ISSN: 2581-5989
PubMed - National Library of Medicine - ID: 101738774

International Journal of Dental Science and Innovative Research (IJDSIR)

IJDSIR : Dental Publication Service

Available Online at: www.ijdsir.com

Volume – 3, Issue – 3, May - 2020, Page No. : 232 - 239

Comparison Of Cephalometric Analysis In Children With And Without Tongue Thrust Habit In Population Of Jammu

[1]Abhimanyu Rohmetra, Senior Lecturer, Department of Orthodontics and Dentofacial Orthopaedics, Institute of Dental Sciences, Sehora , Jammu , J&K

[2]Niharika Gupta, PG student, Department of Oral and Maxillofacial Surgery, J.N. Kapoor DAV(C) Dental College, Yamunanagar, Haryana

[3]Ishita, Intern, Institute of Dental Sciences, Sehora, Jammu, J&K

Corresponding author: Niharika Gupta, PG student, Department of Oral and Maxillofacial Surgery, J.N. Kapoor DAV(C) Dental College, Yamunanagar, Haryana

Citation of this Article: Abhimanyu Rohmetra, Niharika Gupta, Ishita, "Comparison Of Cephalometric Analysis In Children With And Without Tongue Thrust Habit In Population Of Jammu", IJDSIR- May - 2020, Vol. – 3, Issue -3, P. No. 232 – 239.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Introduction: The study was undertaken to compare cephalometric analysis in children with and without tongue thrusting habit and to evaluate the risk factors associated with the skeletal changes due to the tongue thrusting habit.

Method: A total of 21 children with a habit of tongue thrusting and 21 children without any habit between ages 6-14years were selected for the study

Results: Tongue thrust affected only upper incisors by proclining them, but there was no effect on the lower incisors. Hyperactive mentalis muscle in present study was reported to be 24%. 86% subjects presented a relationship between tongue thrust and lisping.

Conclusion: Tongue thrust caused proclination of maxillary incisors. Tongue thrust did not cause significant skeletal changes in the maxilla and mandible or dental changes in the mandibular teeth. Children with tongue thrust showed increased upper lip thickness although it was not clear if it was a cause or an effect. Tongue thrusting showed a significant familial trend.

Keywords: Tongue thrust, cephalometric, habit

Introduction

The morphology of the craniofacial complex, the dynamics of the stomatognathic system & the arrangement of the dentition is an integrated functioning unit. Muscles are potent force, whether they are in active function or at rest. The teeth & supporting structure are constantly under the influence of the contiguous musculature. Tongue is the most agile, versatile appendage in the body. It is the largest organ of the oral cavity and has no skeletal bony base. Peat[1] emphasized that the forward movement of the

tongue tip between the teeth to meet the lower lip in deglutition and in sounds of speech so that the tongue becomes interdental. Rakosi[2] cleared the role of tongue in positioning the dentoalveolar structures and proposed that the growth, posture, and function of tongue are important. Abnormalities of either posture or function could possibly contribute to development of malocclusion and speech defects.[3,4]

In 1969 Hanson[5] et al. reported prevalence of 39% in the preschool children for saliva swallowing, 55% for liquid swallowing, and 68% for solid swallowing. Similar prevalence rates were found by Bell and Hale[6] (1963) in a comparable population. In the epidemiological study of 1500 eleven year old children, only 40 (2.7%) of the sample exhibited tongue thrusting and of those only half (20 subjects) had malocclusion (Tulley[7], 1969). Gellin[8] (1978) studied the prevalence of tongue thrusting in American children. He reported that 97% of the newborns had tongue thrust and this figure declined to 80% at 5-6 years and then to 3% at 12 years of age. He concluded that tongue thrusting significantly decreased with age. Fletcher et al[9] (1961) reported that 50% of the 6 year-old children exhibited tongue thrust swallow and percentage declined to about 25% at age 15 years. Similar findings has been reported by Ward et al[10] (1961) and Jann[11] (1964). The aim of the present study was to compare cephalometric analysis in children with and without tongue thrusting habit and to evaluate the risk factors associated with the skeletal changes due to the tongue thrusting habit.

Material and Method

Source of Data: A total of 21 children with tongue thrusting habit and 21 children without any habit between ages 6-14 years were selected for the study.

Criteria used to select the children

- Children residing in the Jammu city
- Absence of systemic diseases
- No previous history of any orthodontic treatment.
- No history of trauma or surgery in the dentofacial region
- Absence of any other oral habits like finger sucking, lip sucking, etc at the time of selection
- Absence of premature loss of deciduous teeth

Selection of Subjects

Child was diagnosed as a tongue thruster by using following criteria established by Weiss and Van Houten (1972):

1. He/she thrusted his/her tongue against the upper central incisors or between the upper and lower central incisors during swallowing.
2. Swallowed with his/her teeth apart, and/or
3. Had excessive lower lip activity during swallowing.

A total of 21 children were selected who exhibited tongue-thrusting habit and were assigned to the Group TT (Tongue Thrusting).

A total of 21 children were selected who did not exhibit tongue-thrusting habit as controls and were assigned to the Group C (Control).

Clinical Examination

- Competency of lips
- Lateral profile
- Mouth breathing
- Hyper-activity of mentalis muscle
- Position of the tongue-tip during swallow
- Indentations on tongue
- Lisping during speech were also recorded.

Study Models

- Open bite
- Overjet
- Overbite
- Molar relation
- Canine relation

- Inter-premolar palatine width 0
- Inter-molar palatine width.

Cephalometric Analysis

- Relationship of the maxilla to the cranial base
- Relationship of the mandible to the cranial base
- Maxillo-mandibular relations
- Vertical height
- Maxillary and mandibular incisor position
- Growth pattern
- Soft tissue

Statistical Analysis

- Unpaired student's t-test and Mann-Whitney test were used to compare the cephalometric analyses between the two groups.
- Chi-square test was used for categorical data to evaluate the risk factors between the two groups.
- Chi-square test and unpaired student's t-test were used to analyze the effects of tongue thrusting across the groups.

Result

A total of 21 children were selected who exhibited tongue-thrusting habit and were assigned to the Group TT (Tongue Thrusting). Out of 21 subjects 10male and 11 female subjects were there mean age ± SD (Years) 10.6±0.9. A total of 21 children were selected who did not exhibit tongue-thrusting habit as controls and were assigned to the Group C (Control). 17 male and 4 female subjects were there in this study, mean age ± SD (Years) 11.0 ± 1.0. on application of test of significance p-value was 0.18 which was not significant (Table 1). Table 2 compares the maxilla to cranial base and mandible to cranial base across the groups. Whereas Table 3 compares the maxillo-mandibular relationship and vertical height across the groups. Maxillary and mandibular incisor position and growth pattern were compared across the groups in Table 4. Table 5 detailed about comparison of soft tissue analysis across the groups. Table 6 proved that the tongue thrust had a highly significant effect on incompetency of lips, mouth breathing habit, hyper activity of mentalis muscle, lisping, increased overjet and open bite.

Table 1: Distribution of Samples by Age and Sex

Groups	No. of subjects	SEX		Mean age ± SD (Years)	Significance	
		Male	Female		t-value	p-value
Group TT	21	10	11	10.6±0.9	1.36	0.18 NS
Group C	21	17	4	11.0 ± 1.0		

NS: Non-Significant

Table 2: Comparison of Maxilla to Cranial Base and Mandible to Cranial Base across the Groups.

Relationship Studied	Cephalometric Parameters	Group TT	Group C	Significance*	
		Mean ± SD	Mean ± SD	t-value	p-value
Maxilla to cranial base	SNA deg	82.0 ± 3.8	81.3 ± 3.9	0.56	0.58
	N-A FH deg	87.7 ± 2.9	88.3 ± 4.0	0.62	0.54
	A-N Vet mm	0.9 ± 3.9	1.4 ± 4.5	0.40	0.69
Mandible to cranial base	SNB deg	76.4 ± 3.5	77.9 ± 3.8	1.26	0.21
	Npog-FH deg	83.6 ± 3.7	84.2 ± 5.1	0.45	0.65
	Pog-Nvertm	10.1 ± 4.6	11.1 ± 6.1	0.60	0.55

Table 3: Comparison of maxillo-mandibular relationship and vertical height across the Groups.

Relationship Studied	Cephalometric Parameters	Group TT	Group C	Significance*	
		Mean ± SD	Mean ± SD	t-value	p-value
Maxillo mandibular relations	ANB deg	4.5 ± 2.0	4.2 ± 1.7	0.58	0.56
	A-Npog mm	0.2 ± 4.1	-1.8 ± 4.2	1.59	0.12
	Wits mm	2.3 ± 3.2	1.0 ± 1.8	1.67	0.10
Vertical Height	SN-MP deg	32.7 ± 5.3	32.3 ± 5.1	0.21	0.84
	FMPA deg	25.9 ± 5.8	27.0 ± 4.3	0.75	0.46
	Ant. Facial height (mm)	109.0 ± 8.0	107.7 ± 6.4	0.60	0.55
	Posterior facial height (mm)	69.8 ± 6.6	71.5 ± 2.5	0.62	0.54
	Jarabak's ratio (%)	64.9 ± 3.9	65.8 ± 3.1	0.87	0.39

Table 4: Comparison of Maxillary and Mandibular Incisor Position and Growth Pattern across the Groups.

Relationship Studied	Cephalometric Parameters	Group TT	Group C	Significance*	
		Mean ± SD	Mean ± SD	t-value	p-value
Maxillary & mandibular incisor position	U1-SN deg	117.4 ± 9.6	106.4 ± 6.5	4.34	<0.001**
	U1-NA deg	35.9 ± 9.1	26.1 ± 4.1	4.46	<0.001**
	U1-NA mm	7.6 ± 3.2	5.1 ± 1.5	3.27	0.002*
	IMPA deg	104.0 ± 9.1	100.9 ± 8.0	1.15	0.26
	L1-NB mm	7.1 ± 2.1	6.1 ± 2.9	1.34	0.19
	L1-NB deg	35.1 ± 4.9	30.9 ± 8.3	2.04	0.10
	U1-L1 deg	105.2 ± 11	120.2 ± 13	4.03	<0.001**
Growth pattern	Saddle angle	126.3 ± 4.4	126.0 ± 4.1	0.26	0.80
	Articulare angle	140.0 ± 8.9	138.9 ± 4.7	0.54	0.59
	Gonial angle	123.8 ± 5.3	126.9 ± 5.3	1.89	0.07
	Sum	390.2 ± 9.0	391.9 ± 6.5	0.69	0.49
	Y-axis	64.9 ± 5.3	66.0 ± 4.0	0.72	0.48
	Basal angle	25.9 ± 5.4	25.6 ± 5.4	0.20	0.84

** Highly significant, * Significant

Table 5: Comparison of soft tissue analysis across the groups.

Relationship Studied	Cephalometric Parameters	Group TT	Group C	Significance*	
		Mean ± SD	Mean ± SD	t-value	p-value
Soft tissue analysis	Facial angle	87.4 ± 3.2	87.5 ± 3.2	0.10	0.92
	Nasiolabial angle	90.6 ± 17.2	90.4 ± 14.4	0.03	0.98
	H-line angle	22.1 ± 3.8	22.0 ± 4.8	0.04	0.97
	Upper sulcus depth	5.5 ± 3.2	5.3 ± 2.7	0.21	0.83
	Upper lip thickness	14.9 ± 3.1	13.4 ± 1.8	1.92	<0.05*
	Upper lip strain	14.5 ± 2.3	14.4 ± 1.7	0.16	0.88
	Lower sulcus depth	4.3 ± 1.8	4.4 ± 1.5	0.28	0.78

* Significant

Table 6: Effects of Tongue Thrusting

Parameters	Group TT		Group C		Significance	
	No.	%	No.	%	χ^2	p-value
Lip						
Incompetent	18	85.7	3	14.3	21.4	<0.001**
Competent	3	14.3	18	85.7		
Lateral profile						0.31
Straight	-	-	-	-		
Convex	20	95.2	21	100.0	1.02	
Concave	1	4.8	-	-		
Mouth breathing						<0.01*
Absent	13	61.9	21	100.0		
Present	8	38.1	-	-	9.88	
Mentalis muscle						<0.05*
Normal	16	76.2	21	100.0		
Hyperactive	5	23.8	-	-	5.68	
Tip of the tongue touches						<0.001**
Palatal region						
Max. incisors	3	14.3	21	100.0		
Mand. incisors	1	4.8	-	-	31.5	
Both Max. & Mand. incisors	-	-	-	-		
	17	80.9	-	-		

Lisping						
Absent	3	14.3	21	100.0	31.5	<0.001**
Present	18	85.7	-	-		
Over bite						
0%	11	52.4	-	-		
25%	7	33.3	12	57.1	0.47	0.49
> 25%	3	14.3	9	42.9		
Overjet						
0 mm	11	52.4	-	-		
1 - 2 mm	2	9.5	19	90.4	18.14	<0.001**
2 – 4 mm	2	9.5	2	9.5		
> 4 mm	6	28.6	-	-		
Open bite						
Absent	10	47.6	21	100.0	14.9	<0.001**
Present	11	52.4	-	-		
Inter-premolar palatal width (Mean ± SD) mm	35.6 ±1.9		35.9 ± 1.8		t=0.70	0.49
Inter-molar palatal width (Mean ± SD) mm	44.8±2.8		45.0 ± 1.5		t=0.29	0.77

Discussion

Lateral Cephalometric Analysis

In present study some significant differences were observed in cephalometric analyses, which can be reasonably attributed to tongue thrusting habit. There are very few studies reported in the literature that have studied cephalometric changes caused by tongue thrust (Barber and Bonus[12], 1975; Cayley et al[13], 2000). Results of present study indicated that tongue thrust affected only upper incisors by proclining them, but there was no effect on the lower incisors when compared to the controls in our sample. In present study mean SNA and SNB angles of the control group were comparable to those in the tongue thrust group reported by Barber and Bonus[12] (1975) and Cayley[13] et al. (2000). This evidence may indicate trend towards bimaxillary protrusion in children included in present study Table 7. Barber and Bonus[12] (1975) concluded from their study that children who exhibited tongue thrust pattern had more incompetent lips than the non-tongue thrusting children. Similarly Tulley[7] (1969) reported that incompetent lips were associated with tongue thrust. Our findings are concurrent with the findings of Swinehart[14] (1942) and Straub[15] (1960). They concluded from their study that tongue thrusting was the primary cause of open bite. Hyperactive mentalis muscle in present study was reported to be 24% while Hanson et al. (1969)[5] reported that mentalis muscle contractions were not related to presence of tongue thrusting in 5-year-old children in their study. In present study 86% subjects presented a relationship between tongue thrust and Lisping similarly , Subtelny et al[16] (1964) reported that incidence of lisping was twice as high among the tongue

thrusters as it was among the non-thrusters. Inter-premolar and inter-molar palatal widths no association, Brauer and Holt[17] (1965) reported from their study that high and/or narrow maxillary arch was associated with tongue thrust swallow. Similar association has been reported by Straub[15] (1960), Palmer[18] (1962) and Hanson et al[5] (1969). However, our sample did not reveal any differences.

Table 7: Comparison of Present Study Results of Cephalometric Analysis with Other Studies

Cephalometric Measurements	Present Study [a]		Barber and Bonus (1975) [b]		Cayley et al. (2000) [c]	
	Group TT	Group C	Group TT	Group C	Group TT	Group C
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
SNA	82.0(3.8)	81.3(3.9)	82.0(4.0)	79.7(4.4)	81.9(4.3)	80.4(1.4)
SNB	76.4(3.5)	77.9(3.8)	78.0(4.1)	76.1(4.5)	76.9(3.4)	77.2(1.7)
ANB	4.5(2.0)	4.2(1.7)	3.9(1.7)	3.6(0.7)	5.0(2.3)	3.3(2.1)
U1-SN	117.4(9.6)*	106.4(6.5)*	110.7(5.7)	101.0(3.2)	109.6(5.7	103.8(3.8)
U1-L1	105.2(11.1)*	120.2(13.0	110.0(5.6)	128.5(1.4)	119.9(8.2)	129.2(4.3)
IMPA	104.0(9.1)	100.9(8.0)	101.6(4.5)	92.0(2.3)	95.4(7.4)	96.8(3.1)

Conclusions

1. Tongue thrust caused proclination of maxillary incisors.
2. Tongue thrust did not cause significant skeletal changes in the maxilla and mandible or dental changes in the mandibular teeth.
3. Children with tongue thrust showed increased upper lip thickness although it was not clear if it was a cause or an effect.
4. Tongue thrusting showed a significant familial trend.
5. Tongue thrust was significantly associated with incompetency of lips, mouth breathing, open bite, overjet (more than 2 mm), hyperactive mentalis muscle and lisping.
6. Tongue thrust was not associated with constriction of maxilla.

References

1. Peat JH. A cephalometric study of tongue position. Am J Orthod 1968;54:339-51.
2. Rakosi T. An atlas and manual of cephalometric radiography. London, Wolf Medical Publication Limited, 1978. p. 96-8.
3. Kapoor DN, Sharma VP, Grover CM. Dentofacial pattern of tongue thrusters - a cephalometric study. J lnd Dent Assoc 1979;51:295-7.
4. Brodie AG. “Facial Pattern”. A theme on variation. Angle Orthod 1946;16:75-86.
5. Hanson ML, Barnard LW, Case JL. Tongue-thrust in preschool children. American Journal of Orthodontics and Dentofacial Orthopedics. 1969 Jul 1;56(1):60-9.
6. Bell D, Hale A. Observations of tongue-thrust swallow in preschool children. Journal of Speech and Hearing Disorders. 1963 May;28(2):195-7.
7. Tulley WJ. A critical appraisal of tongue-thrusting. American Journal of Orthodontics and Dentofacial Orthopedics. 1969 Jun 1;55(6):640-50.
8. Gellin ME. Digital sucking and tongue thrusting in children. Dental Clinics of North America. 1978 Oct;22(4):603-19.

9. Fletcher SG, Casteel RL, Bradley DP. Tongue-thrust swallow, speech articulation, and age. Journal of Speech and Hearing Disorders. 1961 Aug;26(3):201-8.
10. Ward M M, Malone S H D, Jann G R, Jann H W 1961 Articulation variations associated with visceral swallowing and malocclusion. Journal of Speech and Hearing Disorders 26: 334-341
11. Jann GR, Ward MM, Jann HW. A longitudinal study of articulation, deglutition, and malocclusion. Journal of Speech and Hearing Disorders. 1964 Nov;29(4):424-35.
12. Barber TK, Bonus HW. Dental relationships in tongue-thrusting children as affected by circumoral myofunctional exercise. The Journal of the American Dental Association. 1975 May 1;90(5):979-88.
13. Cayley AS, Tindall AP, Sampson WJ, Butcher AR. Electropalatographic and cephalometric assessment of tongue function in open bite and non-open bite subjects. The European Journal of Orthodontics. 2000 Oct 1;22(5):463-74.
14. Swinehart EW. A clinical study of open-bite. American Journal of Orthodontics and Oral Surgery. 1942 Jan 1;28(1):18-34.
15. Straub WJ. Malfunction of the tongue: Part I. The abnormal swallowing habit: Its cause, effects, and results in relation to orthodontic treatment and speech therapy. American Journal of Orthodontics. 1960 Jun 1;46(6):404-24.
16. Subtelny JD, Mestre JC, Subtelny JD. Comparative study of normal and defective articulation of/s/as related to malocclusion and deglutition. Journal of Speech and Hearing Disorders. 1964 Aug;29(3):269-85.
17. Brauer JS, Holt TV. Tongue thrust classification. The Angle Orthodontist. 1965 Apr;35(2):106-12.
18. Palmer JM. Tongue thrusting: A clinical hypothesis. Journal of Speech and Hearing Disorders. 1962 Nov;27(4):323-33.