Original Research Article

Evaluation of soft tissue chin thickness and lip thickness in different mandibular divergence patterns in Maratwada population-A cephalometric study

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ABSTRACT

Objective: To evaluate the soft tissue chin thickness using different points on lateral cephalogram. To evaluate the lip thickness using different points on lateral cephalogram. To find correlation between soft tissue thickness and lip thickness in different mandibular divergence patterns.

Materials and Methods: The sample size consisted of 120 lateral cephalogram of subjects who had not undergone orthodontic treatment. Lateral cephalogram of 120 subjects was divided under 3 groups based on mandibular divergence into low angle, medium angle and high angle cases. The changes observed in three groups were assessed using the ANOVA test and Posthoc Bonferroni test.

Results: 120 samples were collected according to the inclusion and exclusion criteria and cephalometric analysis was done. The correlation of the Mandibular Divergence and the soft tissue upper lip thickness is statistically significant with a test value of 3.378 and a p value of 0.037. The correlation of the Mandibular Divergence and the soft tissue lower lip thickness is not statistically significant. The correlation of Mandibular divergence and soft tissue chin thickness at anterior part pog-pog′ is not statistically significant. The correlation of Mandibular divergence and soft tissue chin thickness at Angle of the chin Gn-Gn′ is statistically significant. The correlation of Mandibular divergence and soft tissue chin thickness at Inferior part Me-Me′ is not statistically significant.

Conclusions: Soft tissue chin thickness was not uniform at all levels of chin.

1. Introduction

Facial attractiveness has gained much relevance in the latest years, by both patients and orthodontists.[1] Since the facial skeleton and its soft tissue drape determines the facial harmony and balance, so achieving a good facial aesthetics and harmonious soft tissue facial profile is an important treatment goal in orthodontics.

Soft tissue profile has been studied widely in orthodontics principally from lateral cephalometric radiographs. The analysis of the facial soft tissue profile was a concern for the pioneers of orthodontics such as Edward Angle and Calvin Case at the beginning of 20th century. Tweed in 1944 gave special attention to aesthetics, using cephalometric standards in a cross-sectional study of 95 patients with good facial aesthetics. To predict the surgical outcomes, precise analysis of the soft-tissue characteristics is required and the soft tissue is also influenced by functional factors such as thickness, tonicity and elasticity or stretchablity of the msculature.[2]

Group I	High angle/ hyperdivergent	SN-Go-Gn $\leq 27^o$
Group II	Medium angle/ normodivergent	SN-Go-Gn 27°-34°
Group III	Low angle/ hypodivergent	SN-Go-Gn $\geq 34^o$

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Table 1: Mandibular divergence andsoft tissue upper lip thickness (mm)

Angulations	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval Lower bound	95% Confidence Interval Upper bound	F value	P value
1	17	10.647	2.1849	.5299	9.524	11.770		
2	45	11.622	2.0146	.3003	11.017	12.227	3.378	.037
3	58	12.198	2.3600	.3099	11.578	12.819		
Total	120	11.763	2.2557	.2059	11.355	12.170		

2. Materials and Methods

Data was collected from patients visiting the Department of Orthodontics and Dentofacial Orthopaedics, of the institution wishing to take treatment and other volunteers who wished to take part in the study. The sample size consisted of 120 lateral cephalogram of subjects who had not undergone orthodontic treatment. Lateral cephalogram of 120 subjects was divided under 3 groups based on mandibular divergence into low angle, medium angle and high angle cases.[3]

2.1. Inclusion criteria

1. Lateral cephalogram taken with lips at rest.
2. Lateral cephalogram taken at natural head position.
3. Lateral cephalogram of Non-orthodontic treated cases.
4. Facial symmetry.
5. Lateral cephalogram of patients whose atleast three generations staying in Maharashtra.

2.2. Exclusion criteria

1. Previous orthodontic treatment or orthognathic surgery.
2. Craniofacial anomalie

The patients were grouped in three groups based on mandibular divergence as high angle (hyperdivergent), normal angle (normodivergent) and low angle (hypodivergent).

Mandibular divergence was determined using SN-Go-Gn angle.

2.3. Parameters

1. Sella-Nasion Plane (SN Plane)
2. Steiner's Mandibular plane (Go-Gn).
3. Mandibular plane angle (SN-Go-Gn).

3. Statistical Analysis

Data was collected by using a structure proforma. Data thus entered in MS excel sheet and analysed by using SPSS 24.0 version IBMUSA. Descriptive statistics of each variable was presented in terms of Mean, standard deviation and standard error of mean. Correlation between two quantitative variables was assessed by using posthoc Bonferroni correlation coefficient test (r). A p value of less than 0.05 was considered as statistically significant whereas a p value less than 0.001 was considered as highly significant.

4. Results

Table 1 Shows that the correlation of the Mandibular Divergence and the soft tissue upper lip thickness. The correlation of the soft tissue upper lip thickness in Group 1 i.e. High angle cases has the lowest value of 10.647 with a standard deviation of 2.1849 and Group 2 (Medium angle) has the average value of 11.622 with a standard deviation of 2.0146 and Group 3 (Low angle) has the highest value of 12.198 with a standard deviation of 2.3600. This difference is statistically significant with a test value of 3.378 and a p value of 0.037.Table 2 shows posthoc Bonferroni test.

According to Table 2 values, comparing the Group 1 (High angle) and Group 2 (Medium angle) shows a mean difference of -0.9752 and a standard error is 0.6297 with a p value of 0.373 which is statistically insignificant. When Group 1 (High angle) and Group 3 (Low angle) is being compared, it shows a mean difference of -1.5512 9752 and a standard error is 0.6100 with a p value of 0.037 which is statistically significant. Now comparing the Group 2 (Medium angle) and Group 3 (Low angle) shows a mean difference of -5.761 9752 and a standard error is 0.4394 with a p value of 0.577 which is statistically significant.

Table 3 Shows correlation of the Mandibular Divergence and the soft tissue lower lip thickness. The correlation of soft tissue lower lip thickness in Group 1 (High angle) has the lowest value of 14.53 with a standard deviation of 2.281 and Group 2 (Medium angle) has the average value of 15.28 with a standard deviation of 1.996 and Group 3 (Low angle) has the highest value of 15.12 with a standard deviation of 2.395. It has a test value of 2.853 and p value of 0.062 which shows that it is not statistically significant.

Table 4 Shows the Mandibular divergence andAnterior part pog- pog′·The correlation of Mandibular divergence and soft tissue chin thickness at anterior part pog-pog′ in Group 1 (High angle) has the highest value of 12.53 with a standard deviation of 1.924 and Group 2 (Medium angle) has the average value of 11.88 with a standard deviation of 2.398 and Group 3 (Low angle) has the lowest value of

Table 2: Multiple comparisons (posthoc Bonferroni test) Bonferroni

Dependent Variable	(I) Angle	(J) Angle	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Soft Tissue Upper Lip Thickness (mm)	1	2	-.9752	.6297	.373	-2.505	.554
		3	-1.5512(*)	.6100	.037	-3.033	-.069
	2	1	.9752	.6297	.373	-.554	2.505
		3	-.5761	.4394	.577	-1.643	.491
	3	1	1.5512(*)	.6100	.037	.069	3.033
		2	.5761	.4394	.577	-.491	1.643
Soft Tissue Lower Lip Thickness (mm)	1	2	-.748	.637	.727	-2.30	.80
		3	-1.393	.617	.077	-2.89	.11
	2	1	.748	.637	.727	-.80	2.30
		3	-.645	.444	.449	-1.72	.43
	3	1	1.393	.617	.077	-.11	2.89
		2	.645	.444	.449	-.43	1.72
Mandibular Divergence In Degrees SN-Go-Gn	1	2	8.149(*)	.957	.000	5.82	10.47
		3	16.227(*)	.927	.000	13.98	18.48
	2	1	-8.149(*)	.957	.000	-10.47	-5.82
		3	8.078(*)	.668	.000	6.46	9.70
	3	1	-16.227(*)	.927	.000	-18.48	-13.98
		2	-8.078(*)	.668	.000	-9.70	-6.46
Anterior Part Pog-Pog	1	2	.652	.646	.947	-.92	2.22
		3	1.047	.626	.292	-.47	2.57
	2	1	-.652	.646	.947	-2.22	.92
		3	.395	.451	1.000	-.70	1.49
	3	1	-1.047	.626	.292	-2.57	.47
		2	-.395	.451	1.000	-1.49	.70
Angle of The Chin Gn-GnI	1	2	.4248	.6160	1.000	-1.071	1.921
		3	.2988	.5968	1.000	-1.151	1.748
	2	1	-.4248	.6160	1.000	-1.921	1.071
		3	-.1261	.4299	1.000	-1.170	.918
	3	1	-.2988	.5968	1.000	-1.748	1.151
		2	.1261	.4299	1.000	-.918	1.170
Inferior Part Me-MeI	1	2	-.0268	.5137	1.000	-1.274	1.221
		3	-.5237	.4976	.884	-1.732	.685
	2	1	.0268	.5137	1.000	-1.221	1.274
		3	-.4969	.3584	.505	-1.368	.374
	3	1	.5237	.4976	.884	-.685	1.732
		2	.4969	.3584	.505	-.374	1.368

* The mean difference is significant at the .05 level.

Table 3: Mandibular divergence and soft tissue lower lip thickness (mm)

Angulations	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval Lower bound	95% Confidence Interval Upper bound	F value	P value
1	17	14.53	2.281	.553	13.36	15.70		
2	45	15.28	1.996	.298	14.68	15.88	2.853	.062
3	58	15.92	2.395	.314	15.29	16.55		
Total	120	15.48	2.271	.207	15.07	15.89		

Table 4: Mandibular divergence and anterior part (Pog- Pog′)

Angulations	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval Lower bound	95% Confidence Interval Upper bound	F value	P value
1	17	12.53	1.924	.467	11.54	13.52		
2	45	11.88	2.398	.358	11.16	12.60	1.464	.235
3	58	11.48	2.259	.297	10.89	12.08		
Total	120	11.78	2.280	.208	11.37	12.19		

Table 5: Mandibular divergence and angle of the chin (Gn-Gn′)

Angulations	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval Lower bound	95% Confidence Interval Upper bound	F value	P value
1	17	10.147	2.5542	.6195	8.834	11.460		
2	45	9.722	2.0631	.3075	9.102	10.342	.238	.789
3	58	9.848	2.1201	.2784	9.291	10.406		
Total	120	9.843	2.1500	.1963	9.455	10.232		

11.48 with a standard deviation of 2.259. It shows a test value of 1.464 and a p value of 0.235 which shows that it is not statistically significant.

Table 5 Shows the Mandibular divergence and Angle of the chinGn-Gn′. The correlation of Mandibular divergence and soft tissue chin thickness at Angle of the chin Gn-Gn′ in Group 1 (High angle) has the highest value of 10.142 with a standard deviation of 2.5542 and Group 2 (Medium angle) has the lowest value of 9.722 with a standard deviation of 2.0631 and Group 3 (Low angle) has the average values of 9.848 with a standard deviation of 2.1201, it shows a test value of 0.238 and a p value of 0.789 which shows that it is statistically significant.

Mandibular divergence and Inferiorpart Me-Me'. The correlation of Mandibular divergence and soft tissue chin thickness at Inferior part Me-Me′ in Group 1 (High angle) has the lowest value of 7.718 with a standard deviation of 2.0764 and Group 2 (Medium angle) has average value of 7.744 with a standard deviation of 1.5471 and Group 3 (Low angle) has the highest value of 8.241 with a standard deviation of 1.9039, it shows that a test value of 1.172 and a p value of 0.313 which shows that it is not statistically significant.

5. Discussion & Conclusions

The soft tissue upper lip thickness was seen to be highest in hypodivergent cases, and lower values were seen in hyperdivergent cases.

1. The soft tissue lower lip thickness was seen to be highest in hypodivergent cases, and lower values were seen in hyperdivergent cases.

2. The soft tissue chin thickness was seen to highest in high angle or hyperdivergent cases at anterior part of chin (Pog-Pog'), and lower values in low angle or hypodivergent cases.

6. Source of Funding

None.

7. Conflict of Interest

None.

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