Section: Research Paper

A QUANTATIVE COMPARISION OF SOFT TISSUE CHIN THICKNESS IN ADULT PATIENTS WITH DIFFERENT GROWTH PATTERNS IN CHHATTISGARH POPULATION

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Abstract

Aim and Objective: To assess the relationship between various growth trends in the Chhattisgarh population and the thickness of the soft tissue at the chin (STC).

Materials and Method: 80 lateral cephalograms of adult patients who had visited the Department of Orthodontics and Dentofacial Orthopaedics, including 40 men and 40 women, within the age range of 18 to 30 years. Based on the cephalometric mandibular plane inclination to anterior cranial base (MP/SN), all patients in this study were categorised into four subgroups: low, medium low, medium-high, and high MP/SN at the pogonion (Pog), gnathion (Gn), and menton (me), the soft tissue chin thickness is calculated (Me). Student's t-test and two-way analysis of variance were used to assess group differences.

Result: The STC values were lower in the high group (5.60 1.07) than in all other groups at Gn mean values (high group 7.40 STC8.80) and at Me (high group 4.40 1.07; other groups mm, 5.80 STC mm; P5.001).

Conclusion: STC values were higher in men than in women. According to hyper divergent face patterns, the STC is narrower at Gn and Me than Pog.

Introduction: When determining the ideal orthodontic treatment plan, facial pattern should be considered.[1]Fordeveloping and adult patients, the vertical dimension affects orthodontic diagnosis and treatment plan[2]. Commonly used measures have emerged to identify the type of vertical face that includes anterior facial height (AFH) and posterior facial height.[3]The importance of the vertical proportion using mandibular plane angle in diagnosis and treatment planning are also emphasized in other studies[4]. The vertical dimension comprises the relationships between bone structures, dental tissue and soft tissue, which facilitates a complete evaluation.[5] Excessive growth in the vertical dimension of the face can result in a gummy smile, lip position and the long face pattern.[6]

The soft tissues covering the face (muscles, fat, and skin) can develop in proportion or disproportion to the corresponding skeletal components. Differences between skeletal and soft tissues might result in a disassociation between the position of the underlying bony structures and the facial appearance.[7] Soft tissue changes linked with orthognathic surgery are described by several authors.[8]

Several writers have described the soft tissue alterations linked with genioplasty. Bell and Dawn[9] found in their investigation that soft tissue pogonion at a ratio of 0.57:1 to hard tissue. Additional studies[10,11] revealed 1:1 ratio movement at the chin area.

Patients with vertical growth patterns frequently have narrow alveoli, orthodontic treatment is challenging, facial aesthetics are damaged and appear worse in such patients[12]. The appropriate mode of therapy typically involves genioplasty to further correct retrogenia, as well as superior repositioning of the maxilla, maxillary setback to address maxillary prognathism, counter-clockwise rotation of the jaw, which helps in positioning of mandibular advancement.[13,14]Therefore, this study was carried out to assess the association between various development patterns and STC thickness in the Chhattisgarh population measured at different chin levels, as well as the difference in STC thickness between males and females, in adult patients.

Materials and Method:

Inclusion Criteria: 80 lateral cephalograms of individuals between the ages 18 to 30 years were taken at rest without lip tension and had well-defined, recognizable chin structures on the radiograph.

Exclusion Criteria: History of previous orthognathic surgery or orthodontic therapy, a craniofacial abnormality, or the existence of a non-constant soft tissue contour at the level of the chin that indicates chin strain.

A natural head position was used to take the lateral cephalometric radiographs. The maxilla and mandible vertical positions in relation to the anterior cranial base, horizontal planes, and each other were measured in terms of angles by tracing lateral cephalograms. The angles included the mandibular plane to anterior cranial base (MP/SN), the mandibular plane to horizontal (MP/H), the palatal plane to horizontal (PP/H), and the mandibular plane to the horizontal (MP/H). The ANB angle was used to evaluate the sagittal jaw relationship.

Three distinct levels of the STC thickness were measured: Pog-Pog', Gn-Gn', and Me-Me' are the distances between the bony menton (Me) and its vertical projection (Me') on the vertical line passing through the soft tissue menton, respectively. Pog-Pog' is the length between the bony pogonion (Pog) and its horizontal projection (Pog') over the horizontal line passing through the soft tissue pogonion. According to the varied growth patterns identified by the mandibular plane to cranial base angle (MP/SN; average = 32°5° low MP/SN (N-20)= 27° medium-low MP/SN (N-20)-; 27° to 32°, medium-high MP/SN (N-20)-; 32° to 37° and high MP/SN (N-20)-:- 37.°, patients were divided into four groups.

Statistical Methods: Cephalometric angular and STC measurements were compared across the four groups using a two-way analysis of variance and a post-hoc test (Bonferroni). The four groups of men and women were compared individually using one-way analysis of variance, and the Pearson correlation coefficient assessed the association between STC values and mandibular divergence angle.

Results: All groups reported vertical cephalometric values (PP/H, MP/H, and MP/SN) that were congruent with the first stratification of mandibular divergence. Except for PP/H in comparison between groups L-MH, ML-MH, and MH-H. MP/H in comparison, these values were statistically insignificant among the groups (P = 5.022-0.001). Among the four groups, the ANB angle was statistically significant (Table 1).

The hypodivergent group L had the greatest readings for all STC thicknesses, which then steadily fell across the groups, with the hyperdivergent group H having the lowest data (Table 2). At the level of Gn, the distance Gn-Gn' was statistically significantly different across groups L-ML, L- MH, and LM-MH (group L=8.90 1.91 mm; group ML = 8.90 1.91 mm; group MH= 8.20 1.10 mm; group H=6.10 1.07 mm).On a level with "Me, Me-Me" There was only a statistically significant difference between groups L-ML and L-MH (group L= 6.101.55

mm, group ML=7.101.97 mm, group MH=6.400.94 mm, and group H=4.701.52 mm). Only the differences between the groups L-ML, MLMH, and L-MH were statistically significant at the level of Pog (Pog-Pog') (L=9.901.91 mm, ML=10.901.61 mm, MH=10.201.10 mm, and H=8.101.48 mm).

In all groups, men had statistically significant larger chin measurements than women (Table 3). Statistically significant relationships between STC thickness and cephalometric values were low and negative: r = -0.14 to -0.42

Table 1: Mean degree comparison between various groups for variable ANB:

Groups	N	Mean	SD	f-value	p-value
Low	20	2.70	1.12	18.054	0.001 (h.s)
Medium-low	20	4.60	1.31		
Medium-high	20	2.60	0.68		
High	20	5.60	2.41		

Table 2: Mean comparison between various groups for variable POG-POG, GN-GN, ME-ME

Group 1	Group 2	p-value (pog-pog)	p-value (Gn-Gn)	p-value (Me-Me)
Low	Medium-low	0.276 (n.s)	0.276 (n.s)	0.262 (n.s)
	Medium-high	1.000 (n.s)	1.000 (n.s)	1.000 (n.s)
	High	0.003 (s)	0.003 (h.s)	0.032 (s)
Medium-low	Medium-high	0.958 (n.s)	0.958 (n.s)	0.931 (n.s)
	High	0.001 (s)	0.000 (h.s)	0.001 (s)
Medium-high	High	0.001 (s)	0.001 (h.s)	0.005 (s)

Table 3: Gender wise Comparison of various parameter among groups:

Gender	Values	Low		Medium-low		Medium-high		High		p-value
		Mean	SD	Mean	SD	Mean	SD	Mean	SD	
Female	PP/MP	23.40	1.07	23.60	1.07	26.00	1.49	27.80	4.77	0.001 (s)

	PP/H	1.80	0.78	0.60	0.51	1.20	0.78	0.60	0.51	0.001 (s)
	MP/H	23.00	3.46	24.00	2.90	26.40	1.26	32.40	7.79	0.001 (s)
	MP/SN	26.40	0.51	28.40	1.42	34.40	1.71	40.20	2.85	0.001 (s)
	ANB	2.60	1.42	4.60	1.26	2.40	0.51	6.40	3.16	0.001 (s)
	POG-POG	9.00	1.15	11.80	1.03	11.00	0.66	8.80	1.03	0.001 (s)
	GN-GN	7.00	1.15	10.00	1.33	9.00	0.66	6.60	0.84	0.001 (s)
	ME-ME	5.20	1.03	8.20	1.68	7.00	0.66	5.00	0.94	0.001 (s)
Male	PP/MP	23.00	0.94	24.40	1.95	25.00	1.33	31.60	3.23	0.001 (s)
	PP/H	1.60	0.51	1.20	0.78	1.60	1.07	0.00	0.0	0.001 (s)
	MP/H	23.40	1.57	25.60	1.07	25.20	0.78	31.80	4.18	0.001 (s)
	MP/SN	24.00	2.49	27.80	0.78	34.00	2.00	40.00	1.76	0.001 (s)
	ANB	2.80	0.78	4.60	1.42	2.80	0.78	4.80	1.22	0.001 (s)
	POG-POG	10.80	2.14	10.0	1.63	9.40	0.84	7.40	1.57	0.001 (s)
	GN-GN	8.80	2.14	7.80	1.80	7.40	0.847	5.60	1.07	0.001 (s)
	ME-ME	7.00	1.49	6.0000	1.63	5.80	0.781	4.40	1.95	0.001 (s)

Statistical test: ANOVA; (p<0.05- significant, CI=95%), H.S.- Highly Significant

Discussion: The purpose of this study was to measure and evaluate the association between the different growth patterns and the soft tissue of the chin and lip. When descriptive statistics were performed for all variables, it was found that the mean values of all the soft tissue features showed a positive correlation. The findings shows that STC at Gn-Gn' and Me-Me' differ significantly, there is no statistically significant difference in Pog-Pog'.

Severe hyper divergence appears to alter the STC thickness, most likely due to increased soft tissue stretching in the chin. The soft tissue thickness was thinner in the high group due to the extreme hyperdivergent mandible.[15]

Soft tissue growth greatly affects an individual's growth pattern, according to Macari and Hanna's analysis, which revealed that the STC thickness varied significantly between hyper- and hypodivergent people with diverse mandibular divergence patterns[16]. Similar findings have been observed in studies of the long face syndrome, which is caused by nasal obstruction[17,18.]

As STC is thinner than ML and MH, it's probable that this factor played a more significant role in the lack of significance at Me than in the statistical significance between group H and each of the medium groups that was observed at Gn. The stretch ability was possibly reduced by me compared to Gn. The finding that group H was statistically significantly different from only group L at Me highlights the fact that extreme hyperdivergence differs from the other groups both in soft tissue thickness and in response to vertical growth since STC at Me in group H is actually the thinnest of all distances in all groups (Table 3). Our findings, with the exception of gender differences in group H, are similar with those of prior studies by Brodie[19] and Macari[20], which indicated that men have thicker soft tissue in all areas of the face when compared to women. The STC reduction in participants with the highest levels of hyperdivergence and the highest levels of lower face height may have had an equivalent effect on group H.

According to Feres et al.[21] findings, who evaluated the STC in several divergent patterns but only at the level of Pog, Other writers that measured the longitudinal growth of developing individuals with long face patterns noted greater STC growth at Intervals in childhood and suggested that this disguised the vertical abnormalities. [22]

However, this growth stopped sooner than in children with short face patterns, which finally caught up to the long face patterns. This observation confirms the similarity of STC at Pog across groups that we previously discovered. In our investigation, the ANB angle, was

statistically significant among the divergence groups (Table 1); nevertheless, in other studies, it has not been used as a criteria for classifying vertical divergence. When groups ML and MH are combined, the mean STC measurements are consistent with the initial norms established by Holdaway[23] (Pog-Pog'= 10-12 mm) and the results of Scheideman et al.[24] who studied soft tissue thickness in a sample of adults with normal ANB angle. STC thicknesses in normodivergent subjects (groups ML and MH) should approach normative values and are actually compatible with norms reported in adult patients.

Despite the fact that the results support the goal of our study, which was to analyse STC thickness as one of the contributing factor to chin extension, more research is necessary to determine the existence and role of other variables in defining the overall chin and facial aesthetics.

Conclusions: When compared to participants who had a hypodivergent pattern, subjects with a hyperdivergent mandible showed a statistically considerably thinner STC at Gn and Me.

- All STC parameters were higher in men than in women.
- The results imply that STC thickness in a hyperdivergent pattern should be viewed differently at its most anterior point (Pog) in comparison to its inferior markers (Gn and Me).More research on this difference is needed, especially in light of its possible implications for genioplasty in patients with significant hyperdivergence who may need more chin advancement to make up for a higher vertical height rather than only initially inadequate chin projection.

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