ORIGINAL ARTICLE

A comparative evaluation between cheiloscopic patterns and canine relationship in primary dentition

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Abstract

Objective: The aim of this study was to evaluate the correlation between different cheiloscopic patterns with the canine relationship in deciduous dentition. **Materials and Methods:** Three-hundred children who were 3–6 years old with complete primary dentition were recruited and the relationships between maxillary and mandibular canines were recorded in the pro forma. Lip prints of the patients were recorded with the lipstick-cellophane method, and middle 10 mm of the lower lip was analyzed for the lip print pattern. The patterns were classified based on the Tsuchihashi and Suzuki classification. **Results:** Type II (branched) pattern was the most predominant cheiloscopic pattern. The predominant patterns which related to the terminal planes were Type IV (reticular) pattern for Class I, Type IV (reticular) and I (complete vertical) patterns for Class II, and the presence of Type V (irregular) pattern for Class III. Presence of Type I (complete vertical) and II (branched) patterns in males and Type II (branched) pattern alone in females can suggest for a Class II canine relationship. **Conclusion:** Lip prints can provide an alternative to dermatoglyphics to predict the canine relationship in primary dentition. Further studies with larger sample size are required to provide an insight into its significant correlations.

Key words: Canine relationships, cheiloscopy, primary dentition

Introduction

One of the many problems a dental practitioner face is to determine the occlusal relationship of canines and molars in the primary dentition. Many researches on the occlusal characteristics of primary dentition have been carried out among the children of different age groups in various regions of the world and indicate different results among various ethnic groups.[1] The position of the primary dentition tends to predict the occlusal relationship of the succedaneous dentition. Any development of malocclusion in the permanent dentition can be predicted by understanding the position of primary dentition and also the aftermath of dental caries. It is essential to provide early care for the deciduous tooth, which represents the best space maintainers or if the assessment is too late, it is essential to use an orthodontic appliance for "maintenance

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of space."[2] Lip prints are unique in every living individual and do not change with time which makes it special to be used as an analytical tool in the forensic dentistry. If these cheiloscopic prints can be linked to the relationship of maxillary and mandibular teeth in primary dentition, it could be helpful in predicting the future malocclusions. Hence, this study was aimed to assess the correlation between different cheiloscopic patterns with the canine relationship in deciduous dentition.

Materials and Methods

The present study was conducted among a total of 300 children who were aged 3–6 years attending the department of pediatric and preventive dentistry. Ethical clearance was obtained from the Institutional Review Board. The purpose and procedures of the study were explained to the parents/guardians and informed consent was obtained to participate in the study. Inclusion criteria were children with completely erupted primary dentition. Exclusion criteria were previous history of orthodontic treatment, initiation of the first transitional period, previous history of burn or chemical injury or lesions on distal phalanges of hands, different molar relationships on either side of the same patient, children with grossly decayed teeth or proximal caries or premature extraction of primary tooth affecting the molar relation, and uncooperative children.

Two calibrated examiners were trained to assess the canine relationships as Class I, Class II, and Class III. Class I is when the cusp tip of the maxillary primary canine tooth is in the same vertical plane as the distal surface of the mandibular primary canine. Class II is when the cusp tip of the maxillary primary canine tooth is mesial to the distal surface of the mandibular primary canine. Class III is when the cusp tip of the maxillary primary canine tooth is distal to the distal surface of the mandibular primary canine. Examination was performed using a mouth mirror and recorded in the pro forma. Under each terminal plane, 100 children were taken so as to standardize the number of children under each group, thereby the results can be closely related to the patterns obtained.

Lip print was recorded using the lipstick-cellophane technique as proposed by Sivapathasundaram *et al*.[3] which provides good clarity and accuracy.[4] The lips of the children were cleaned using wet cotton and allowed to dry. Matte finish lipstick was taken on one end of the cotton bud and applied evenly over the upper lip of the children. Similarly, the other end was used to apply for the lower lip, and it was then disposed maintaining strict aseptic conditions as suggested by Amith.[5] Children were asked to rub their lips gently against over one another and then to keep their lips at rest position. The glue part of the cellophane sheet is placed over the lips. After a few seconds, the cellophane sheet with lip print was carefully removed and was stuck on to a bonded white paper. Lip print was checked for clarity and if any smudging of the print was noticed, the procedure was repeated once again. Children were asked to wipe off the remnant lipstick using wet tissue paper.

The collected lip prints were analyzed using a magnifying glass by the same forensic specialist. The analyst reads the lip prints based on the classification given by Suzuki and Tsuchihashi in 1971.[6]

- Type I – Complete vertical
- Type I′ – Incomplete vertical
- Type II – Branched
- Type III – Intersected
- Type IV – Reticular
- Type V – Undetermined or irregular.

The middle part of the lower lip (10-mm wide) was taken as the study area, similar to the study by Sivapathasundharam *et al*.[3] Lip print pattern was determined by counting the highest number of patterns in the above-mentioned region.

Statistical analysis

The data values were tabulated and subjected to statistical analysis. For comparison of proportions between all the groups and also between genders, Chi-Square test was applied. Fisher's exact test was used when any expected cell frequency of <5 was obtained. SPSS version 22.0 (SPSS Inc., Chicago, IL, USA) was used to analyze the data. $P < 0.05$ is considered as statistically significant.

Results

The mean age of the children was 4.99 ± 0.67 years. Among the 300 children, 226 were Class I, 43 were Class II, and 31 were Class III. For the children having Class I, 55.7% were female and 44.3% were male. Among the children having Class II, 46.5% were female and 53.5% were male. In children having Class III, 41.9% were female and 58.1% were male.

Type II (branched) pattern is the most predominant cheiloscopic pattern which was equally distributed among children with primary dentition. An increase in Type IV (reticular) pattern was noted in children with Class I canine relationship. Type IV (reticular) and I (complete vertical) patterns were noted in higher frequency in Class II canine relationship. Among children with Class III canines, Type V (irregular) pattern was predominantly noted. This was statistically significant when comparing the cheiloscopic patterns with different classes of canine relationship ($P = 0.005$) [Table 1].

On comparing between genders, no statistically significant relationship was noted with Class I and III canine relationships. Type I (complete vertical) and II (branched) patterns were predominant in males with Class II canine relationship and Type II (branched) pattern alone is

predominant for females with Class II canine relationship, which was statistically significant ($P = 0.044$) [Table 2].

Discussion

Humans are unique in the pattern of characteristics they exhibit. Cheiloscopy is the study of lip prints, which are fissures and lines that appear as wrinkles and grooves in the zone of transition between the inner labial mucosa and outer skin of human lip.[3,7] Although the existence of lip prints was noted as early as 1902, its importance did not reach the forensic specialists until it was found in a murder scene. These patterns are analogous to the palm and thumbprints and gained popularity for sex determination in the field of forensics. The development of lip, alveolus, and palate occurs at the same embryonic period, which is the 24th week of intrauterine life. They are also formed from the same embryonic origin. Any factor which could affect the development of a particular structure will ultimately affect all the other structures that develop at the same time. Hence, there could be a possibility for the developmental changes that occur in relation to alveolus that might be reflected in the cheiloscopic patterns. This was the basis of analyzing the canine relationship of primary canines with the different cheiloscopic patterns.

Table 1: Cheiloscopic distribution among different classes of primary canines in primary dentition

Cheiloscopic pattern	Class I, *n* (%)	Class II, *n* (%)	Class III, *n* (%)	*P*
I	21 (9.3)	9 (20.9)	3 (9.7)	0.005
I′	3 (1.3)	2 (4.7)	0 (0.0)	
II	161 (71.2)	21 (48.8)	20 (64.5)	
III	1 (0.4)	2 (4.7)	1 (3.2)	
IV	27 (11.9)	9 (20.9)	3 (9.7)	
V	13 (5.8)	0 (0.0)	4 (12.9)	

Table 2: Gender comparison on distribution of cheiloscopic pattern among different classes of primary canines in primary dentition

Canine	Pattern	Gender		*P*
		Male, *n* (%)	Female, *n* (%)	
Class I	I	14 (14.0)	7 (5.6)	0.244
	I′	1 (1.0)	2 (1.6)	
	II	71 (71.0)	90 (71.4)	
	III	0 (0.0)	1 (0.8)	
	IV	9 (9.0)	18 (14.3)	
	V	5 (5.0)	8 (6.3)	
Class II	I	8 (34.8)	1 (5.0)	0.044
	I′	0 (0.0)	2 (10.0)	
	II	9 (39.1)	12 (60.0)	
	III	2 (8.7)	0 (0.0)	
	IV	4 (17.4)	5 (25.0)	
	V	0 (0.0)	0 (0.0)	
Class III	I	3 (16.7)	0 (0.0)	0.094
	I′	0 (0.0)	0 (0.0)	
	II	9 (50.0)	11 (84.6)	
	III	0 (0.0)	1 (7.7)	
	IV	2 (11.1)	1 (7.7)	
	V	4 (22.2)	0 (0.0)	

This study is an initial attempt to relate them as the primary canines that may play a significant role in determining the occlusion of the permanent dentition. Since the primary dentition provides the framework for proper eruption and alignment of the permanent dentition, the prediction of the primary canine relationships can help the dental practitioner in maintaining it in a favorable plane which may get affected by other environmental factors such as dental caries.

The results of the current study have helped us to predict certain patterns which might be related to specific primary canine relationships. In our study, among cheiloscopic patterns, Type II (branched) pattern was predominant among all the patients. This was in accordance to the study done by Raghav *et al*.[8] and Madhusudan *et al*.,[9] who reported the same predominance in patients with complete permanent dentition.

The results of the current study have provided an insight into specific cheiloscopic patterns which could be used as an anatomical tool to relate to the primary canine relationship, thereby helping to predict any malocclusions if any. This could help the dental practitioner to establish necessary measures to ensure no further loss of space occurs which could worsen the situation if any. We acknowledge that further studies with larger sample size are required to provide a more accurate prediction of the relationship and if this association can be proved on a larger scale, it can help as a very good noninvasive marker to predict the developing malocclusion which can be prevented, intercepted, or guided to achieve ideal occlusion.

Conclusion

Within the limitations of this study, we could conclude that Type II (branched) pattern was the most predominant cheiloscopic pattern. The predominant patterns which related to the primary canine relationships were Type IV (reticular) pattern for Class I, Type IV (reticular) and I (complete vertical) patterns for Class II, and the presence of Type V (irregular) pattern for Class III. Presence of Type I (complete vertical) and II (branched) patterns in males and Type II (branched) pattern alone in females can suggest for a Class II canine relationship.

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Conflicts of interest
There are no conflicts of interest.

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