100.0%	75.4%	89.2%	83.3%		
	Y	12	5	8	5	0	16	4	50		
		19.7%	10.0%	17.4%	13.5%	0.0%	24.6%	10.8%	16.7%		
Spacing	N	59	46	45	35	4	65	35	289		0.27(NS)#
		96.7%	92.0%	97.8%	94.6%	100.0%	100.0%	94.6%	96.3%		
	Y	2	4	1	2	0	0	2	11		
		3.3%	8.0%	2.2%	5.4%	0.0%	0.0%	5.4%	3.7%		
Open bite	N	59	47	44	35	4	58	36	283		0.67(NS)#
		96.7%	94.0%	95.7%	94.6%	100.0%	89.2%	97.3%	94.3%		
	Y	2	3	2	2	0	7	1	17		
		3.3%	6.0%	4.3%	5.4%	0.0%	10.8%	2.7%	5.7%		
Cross bite	N	56	47	43	34	4	63	33	280		0.76(NS)#
		91.8%	94.0%	93.5%	91.9%	100.0%	96.9%	89.2%	93.3%		
	Y	5	3	3	3	0	2	4	20		
		8.2%	6.0%	6.5%	8.1%	0.0%	3.1%	10.8%	6.7%		
Class 2	N	54	45	44	32	2	55	29	261		0.09(NS)#
		88.5%	90.0%	95.7%	86.5%	50.0%	84.6%	78.4%	87.0%		
	Y	7	5	2	5	2	10	8	39		
		11.5%	10.0%	4.3%	13.5%	50.0%	15.4%	21.6%	13.0%		
Class 3	N	61	50	45	36	4	62	37	295		0.31(NS)#
		100.0%	100.0%	97.8%	97.3%	100.0%	95.4%	100.0%	98.3%		
	Y	0	0	1	1	0	3	0	5		
		0.0%	0.0%	2.2%	2.7%	0.0%	4.6%	0.0%	1.7%		

*p<0.05 statistically significant,   p>0.05 Non significant, NS

Discussion

Different studies have yielded varying results, Tsuchihashi, in his study in Japanese population found that intersected lip pattern was the most frequent.[3] Vahanwala and Parekh, in their study in Mumbai found that vertical lip pattern was most common.[9] Sivapathasundharam, Prakash and Sivakumar, studied the lip prints of Indo-Dravidian population and noted that intersected lip pattern was predominant.[2] Verghese et al., in Kerala found that reticular lip pattern showed the highest incidence.[10]

In the present study, it was seen that with respect to dental caries, the intersected lip pattern showed the highest number of dental caries afflicted students (54.1%) followed by the branched pattern (50.8%) whereas a large number of students had an undetermined lip pattern but showed dental caries (51.4%) which was similar to a study conducted by Madhusudan.K et al.

With respect to malocclusions, the reticular lip pattern showed highest number of crowding cases (24.6%) followed by the branched pattern (19.1%).

The full vertical pattern showed the highest number of spacing cases (8%) followed by the intersected (5.4%) and the undetermined pattern (5.4%).

The reticular pattern showed the highest number of open bite cases (10.8%) followed by the full vertical pattern (6%).

The undetermined lip patterns showed the highest number of cross-bite cases (10.8%) followed by the branched pattern (8.2%).

The undetermined lip pattern showed the highest number of Angle's class 2 malocclusion cases (21.6%) followed by the reticular pattern (15.4%).

The reticular pattern showed the highest number of Angle's class 3 malocclusion cases (4.6%) followed by the intersected pattern (2.7%). The p values for all these observations were > 0.05 and hence there was no statistically significant difference between the lip patterns and the various dental malocclusions present.

In only one of the study of this type in the past, using four quadrants of upper and lower lips found 1, 3 and 2, 3 types of lip print combination in class I subjects, 1, 4 and 3, 4 types of lip prints in skeletal class III and 1, 2 type in class II subjects but we could not compare this with our study because of difference in lip print analysis method.[11]

Kulkarni et al., concluded that it is easier to relate lip print patterns to class I and class III sagittal malocclusion subjects as compared to class II subjects but the association of lip patterns with different skeletal malocclusion needs an extensive research with a large sample from varied ethnical groups for conclusive results.[11]

Raghav P et al in a similar study concluded that there existed a definite correlation of skeletal class 3 malocclusion with the vertical lip pattern.[12]

Limitations of the study

1. The sample size is small and hence, a statistically significant correlation could not be established.
2. The lip prints and the corresponding dental malocclusion was only taken into account, further studies are required to compare these findings and skeletal malocclusions.
3. With respect to dental caries, as this study involved children taking their past caries experience into account was not possible, so predictability of lip prints and dental caries needs further studies to extrapolate the results.

Conclusion

Prevalence of dental caries was higher among subjects with branched groove pattern and malocclusion was higher among reticular patterns

compared to other lip print patterns. Thus, cheiloscopic patterns can be used as an adjunct to predict the dental caries as well as various dental malocclusions in children as well as could be of great use in forensic dentistry although further studies are needed to extrapolate the results.

References

1. Mathew L, Hegde AM, Rai K. Dermatoglyphics peculiarities in children with oral clefts. J Indian Soc Pedod Prev Dent 2005; 23:179-82.
2. Sivapathasundharam B, Prakash PA, Sivakumar G. Lipprints (cheiloscopy). Indian J Dent Res 2001;149:129-32.
3. Tsuchihashi Y. Studies on personal identification by means of lip prints. Forensic Sci 1974;3:233-48.
4. Schnuth ML. Advantages of lip print analysis in criminal investigations. The FBI law Enforcement Bulletin 1992 Nov.
5. Williams TR. Lip prints – Another means of identification. J Forensic Ident 1991;41:190-4.
6. Ball J. The current status of lip prints and their use for identification. J Forensic Odontostomatol 2002;20:43-6.
7. Hassel TM, et al. Genetic influences in caries and periodontal diseases. Oral Biol Med 1995;6(4):319-42.
8. Atasu M. Dermatoglyphic findings in Dental caries: A preliminary report. J Clin Pediatr Dent. 1998; 22: 147-9.
9. Vahanwala SP, Parekh BK. Study of lip prints as an aid to forensic methodology. J Indian Dent Assoc 2000;71:269-71.
10. Verghese AJ, Somasekar M, Babu RU. A study on Lip prints types among the people of Kerala. J Indian Acad Forensic Med 2010;32:1.6-7.
11. Kulkarni N, Vasudevan S, Shah R, Rao P, Balappanavar AY. Cheiloscopy: A new role as a marker of sagittal jaw relation. J Forensic Dent Sci 2012;4:6-12.
12. Raghav P, Kumar N, Shingh S, Ahuja NK, Ghalaut P. Lip prints: The barcode of skeletal malocclusion. J Forensic Dent Sci 2013;5:110-7.