International Journal of Current Advanced Research
ISSN: O: 2319-6475, ISSN: P: 2319-6505, Impact Factor: 6.614
Available Online at www.journalijcar.org
Volume 7; Issue 4(D); April 2018; Page No. 11563-11566
DOI: http://dx.doi.org/10.24327/ijcar.2018.11566.2005

Research Article

CHEILOSCOPY: A GENETIC MARKER IN CLEFT LIP AND PALATE

Karthik J Kabbur., Kavitha S., Sharmada B K., Hemanth M., Jayaprasad Darsan and Fatima Khalidi

Department of Orthodontics and Dentofacial Orthopedics, Dayananda Sagar Dental College, Shavige Malleshwara Hills, Kumaraswamy Layout, Bangalore 560 078, Karnataka, India

A R T I C L E I N F O

Article History:

Received 18th January, 2018
Received in revised form 13th February, 2018 Accepted 15th March, 2018
Published online 28th April, 2018

Key words:

Groove count, Cheiloscopy, Oro-facial clefts, O pattern

A B S T R A C T

Background: Labial mucosa has elevations and depressions forming a pattern called 'Lip Prints'. Parents of patients with cleft lip &/or palate are known to have a particular lip print pattern. Objectives: To analyze the various pattern of lip prints in parents of CL(P) children and to compare these patterns with that of parents of unaffected children and to analyze the significance of number of grooves present in the lip print of the affected children's parents. Methodology: The study included 15 subjects [study group-parents with children having cleft lip &/or cleft palate) and 15 subjects (control group-parents having children without cleft lip &/or cleft palate). The lip prints of the subjects were obtained using the cellophane method and analysed using Suzuki Tsuchihashi classification of lip prints. The data was subjected to Chi- Square test and Student t-test. Results: A new O pattern was present in the study group. The groove count was higher in the mothers' than in the fathers' prints. Conclusion: The new pattern was present in the study group in a significant number of cases. The groove count was significantly high in the study group.

INTRODUCTION

Cleft lip and palate (CLP) is a common developmental disorder with a prevalence ranging from 1:500 to 1:2000 worldwide.[1] This disorder requires a multidisciplinary approach for management. Hence, prevention of this developmental disorder and lowering its incidenceneeds to be addressed more than its surgical repair. For this purpose, identification of prone candidatesmust be done, which can be achieved with the help of identifying a genetic marker in inheritance of CLP.[2]

Lips are proved to have something that characterizes the human being the same as fingerprints, which is the lip prints.[3]In 1950, Le Moyne Synder first described lip prints stating that wrinkles and cracks on the lips might identify persons.[3] Lip prints are normal wrinkles and cracks present in the zone of transition of human lip, between the inner labial mucosa and outer skin. Theseprints are unique for individuals, as fingerprints andthey do not change during the life of a person. There arevarious patterns of lip prints which can be identified by cheiloscopy. This lip print pattern is the anatomical character of the human lips, which becomes useful in identification and diagnosis of congenital diseases and anomalies.[4,5,6] Parents of patients affected with cleft lip &/or palate have been shown to have a particular lip print pattern.

Corresponding author:* **Karthik J Kabbur
Department of Orthodontics and Dentofacial Orthopedics, Dayananda Sagar Dental College, Shavige Malleshwara Hills, Kumaraswamy Layout, Bangalore 560 078, Karnataka, India

The study of lip prints in understanding the inheritance of various congenital anomalies can therefore be a useful tool. This provides a cost effective, noninvasive screening method to evaluate the occurrence of clefts in the offspring [7-9]. The study of lip prints or cheiloscopy, in light of predicting the occurrence of cleft lip and/or cleft palate can be a valuable tool in tackling the psychosocial and therapeutic approach to this common developmental deformity. Therefore, this study was undertaken in order to verify if any relationship exists between cleft lip and cleft palate and lip prints.

METHODOLOGY

This study was conducted on parents of cleft lip and/or cleft palate patients who visited the out-patient departments of Bhagwan Mahaveer Jain Hospital, Vasanth Nagar, Bangalore. The sample size of this research work comprised of 15 subjects for the study group (parents with children having cleft lip and/or cleft palate) and 15 subjects for the control group (parents having children without cleft lip and/or cleft palate).

Inclusion criteria

Lip prints of parents with their children having cleft lip and/or palate (for the study group) and Lip prints of parents with their children without cleft lip and/or cleft palate (for the control group)

Exclusion criteria

Any lesion or inflammatory state of lips or previous history of surgery to lips and individuals with known hypersensitivity to lipstick.

Materials required

Dark coloured lipstick, Dark coloured lip liner, Lipstick applicator brush, Petroleum jelly, Transparent cellophane tape, Cotton wool, White coloured executive bond sheets, Magnifying glass(figure 1).

Figure 1 Materials required for the study.

METHODOLOGY

The participants were positioned with lips relaxedwithout any strain and the lip prints of the participantswere obtained using the cellophane method.First, the lips of the subject were cleaned thoroughly with sterile cotton. Petroleum jelly was applied on the lips if the lips were dry as this would hamper the uniform spread of lipstick. After about 2-3 minutes, excess petroleum jelly was wiped off the lip surface using cotton wool. The cellophane method of obtaining lip prints was used in this study.

A folded piece of white bond paper was placed between the lips, and the person was asked to press the lips gently against the paper (figure 2). The lips of the subject were thoroughly wiped off the lipstick colour after completion of the procedure using cotton wool.

This procedure was repeated for each subject in the study and control groups. The lip prints were repeated if the ones obtained were not satisfactory.

Figure 2 Lip prints of various individuals obtained by cellophane method.

The lip prints were then visualized using a magnifying glass and analysed according to the Suzuki & Tsuchihashi lip print classification.(figure 3).

The classification of lip print patterns as proposed by Tsuchihashi,**[9]** was followed which was [Figure 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).

Type I i.e., full vertical grooves and type I' i.e., partialvertical grooves (Tsuchihashi classification) were very difficult to differentiate between each other, therefore were considered as a single group in this study.

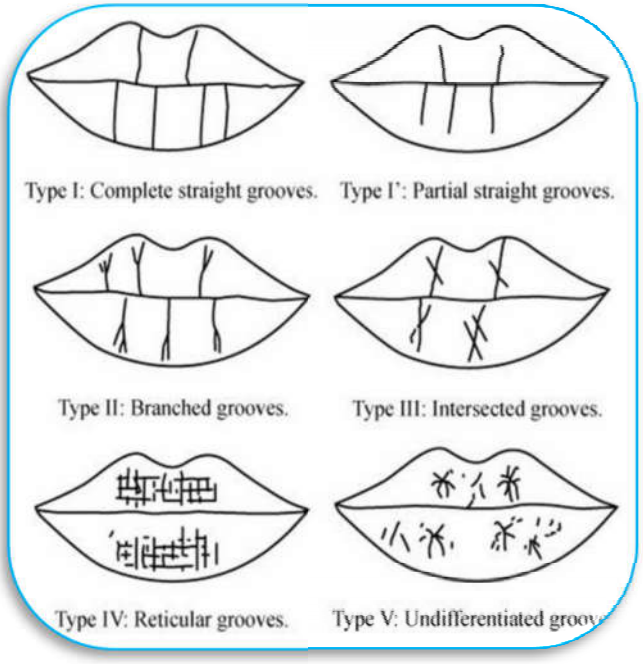

Figure 3 different types of lip print patterns.

Analysis of each area was carried out by using lip pattern classification given by Suzuki *et al. (1968)*.

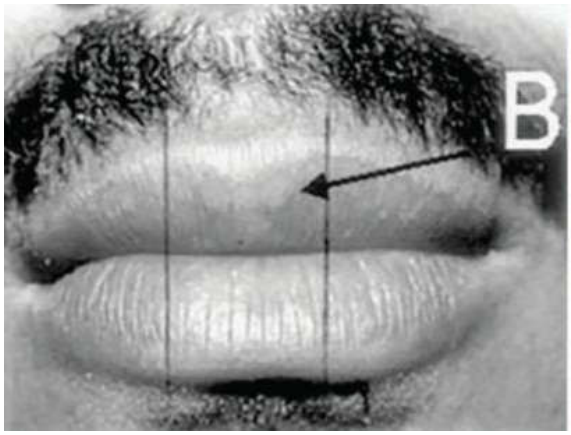

Figure 4 Recently, Saad, 2005 identified type (O)

RESULTS

The data obtained was subjected to Chi-Square Test & Student t-test and the Statistical Package for Social Sciences [SPSS] was used to perform statistical analyses.The level of significance was set at P<0.05.

A comparison of the fathers' prints between the two groups was done. The incidence of the different types on lip prints according to the Suzuki and Tsuchihashiclassification in the six different quadrants and the new type (type O) have been tabulated. Type 2 pattern is mainly seen in upper right and least in upper middle region. The o pattern seen in upper middle region (Table 1).

Table 1 Comparison of fathers lip prints in two groups of subjects

	Group	Type I	Type II	Type III	Type IV	Type V	New type	p-value
FP UR	Control	5(20%)	9(36%)	1(4%)	0(0%)	1(4%)	0(0%)	0.453
	Study	12(24%)	24(48%)	0(0%)	0(0%)	1(2%)	0(0%)	
FP UM	Control	0(0%)	4(16%)	1(4%)	4(16%)	7(28%)	0(0%)	0.005**
	Study	3(6%)	13(26%)	3(6%)	3(6%)	7(14%)	12(24%)	
FP UL	Control	1(4%)	8(32%)	3(12%)	0(0%)	1(4%)	0(0%)	0.178
	Study	5(10%)	19(38%)	1(2%)	1(2%)	3(6%)	4(8%)	
FP LR	Control	6(24%)	8(32%)	1(4%)	0(0%)	2(8%)	0(0%)	0.547
	Study	16(32%)	19(38%)	3(6%)	0(0%)	4(8%)	1(2%)	
FP LM	Control	1(4%)	11(44%)	0(0%)	3(12%)	3(12%)	0(0%)	0.23
	Study	0(0%)	20(40%)	4(8%)	8(16%)	7(14%)	2(4%)	
FP LL	Control	5(20%)	10(40%)	0(0%)	0(0%)	0(0%)	0(0%)	0.063
	Study	14(28%)	17(34%)	2(4%)	0(0%)	6(12%)	0(0%)	

Table 1:The incidence of the different types on lip prints according to the Suzuki and Tsuchihashi classification in the six different quadrants and the new type (type O) have been tabulated – type 2 pattern is mainly seen in upper right and least in upper middle region. The o pattern seen in upper middle region.

A comparison of the mothers' prints between the two groups was done. The incidence of the different types on lip prints according to the Suzuki and Tsuchihashi classification in the six different quadrants and the new type (type O) have been tabulated [Table 2]. The more number of type 2 grooves are found in upper right region and least in lower left in mothers group, however the new o pattern are found in upper middle region.(Table 3).

Table 2 Comparison of mothers' lip prints in two groups of subjects

	Group	Type I	Type II	Type III	Type IV	Type V	New type	p-value
MP	Control	3(12%)	14(56%)	2(8%)	1(4%)	1(4%)	0(0%)	0.004**
UR	Study	13(26%)	8(16%)	1(2%)	2(4%)	1(2%)	0(0%)	
MP	Control	0(0%)	12(48%)	1(4%)	6(24%)	2(8%)	0(0%)	0.006**
UM	Study	5(10%)	9(18%)	6(12%)	4(8%)	8(16%)	10(20%)	
MP	Control	5(20%)	12(48%)	2(8%)	2(8%)	0(0%)	0(0%)	0.020*
UL	Study	7(14%)	12(24%)	3(6%)	1(2%)	6(12%)	0(0%)	
MP	Control	18(72%)	6(24%)	0(0%)	0(0%)	0(0%)	0(0%)	0.002**
LR	Study	15(30%)	10(20%)	1(2%)	1(2%)	1(2%)	2(4%)	
MP	Control	1(4%)	10(40%)	0(0%)	0(0%)	0(0%)	0(0%)	0.003**
LM	Study	1(2%)	3(6%)	1(2%)	6(12%)	10(20%)	2(4%)	
MP	Control	16(64%)	4(16%)	2(8%)	0(0%)	1(4%)	0(0%)	<0.001**
LL	Study	7(14%)	13(26%)	3(6%)	0(0%)	9(18%)	2(4%)	

Table 2: The more number of type 2 grooves are found in upper right region and least in lower left in mothers group, however the new o pattern are found in upper middle region.

Table 3 Comparison of fathers and mothers prints in the study group

Group	Type I	Type II	Type III	Type IV	Type V	New type	P value
FP UR	12(24%)	24(48%)	0(0%)	0(0%)	1(2%)	0(0%)	0.514
MP UR	13(26%)	25(50%)	1(2%)	2(4%)	1(2%)	0(0%)	
FP UM	3(6%)	13(26%)	3(6%)	3(6%)	7(14%)	12(24%)	0.799
MP UM	5(10%)	8(16%)	6(12%)	4(8%)	8(16%)	10(20%)	
FP UL	5(10%)	19(38%)	1(2%)	1(2%)	3(6%)	4(8%)	0.294
MP UL	7(14%)	21(42%)	3(6%)	1(2%)	6(12%)	0(0%)	
FP LR	16(32%)	19(38%)	3(6%)	0(0%)	4(8%)	1(2%)	0.58
MP LR	15(30%)	20(40%)	1(2%)	1(2%)	1(2%)	2(4%)	
FP LM	0(0%)	20(40%)	4(8%)	8(16%)	7(14%)	2(4%)	0.264
MP LM	1(2%)	27(54%)	1(2%)	6(12%)	10(20%)	2(4%)	
FP LL	14(28%)	17(34%)	2(4%)	0(0%)	6(12%)	0(0%)	0.388
MP LL	7(14%)	16(32%)	3(6%)	0(0%)	9(18%)	2(4%)	

Table 3: A comparison of fathers' and mothers' prints in study group was done and the results are tabulated- the o pattern are found more in upper middle region.

A comparison of groove count per centimetre between fathers' and mothers' prints in the study group was also done. The results have been charted. Groove count is found more in mothers than fathers group (Table 4).

Table 4 Comparison of groove count per centimetre in mothers' prints in the study group in CL, CP & CLP

MGC	CL only	CP only	Both CL & CP	p-value
UL	11.91±1.75	9±4.51	11.29±2.39	0.082
LL	10.28±2.50	8.44±1.78	9.40±1.36	0.102

Table 4 Comparison of groove count per centimetre in fathers' prints in the study group in CL, CP & CLP

FGC	CL only	CP only	Both CL & CP	p-value
UL	10.54±3.41	9±2.49	10.35±2.11	0.37
LL	9.98±1.65	9.85±2.47	9.82±1.77	0.973

Table 4: Groove count is found more in mothers than fathers group. Groove count is found more in mothers than fathers group.

DISCUSSION

Various investigators have discussed the use of lip prints in other fields like inheritance of congenital anomalies and diseases. Afaf *et al*., have explained the mode of inheritance of lip prints.Whorl lip patterns can occur on the upper and/or lower lips. An upper lip whorl is a single, circular pattern of grooves centred on the midline of the upper lip. Lower lip whorls are circular patternslocated on the left and/or right of

the lower lip midline. Whorls were first noted by Hirth and his colleagues. They observed that the frequency of whorls on the lower lip increased with non-syndromic CL/P patients and their families [10].Therefore, studying in depth and establishing further facts and truth in lip prints not only in forensic odontology but also in better understanding various congenital anomalies and diseases is necessary [11].

In the present study, a new pattern of lip prints called the "whorl" or "O" pattern was also noted in the study group as previous study. These whorl pattern was absent in the individuals belonging to control group which suggests their presence as a marker for genetic inheritance of cleft anomalies. The study conducted by Saad *et al*. found more whorl pattern in mothers as compared to fathers. This might be due to the inequality of the samples in their study, i.e., 30 fathers and 32 mothers were included whereas in our study, the presence of whorl pattern is more in fathers. However, similar results are showed in the study conducted by Ravath *et al*.[12] had the presence of whorl pattern more in fathers.

Another factor which might explain the difference in the results with the previous studies is that direct digital photography of the participants' lips was used to obtain the lip prints in the study by Saad *et al*., whereas the cellophane method wasfollowed in the present study as used by Saujanya *et al*.[13] In a study conducted by Saujanya *et al. in* 2016 conducted among South Indian population, wherein Type II followed by Type O were significantly higher in both mothers and fathers of children with CLP.

In this present study the groove count is more in cleft lip than cleft palate alone. Least groove count is observed in cleft lip and palate patients parents. This may suggested that influence of groove counts on cleft lip and palate occurrence.

CONCLUSION

- The type 2(branched) pattern are more seen on cleft lip and palate patients parents than control groups.
- The presence of O pattern in the study groups and its total absence in the control group clearly suggests its importance as a genetic marker for inheritance of CLP.
- The number of groove will give the prediction of incidence of cleft lip and palate.
- The lip prints are now beginning to prove themselves as an useful tool for preliminary investigations into conditions with a suspected genetic basis.
- Determining the relative risk of cleft lip and palate on the basis of lip prints as genetic background may be useful for genetic counseling, educate the patients for the future preventive measures.

References

1. Shamim T, Varghese IV, Shameena PM, Sudha S. Forensic odontology- a new perspective. *Med Leg Update.* 2006;6(1):1-4.
2. Gondivkar SM, Indurkar A, Degwekar S, Bhowate R. Cheiloscopy for sex determination. *J Forensic Dent Sci.* 2009;1(2):56-60.
3. Domiaty MAE, Al-gaidi SA, Elayat AA, Safwat MDE, Galal SA. Morphological patterns of lip prints in Saudi Arabia at almadinah almonawarah province. *Forensic Sci Int.* 2010; 170e1-79e9.
4. Singh H, Chhikara P, Singroha R. Lip prints as evidence. *J Punjab Acad Forensic Med Toxicol.* 2011; 11(1):23-5.
5. Vahanwala S, Nayak CD, Pagare SS. Study of lip prints as aid for sex determination. *Med Leg Update.* 2005;5(3):93-8.
6. Bindal U, Jethani SL, Mehrotra N, Rohatgi RK, Arora M, Sinha P. Lip prints as a method of identification in human being. *J. Anat. Soc. India.*2006; 58(2):152-55.
7. Saad WM, Kamel AH, Hassan FZ, El-otiefy. Genetic studies on the inheritance of lip prints in cleft lip and palate. *J. Plast. Reconstr. Surg.*2005; 29(1):9-12.
8. Patel S, Paul I, Madhusudhan AS, Ramesh G, Sowmya GV. A study of lip prints in relation to gender, family and blood group. *International Journal of Oral and Maxillofacial Pathology.* 2010;1(1):4-7.
9. Tsuchihashi Y. Studies on personal identification by means of lip prints. *Forensic Sci* 1974; 3:233-48.
10. Neiswanger K, *et al*. Whorl patterns on the lower lip are associated with nonsyndromic cleft lip with or without cleft palate. *Am J Med Genet A.* 2009; 149A(12):2673-79.
11. Bender PL. Genetics of cleft lip and palate. *Journal of Pediatric Nursing*. 2000;15(4):242-49.
12. Manasa Ravath CJ *et al*., Cheiloscopy & Developmental Defects. *Journal of Clinical and Diagnostic Research.* 2014 Jul, Vol-8(7)
13. Soujanya, Saraswathi TR, Mishra G, Ranganathan K. Study of lip prints. *J Forensic Dent Sci.* 2009;1(1):28-31.

How to cite this article:

Karthik J Kabbur *et al* (2018) 'Cheiloscopy: A Genetic Marker in Cleft Lip And Palate', *International Journal of Current Advanced Research,* 07(4), pp. 11563-11566. DOI: http://dx.doi.org/10.24327/ijcar.2018.11566.2005

****