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 – 6, Issue – 5, September- 2023, Page No. :106 - 115

Evaluation of peri-oral soft tissues in skeletal Class I, Class II division 1 and Class III - A lateral cephalometric study

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Citation of this Article: Sanila Khan, Dr. Atul Singh, Dr. Omkar Yadav, Dr. Sunegha Kundal, Sunaina Singh, Nikita Soni, "Evaluation of peri-oral soft tissues in skeletal Class I, Class II division 1 and Class III - A lateral cephalometric study", IJDSIR- September- 2023, Volume –6, Issue - 5, P. No.106– 115.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Aims and Objectives of Study: To evaluate the perioral soft tissue characteristics of skeletal class II div 1 and class III subjects with various growth patterns compared with skeletal class I subjects.

Material and Methods: Pretreatment lateral cephalograms of 90 patient's were taken. Sample consisted of 3 skeletal pattern groups Class I, Class II, Class III which were further sub divided depending upon growth pattern i.e Average, Horizontal, Vertical depending upon SN/MP angle. Comparison was drawn between Males and Females intragroup also.

Results: Class I vertical showed highest means for upper lip thickness, basic lower lip thickness, rickets E-line to upper and lower lip, lower lip length. ClassI average showed highest means for subnasale to H - line, and nasolabial angle. Class I horizontal showed highest mean for chin thickness vertical measurement and upper lip

length. Class II vertical showed highest mean for lower lip to H- line and H- angle. Class III vertical showed highest mean for chin thickness horizontal.

Conclusion: Clinicians need to evaluate perioral soft tissues based on the skeletal pattern as well as dental inclinations to obtain balance in perioral muscle activity.

Keywords: Skeletal, Class, Cephalometric, Radiographs

Introduction

The soft-tissue profile plays an important part in our orthodontic considerations. Usually, as we correct malocclusions, we bring about changes in appearance that are pleasing to all concerned. We should determine beforehand that the proposed orthodontic treatment will not result in adverse facial change. Since malocclusion, tooth stability, and facial esthetics are influenced in part by the total mass, position in space, and general activity of the soft-tissue structures, the orthodontist is vitally concerned with soft-tissue morphology and the posture of the lips.1

This study is to evaluate the peri-oral soft tissue characteristics of skeletal ClassII division 1 and ClassIII subjects with various growth patterns and compare it with skeletal ClassI subjects.

MaterialAndMethods

The sample was consecutively selected and included A total of 90 (40 men, 50 women) subjects. The sample consisted of 3 skeletal pattern groups, Class I (control group)-30, Class II-30 and Class III-30 (experimental groups) with different growth patterns.

Inclusion Criteria

- All the subjects were within the age group of 20 to 30years.
- Healthy patients with no significant medical history and Permanent dentition were considered.
- Patients with symmetrical face without gross facial asymmetry.

Materials

The Lateral cephalograms of the subjects were taken prior to their orthodontic treatment to classify into skeletal Class I, Class II and Class III malocclusion with informed consent using a standardized x-ray machine - Care Stream 8100C - Panoramic and Cephalometric System. All Lateral Cephalometric radiographs were taken in natural head position with the teeth in maximum intercuspation in a cephalostat oriented to the Frankfort horizontal plane, lips in relaxed position.(fig 1)

Methodology

Lateral Cephalograms were obtained for each subject and cephalometric tracings, landmark identification and measurements were performed on acetate paper. Lateral cephalometric radiographs were further grouped into three subgroups based on cephalometric mandibular plane inclination to anterior cranial base (MP/SN) as Horizontal = MP/SN $\leq 27^\circ$, average = MP/SN: 27° -37° and Vertical = MP/SN $\geq 37^\circ$ (fig-3).

Statistical Analysis

Data was then summarized by finding means and standard deviations. In each group, means and standard deviations were determined. SPSS 20.0 software was used for statistical analysis. Confidence interval was set at 95%. P value < 0.05 was considered statistically significant. Mann Whitney U test was used for intergroup comparison.

In first step intergroup comparison was done between skeletal class I and class II, III with their subgroups (different growth patterns). In second step intra group comparison was done between males and females of skeletal class I, II, III with their subgroups.

Figure 1: Subject Positioned In A Cephalostat (Frontal View)

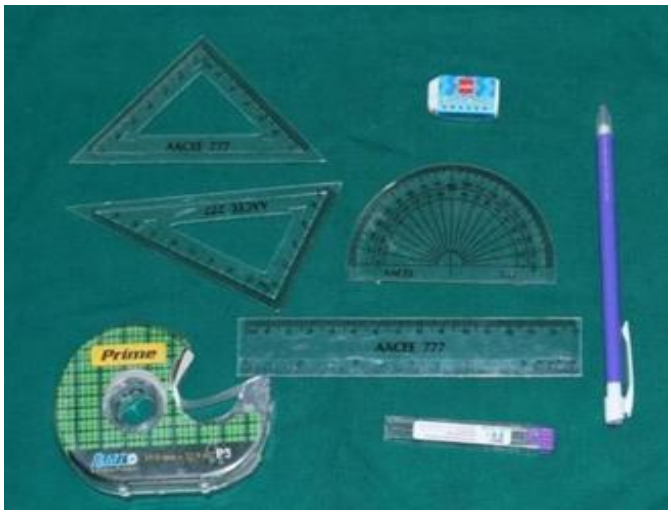

Figure 2: Armamentarium Used for Tracing

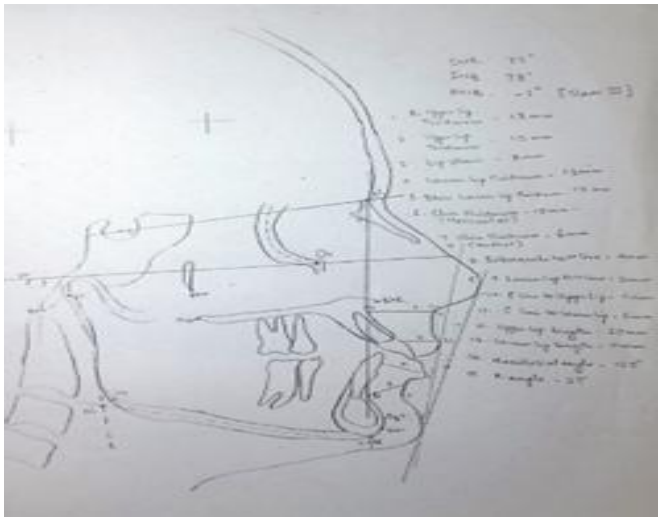

Figure 3: Cephalometric Soft Tissue Analysis

Figure 4: Cephalostat

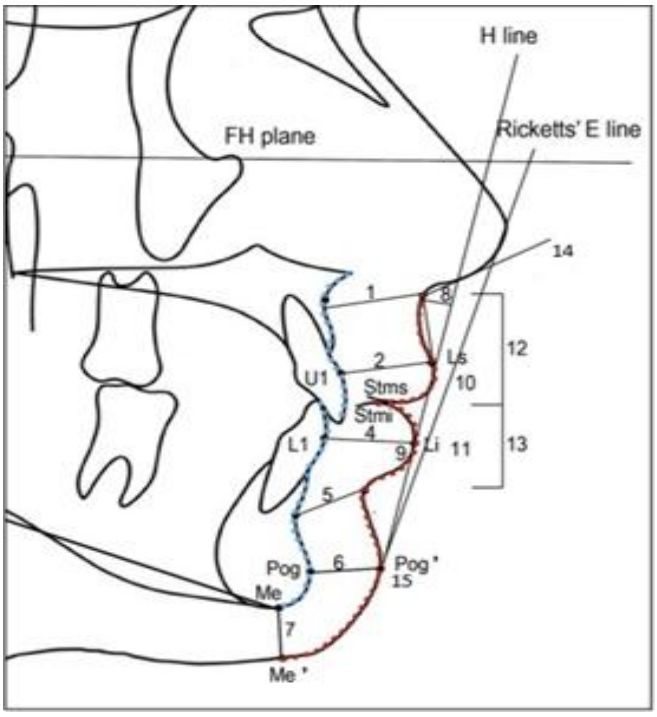

Figure 5: Perioral Soft Tissue Landmarks for Analysis

Results

The mean and standard deviation of soft tissue thickness recorded for horizontal, average and vertical subgroups in skeletal class I, class II and class III malocclusions.

The statistical analysis showed there is significant difference in classI, classII, classIII malocclusions. ClassI vertical showed highest means for upper lip thickness, basic lower lip thickness, rickets E-line to upper and lower lip, lower lip length with mean of 12.6±2.32, 13.4±2.07, 2.2±1.48, 4.1±2.13, 16.3±1.89 respectively. ClassI average showed highest meansfor subnasale to H- line, and nasolabial angle with mean 7.6±2.32 and 100±11.86 respectively. ClassI horizontal showed highest mean for chin thickness vertical measurement and upper lip length with mean value 7.4±1.26 and 17.2±1.99 respectively. ClassII vertical showed highest mean for lower lip to H- line and H-angle with mean of 3.7±1.95 and 22.4±3.06 respectively. ClassIII vertical showed highest mean for chin thickness horizontal measurement with mean value of 12.2±2.04. (Table-1)The mean and standard deviation of soft tissue thickness recorded for horizontal, average and vertical subgroups in skeletal classI, males and females. The statistical analysis showed there is significant difference. In classI horizontal patients upper lip strain more in males then females (mean 4.25±0.5>3.17±0.75). In classI average patients chin thickness more in males then females (mean11.83±1.17>9.75±1.26). In classI vertical patients basic upper lip thickness more in males then females (17.5 ± 3.32 > 13.83 ± 1.33). (Table - 2)The mean and standard deviation of soft tissue thickness recorded for horizontal, average and vertical subgroups in skeletal classII males and females. The statistical analysis showed there is significant difference. In class II horizontal patients basic upper lip thickness more in males then females (mean 14.4±0.55>12.2±1.79). In class II vertical patients Rickets E-line to lower lip more in females then males (mean 4.33±0.82>1.75±0.96). (Table-3)

The mean and standard deviation of soft tissue thickness recorded for horizontal, average and vertical subgroups in skeletal class III, males and females. The statistical analysis showed there is significant difference. In class III horizontal patients basic upper lip thickness and upper lip length more in males then females with mean of

16.4±2.19>12.6±1.82,17.4±2.79>13.8±1.48respectively. And lower lip H-line more in femalesthen males with mean of 1.8±0.84> 0.4±0.55. In class III vertical patients upper lip thickness and upper lip length more in females then males with mean of 10.5 ± 1.05> 6.5 ± 1.91 and 16.33 ± 1.21 > 12.5 ± 1.73 respectively. (Table-4) Skeletal measurements (mean and standarddeviations) for all subjects were:

Table 1: Soft tissue analysis of all subjects in skeletal class I, II, III (Mean and SD) and comparison between the groups.

Variable	Class I- H		Class I- A		Class I- V		Class II- H		Class II- A		Class II- V		Class III- H		Class III- A		Class III- V		Class IH vs Class IIH	Class IA vs Class IIA	Class IV vs Class IIV	Class IH vs Class IIIH	Class IA vs Class IIIA	Class IV vs Class IIIV
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	P value	P value	P value	P value	P value	P value
AGE	23.1	2.08	24.1	3.11	24.7	3.27	23.5	2.37	23.2	2.74	22.7	2.21	25.8	3.19	22.4	2.32	25.1	2.23	.70	.49	.15	.07	.19	.88
B. UL THICKNESS	14.1	2.23	13.7	2.58	15.3	2.87	13.3	1.7	13	2.31	13.1	1.6	14.5	2.76	12.8	1.48	14	1.7	1.00	.42	.05	.67	.49	.35
UL THICKNESS	11.4	1.96	11.1	2.77	12.6	2.32	9.9	2.47	9.8	2.1	7.7	3.53	12.5	1.78	11.9	2.13	8.9	2.47	.10	.23	.00	.08	.10	.00
UL STRAIN	3.6	0.84	2.5	1.08	4.2	2.3	3.4	2.01	3.4	2.17	4.2	2.35	3.9	2.28	3.2	2.2	3.4	1.58	.67	.40	.88	.91	.67	.40
LL THICK	12.8	1.48	12.7	1.89	14.4	1.9	13.8	1.99	14.3	2.45	13.9	2.81	13.5	1.72	13.2	2.04	13.4	1.26	.26	.18	.52	.36	.62	.14
B. LL THICKNESS	11.2	1.55	12.1	1.79	13.4	2.07	10.4	2.27	12	2.54	9.4	2.63	12.4	1.51	12.7	1.89	10.8	1.55	.25	.76	.00	.10	.57	.01
CH THICKNESS-H	11.1	1.52	11	1.56	9.2	1.69	9.5	2.17	9.4	2.63	9.3	2.71	12.2	2.04	8	1.76	10	2.31	.09	.11	.97	.25	.00	.49
CH THICKNESS- V	7.4	1.26	5.5	2.17	6	1.7	7.8	1.93	6.3	3.06	6.4	2.46	10.3	2.79	4.4	2.07	5.7	3.37	.70	.49	.82	.01	.32	.47
SUBN TO H-LINE	6.2	1.69	7.6	2.32	7.5	2.84	7	2.36	6.3	2.83	6.1	3.51	5.8	1.55	3.8	1.87	6.4	2.01	.49	.38	.40	.64	.00	.38
LL TO H-LINE	1.4	1.26	2.5	1.27	3.8	1.55	0.9	2.77	2.4	1.51	3.7	1.95	1.1	0.99	-2	3.2	3	1.33	.62	.73	.97	.46	.00	.16
R E-LINE-U	2	1.41	1	1.94	2.2	1.48	0.1	2.38	2	1.15	1.6	1.78	-2.3	3.13	-2.2	2.3	-2.4	2.01	.06	.22	.31	.00	.00	.00
R E-LINE-L	2.2	1.48	1.7	2.58	4.1	2.13	2.8	5.18	2.5	1.78	3.3	1.57	0.6	2.99	2.3	2.41	-0.3	1.77	.51	.44	.44	.03	.73	.00
UL LENGTH	17.2	1.99	17.1	1.79	15.4	1.65	14.1	2.33	15.1	2.33	15.5	2.59	15.6	2.84	13.5	1.96	14.8	2.39	.01	.06	.94	.20	.00	.64
LL LENGTH	14.3	2.31	16	2.11	16.3	1.89	13.9	2.13	15.2	2.74	14	2.26	15	2.11	13.6	2.01	16.3	2.5	.91	.54	.03	.30	.02	.88
NLA	89.9	5.26	100	11.86	92.9	14.79	90	7.51	92.1	8.23	92.2	5.9	84.7	7.72	91.5	5.25	93.9	8.13	.94	.05	.82	.10	.03	.91
H-ANGLE	17	2.49	20.5	1.65	19.7	2	21.2	1.55	21.5	1.9	22.4	3.06	13.1	2.02	19.9	2.69	15	2.71	.00	.33	.05	.00	.70	.00

Table 2: Soft tissue analysis between the sexes for each group in skeletal class I. (Mean and SD).

Variables	Class I H				p value	Class I A				p value	Class I V				p value
	Male		Female			Male		Female			Male		Female		
	Mean	SD	Mean	SD		Mean	SD	Mean	SD		Mean	SD	Mean	SD	
AGE	23.25	2.63	23	1.9	.91	24.83	3.49	23	2.45	.39	26	2.31	23.83	3.71	.39
B. UL THICKNESS	15	3.56	13.5	0.55	.74	14.33	3.01	12.75	1.71	.38	17.5	3.32	13.83	1.33	.03
UL THICKNESS	12	2	11	2	.11	12	3.22	9.75	1.26	.19	12.5	1.91	12.67	2.73	1.00
UL STRAIN	4.25	0.5	3.17	0.75	.04	2.17	1.17	3	0.82	.23	4.25	2.75	4.17	2.23	.91
LL THICK	13.75	1.89	12.17	0.75	.16	13	1.9	12.25	2.06	.38	15.25	1.26	13.83	2.14	.39
B. LL THICKNESS	11.75	1.71	10.83	1.47	.38	12.83	1.72	11	1.41	.13	12.75	1.26	13.83	2.48	.59
CH THICKNESS-H	12	0.82	10.5	1.64	.10	11.83	1.17	9.75	1.26	.04	9	2.45	9.33	1.21	.66
CH THICKNESS- V	7.75	2.06	7.17	0.41	1.00	5.5	2.43	5.5	2.08	1.00	6.5	1.29	5.67	1.97	.51
SUBN TO H-LINE	6.5	1.73	6	1.79	.59	6.83	2.04	8.75	2.5	.28	8.25	4.19	7	1.79	.67
LL TO H-LINE	1	0.82	1.67	1.51	.27	2	1.1	3.25	1.26	.10	3.75	1.5	3.83	1.72	.66
R E-LINE-U	2	0.82	2	1.79	1.00	0.5	2.43	1.75	0.5	.32	2.75	2.06	1.83	0.98	.37
R E-LINE-L	1.5	1	2.67	1.63	.21	0.33	2.16	3.75	1.71	.03	4.5	2.38	3.83	2.14	.67
UL LENGTH	17.75	0.5	16.83	2.56	1.00	17.5	1.87	16.5	1.73	.38	16	0.82	15	2	.51
LL LENGTH	14.75	3.59	14	1.26	.74	16.17	1.94	15.75	2.63	.83	16	2.94	16.5	1.05	1.00
NLA	89.75	4.72	90	6.03	.83	99.5	12.47	100.75	12.71	.75	90	21.43	94.83	10.34	.59
H-ANGLE	17	2.16	17	2.9	.66	20.83	1.72	20	1.63	.38	20.25	2.5	19.33	1.75	.45

Table 3: Soft tissue analysis between the sexes for each group in skeletal class II. (Mean and SD).

Variables	Class II H				p value	Class II A				p value	Class II V				p value
	Male		Female			Male		Female			Male		Female		
	Mean	SD	Mean	SD		Mean	SD	Mean	SD		Mean	SD	Mean	SD	
AGE	24.4	1.82	22.6	2.7	.20	24	3.65	22.67	2.16	.59	24.25	2.22	21.67	1.63	.09
B. UL THICKNESS	14.4	0.55	12.2	1.79	.03	13.5	3.32	12.67	1.63	.91	13.75	2.22	12.67	1.03	.38
UL THICKNESS	11.4	2.51	8.4	1.34	.07	9	2.16	10.33	2.07	.28	6.5	5.51	8.5	1.52	.59
UL STRAIN	3.8	2.17	3	2	.52	4	2.16	3	2.28	.45	5	3.37	3.67	1.51	.45
LL THICK	14.2	2.59	13.4	1.34	.52	14.25	3.2	14.33	2.16	.67	15	3.56	13.17	2.23	.45
B. LL THICKNESS	11.2	3.03	9.6	0.89	.24	13	3.65	11.33	1.51	.52	8.75	1.26	9.83	3.31	.23
CH THICKNESS-H	9	2.74	10	1.58	.60	9	1.63	9.67	3.27	.59	10.5	3.42	8.5	2.07	.39
CH THICKNESS- V	8.4	2.3	7.2	1.48	.40	5.5	1.91	6.83	3.71	.44	6.75	4.03	6.17	0.98	.91
SUBN TO H-LINE	6.4	2.07	7.6	2.7	.53	6.75	1.89	6	3.46	.75	4.25	2.87	7.33	3.56	.16
LL TO H-LINE	1.6	1.82	0.2	3.56	.40	3	1.83	2	1.26	.32	2.5	1.29	4.5	1.97	.08
R E-LINE-U	0.6	2.7	-0.4	2.19	.24	2.5	1.29	1.67	1.03	.32	2.25	2.22	1.17	1.47	.44
R E-LINE-L	2.6	6.69	3	3.94	.67	1.25	0.96	3.33	1.75	.06	1.75	0.96	4.33	0.82	.01
UL LENGTH	14.2	2.95	14	1.87	.59	14.75	2.63	15.33	2.34	.91	15	3.37	15.83	2.23	.67
LL LENGTH	13.8	2.17	14	2.35	.83	15.5	3.42	15	2.53	.75	13	2.71	14.67	1.86	.23
NLA	93.8	5.26	86.2	7.95	.21	96.25	11.18	89.33	4.89	.28	95.75	4.65	89.83	5.74	.13
H-ANGLE	21.8	1.79	20.6	1.14	.29	20.75	0.5	22	2.37	.51	23.25	2.87	21.83	3.31	.23

Table 4: Soft tissue analysis between the sexes for each group in skeletal class III. (Mean and SD)

Variables	Class II H				p value	Class II A				p value	Class II V				p value
	Male		Female			Male		Female			Male		Female		
	Mean	SD	Mean	SD		Mean	SD	Mean	SD		Mean	SD	Mean	SD	
AGE	24.4	1.82	22.6	2.7	.20	24	3.65	22.67	2.16	.59	24.25	2.22	21.67	1.63	.09
B. UL THICKNESS	14.4	0.55	12.2	1.79	.03	13.5	3.32	12.67	1.63	.91	13.75	2.22	12.67	1.03	.38
UL THICKNESS	11.4	2.51	8.4	1.34	.07	9	2.16	10.33	2.07	.28	6.5	5.51	8.5	1.52	.59
UL STRAIN	3.8	2.17	3	2	.52	4	2.16	3	2.28	.45	5	3.37	3.67	1.51	.45
LL THICK	14.2	2.59	13.4	1.34	.52	14.25	3.2	14.33	2.16	.67	15	3.56	13.17	2.23	.45
B. LL THICKNESS	11.2	3.03	9.6	0.89	.24	13	3.65	11.33	1.51	.52	8.75	1.26	9.83	3.31	.23
CH THICKNESS-H	9	2.74	10	1.58	.60	9	1.63	9.67	3.27	.59	10.5	3.42	8.5	2.07	.39
CH THICKNESS- V	8.4	2.3	7.2	1.48	.40	5.5	1.91	6.83	3.71	.44	6.75	4.03	6.17	0.98	.91
SUBN TO H-LINE	6.4	2.07	7.6	2.7	.53	6.75	1.89	6	3.46	.75	4.25	2.87	7.33	3.56	.16
LL TO H-LINE	1.6	1.82	0.2	3.56	.40	3	1.83	2	1.26	.32	2.5	1.29	4.5	1.97	.08
R E-LINE-U	0.6	2.7	-0.4	2.19	.24	2.5	1.29	1.67	1.03	.32	2.25	2.22	1.17	1.47	.44
R E-LINE-L	2.6	6.69	3	3.94	.67	1.25	0.96	3.33	1.75	.06	1.75	0.96	4.33	0.82	.01
UL LENGTH	14.2	2.95	14	1.87	.59	14.75	2.63	15.33	2.34	.91	15	3.37	15.83	2.23	.67
LL LENGTH	13.8	2.17	14	2.35	.83	15.5	3.42	15	2.53	.75	13	2.71	14.67	1.86	.23
NLA	93.8	5.26	86.2	7.95	.21	96.25	11.18	89.33	4.89	.28	95.75	4.65	89.83	5.74	.13
H-ANGLE	21.8	1.79	20.6	1.14	.29	20.75	0.5	22	2.37	.51	23.25	2.87	21.83	3.31	.23

Discussion

A proportionate relationship among the different structures of a face is the key to its esthetic and pleasing appearance. The facial profile is determined by the facial soft tissue thickness and dental and skeletal characteristics. It has been reported that soft tissues more closely determine therapeutic modifiability. Thus, soft tissue analysis is a critical part in orthodontic decision making, and this can be accomplished by recognizing

the differences in the soft tissue thickness in each skeletal classification.

Improvement in facial appearance has long been recognized as the most important motive for patients to accept orthodontic treatment. The essential determinant for facial esthetics is an understanding of the relationship between the facial bones and soft tissue. It was previously thought that the configuration of the soft tissue profile was primarily related to the basic skeletal configuration. However, there have been reports to indicate that soft tissue acts independently of the basic dentoskeletal base, since soft tissue is very variable in thickness, and is considered to be the main factor in determining a patient's final facial profile.

The important aspect of soft tissue analysis has been acknowledged by several investigators, and it has been suggested that it is inadequate to use hard tissue analysis alone for orthodontic diagnosis and treatment planning. The interrelationship between the soft tissue profile and the underlying skeletal pattern has been reported by many researchers, but this issue still remains controversial.

Riedel stated that there are strong interconnections between the skeletal pattern and the soft tissue profile, whereas others have suggested that the soft tissue profile was not matched to the skeletal pattern because of the variations of individual factors. In this study, we assumed that the soft tissue thickness would be influenced by the sagittal and vertical positions of the underlying hard tissues, including the skeletal and dental positions. The covering facial soft tissues (muscles, fat, skin) can develop in proportion or disproportion to the corresponding skeletal structures. Variations in thickness, length, and tonicity of the soft tissues may affect the position of and the relationships among the facial structures thereby affecting facial esthetics. Such variations between skeletal and soft tissues can cause a disassociation between the position of the underlying bony structures and the facial appearance that may shift treatment into the range of orthognathic and cosmetic surgery.[8]

This study is to measure and compare the perioral soft tissue thickness in adult patients with Class I, Class II and Class III malocclusion with different growth patterns and also between males and females which will help in diagnosis and treatment planning during the orthodontics treatment and orthogenetic surgery. According to Schudy and Isaacson et al, the degree of inclination of the mandible to the cranial base (SN-MP) has an effect on mandibular rotation.

The larger the SN-MP angle, the more the mandible tends to become steeper and the more the chin moves backward, and vice versa. Therefore, we assumed that the characteristics of soft tissue measurements would be variable even in the same skeletal class I accompanied by a different vertical pattern.

The study done by Young-Joo Lee, Jong-Tae Park, and Jung- Yul Cha in on Lateral cephalograms of 99 Korean adults (44 women, 45 men; mean age, 23.4 years) concluded that most measurements of perioral soft tissue thickness were greater in men than in women.Especially, the values for basic upper lip thickness and upper lip thickness were significantly greater in men than in women in all groups. Several studies evaluating the soft tissue measurements for men and women found the same results.[1]

In previous study, the lower lip thickness was significantly greater in Class II-H and II-V compared with classI patients, they found that the characteristics of soft tissue measurements according to the vertical pattern (SN-MP) were distinct, with statistical differences in basic lower lip thickness, lower lip length,

soft and hard tissue contours, and contour ratios. Group II-H had a statistically greater value in basic lower lip thickness than did group II-L (19.0 6 2.9 mm and 16.5 6 1.9 mm for groups II-H and II-L, respectively). The result of this study suggests that upper lip thickness and Basic lower lip thickness showed statistically significant values between class I vertical and class II, III vertical patients, with highest value in classI vertical patients.[1]

Macari and Hanna compared soft tissue chin thickness between different mandibular divergence patterns and found a significant difference between hyper- and hypo-divergent individuals. The growth pattern of an individual also had a role in amount of soft tissue growth.[7] In our present study Chin thickness horizontal measurement showed statistically significant values between class I average and class III average patients. Chin thickness vertical measurement showed statistically significant values between class I horizontal and class III horizontal patients. Subnasale to H-line, Lower lip to Hline, upper lip length, nasolabial angle, lower lip length, Rickets E-line to upper lip showed statistically significant values between class I average and class III average patients with highest values in classI average patients. H-angle showed statistically significant values between class I horizontal and class III horizontal patients. Most measurements of perioral soft tissue thickness were greater in classI patients then other groups. Upper and lower lip thickness showed highest values in classI vertical patients then that of other group of patients.

The study done by Sesham V et al stated that: In both males and females, changes in upper lip length and thickness at rest and smile was higher in classI compared with classII division 1 and Class II division 2.

In males, upper lip length and thickness at rest and at smile was higher in class II division 2 compared to class II division 1. In females, upper lip length and thickness at rest and at smile was higher in Class II division 1 compared to Class II division 2. Changes in upper lip length and upper lip thickness at rest and on smiling were greater in males as compared with females in all groups.[30]

In the present study the results are correlating with the above study where Class I vertical showed highest means for upper lip thickness, basic lower lip thickness, rickets E-line to upper and lower lip, lower lip length, With mean of 12.6 ± 2.32, 13.4±2.07, 2.2±1.48, 4.1±2.13,16.3±1.89 respectively.

ClassI average showed highest means for subnasale to H- line, and nasolabial angle with mean 7.6±2.32 and 100±11.86 respectively. ClassI horizontal showed highest mean for chin thickness vertical measurement and upper lip length with mean value 7.4±1.26 and 17.2±1.99 respectively. Class II vertical showed highest mean for lower lip to Hline and H- angle with mean of 3.7±1.95 and 22.4±3.06 respectively. Class III vertical showed highest mean for chin thickness horizontal measurement with mean value of 12.2±2.04.

More specifically, there was a statistically significant difference between the horizontal and vertical growth pattern groups in the soft tissue chin thickness at Gn and Me, but not at Pog, suggesting the presence of a differential extension between their hard and soft tissues.

Our findings correlate with that of Macari et al as far as soft tissue menton and gnathion are considered, but disagreement lies for the point pogonion. In our study, the soft tissue chin thickness was greater in horizontal group of patients, and it gradually decreased across the groups with the least being in the vertical group.

Blanchette et al. performed a longitudinal cephalometric study of the soft tissue profile of short and long face

syndromes from 7–17 years in individuals of Northern European ancestry.

They found out that all chin measurements including the thickness of soft tissue at point B and Pog were significantly larger thickness in the long vertical patterns. He suggested that this might have been nature's way of compensating for the shorter mandibular corpus length in an effort to mask the condition and to provide a more normal facial appearance. The converse was true for the short pattern that showed a thinner tissue drape. However, these findings are contradictory to our study. [29]

Gender Differences

The results of the present study showed a statistically significant difference in the perioral soft tissue thickness measurements between males and females among all the 3 groups, thereby indicating that females have thinner, soft tissue lip and chin than males. Soft tissue thicknesses were found to be greater for men than for women.

Statistically significant differences among the skeletal groups were found in both men and women at the following sites: labrale superius, stomion, and labrale inferius. The thickness at the labrale superius and stomion points in each skeletal type was the greatest in Class III for both men and women. On the other hand, at the labrale inferius point, for both men and women, soft tissue depth was the least in Class III and the greatest in Class II. And concluded that soft tissue thickness differences among skeletal malocclusions were observed at the labrale superius, stomion, and labrale inferius sites for both men and women.[3]

In the study conducted by Taki et al. soft tissues chin thickness in Persian adults was significantly larger in men than in women. Similar results were obtained by Basciftci et al., who reported that Anatolian Turkish men have a more prominent chin than women. Similar results were obtained in our study where males showed increased soft tissue chin thickness than females.[18]

Conclusion

H angle is highest in Class II horizontal, vertical group compared to class I & class III horizontal, vertical group Based on the results from the present study, the following conclusions can be made:

1. Basic upper lip thickness, upper lip thickness, basic lower lip thickness showed higher values in classI vertical patients compared to patient's in other groups i.e Class II vertical, Class III vertical groups.
2. H angle showed highest value in Class II vertical group & ClassII average group compared to Class I vertical and class III vertical and average group.
3. Chin thickness- horizontal showed greater value in classI average individuals in comparison to class III average individuals, in contrast chin thickness vertical showed greater values in class III horizontal group compared to classI horizontal group patient's.
4. Sub-nasale to H-line, lower lip to H-line shows greater value in classI average individuals compared to classIII average individuals.
5. Rickets- E line to upper, rickets e line to lower showed highest values in classI vertical, classI horizontal, class I average compared to class III horizontal, class III average, class III vertical.
6. Lower lip length is higher in classI vertical & classI average in comparison to lower lip length in class II vertical & class III average groups.
7. Nasiolabial angle is highest in classI average group, followed by classII average group, followed by class III average group.
8. Rickets e line to lower showed higher value for females in class II and class III vertical group when compared to class II and class III vertical males.

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