INTRODUCTION

Modern treatment goals and limitations of orthodontic and orthognathic surgery are dictated by the soft tissue paradigm.¹ It dictates that treatment goals, diagnostic emphasis and treatment approach when governed by soft tissues of the face will lead to a normal teeth and jaw relationship.² The shift of orthodontics away from the conventional angles paradigm has provided a new direction to the field of orthodontics in general and also specifically to our primary goal of preserving, or achieving optimal facial attractiveness. For this purpose it is important that orthodontists conduct a thorough examination, for identification of areas of disharmony and have a thorough knowledge of how their treatment would affect the patient’s facial profile.

The importance of identifying the facial types of each individual arises from the influence it has on the profile of the individual and dental arches.³ The affects that incisor positions have on their respective bony bases and resultant facial patterns has also been the topic of many researches.⁴

Facial profile comprises of several skeletal, dental and facial components, and each has to be in a normal range for a normal facial profile. Multiple factors include the positions of dentition, skeletal problems, along with growth which also plays a major role in the development of soft tissue profile of an individual. Knowledge of the soft tissue profile changes at different stages of growth would allow the operator to treat those variations in values as normal for a specific age. For example studies have found that during youth there is more extensive growth in the area of nose and lips where as there is minimal growth in the menton area. Upper lip full length is established by the age of 7, increase in depth and length of the nose is observed in adult's facial profile for both genders. In men, the upper and lower lip thickness diminishes, whereas in women the profile becomes more convex because there are greater growth changes in the nose than in the menton.³

Different malocclusions therefore have a specific set of values for each of these variables, and it is of utmost importance that the orthodontist is aware of these values.

OBJECTIVE: The present study assess some cephalometric measurements of the soft tissue profile in order to observe the behavior of facial convexity in patients with Class I, Class II division 1, and Class III malocclusions.

METHODOLOGY: 102 Pre-treatment cephalometric radiographs of patients attending orthodontic OPD. Ages 16-45 years (mean age of 17.6 years) were selected for this study. They were divided into 3 groups, Class I, class II and class III, using ANB value of (Steiners analysis). Soft tissue cephalometric values of angle of convexity, H.SN angle, nasolabial angle, mentolabial angle and linear measurements of upper and lower lip to S line was measured by a single observer. Inter group and inter gender comparison of all the variable were done.

RESULTS: The result showed significant differences amongst the three groups in mentolabial angle , H.SN angle, upper lip to S line and lower lip to S lines.

KEY WORDS: Cephalometry, Soft tissue profile, Casolabial angle.


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before starting the treatment. The lip position can be evaluated by various reference lines such as Steiner S-line, Burstone's B line, Rickets E line, Holdaway H line.

Our study aims to assess the cephalometric measurements of soft tissue profile in patients of class I, II and III, malocclusions to specify the soft tissue patterns for those malocclusions. Based on this knowledge the treatment plans can be better devised for the patients. This study will also help to clarify if soft tissue analysis alone can be used to assess skeletal malocclusions.

**METHODOLOGY**

**Methodology and data collection**

It was a cross sectional study, using 102 (sample size calculated by open-epi software) pretreatment cephalometric radiographs of patients attending orthodontic OPD. Ages 16-45 years (mean age of 17.6 years) were selected for this study to ensure completion of growth of soft and hard tissue.

The cephalometric radiograph was obtained by one digital machine, model Viata Pano with a power input of 200-240 V, 50/60Hz and 2.2Kva max.

They sample was divided into 3 groups, Class I, class II and class III (using ANB value of (Steiners analysis). Sample size calculation was done using open-epi soft ware, with the confidence interval kept 95%. These x rays are a part of usual diagnostic protocol of orthodontic cases, therefore no ethical concern was applicable. An informed consent was taken from all patients at the start of treatment informing them that their records would be utilized for research purposes. All radiographs were traced on an acetate paper with a lead pencil by the same observer to reduce intra-examiner variability, reading as given in figure 1 were traced and values were calculated.

The participants in the sample were randomly selected with convenience sampling. Only those cases were included who had never undergone any orthodontic treatment before. Cases having a crossbite or open bite were excluded along with syndromic patients and those who needed orthognathic surgery as their treatment plan.

Data analysis was performed using the SPSS version 23. The analysis of variance and turkey hoc test (table.3, table.4) was used for the comparative analysis of the variables between the three groups of malocclusion. Independent sample t test was used to compare between two genders.

**RESULT**

The result showed significant differences amongst the three groups in mentolabial angle, H.SN angle, upper lip to S line and lower lip to S lines as shown in table 2. Mentolabial angle was highest in class 2 (122.46°) and a lowest in class III group (106.96°). H.SN angle is class III group was highest value of 67.12° and a lowest value of 58.23° in class 2 group. Upper lip and lower lip to S-line was highest in class 2 groups and lowest in class III group, 2.187mm, 2.500mm and -2.20mm, 0.55mm respectively. The comparative analysis between all variables in the three groups is shown in bar chart (figure 2). Comparison between male and female groups showed significant differences in nasolabial angle and upper lip to S line. Nasolabial angle was a mean of 104.50° in males and 98.76° in females. According to descriptive analysis the mean value of angle of convexity came out to be 31.40°, with class 1 group having the highest value of 33.03°, and a lowest value in

**Diagrammatically shown in figure 1.**

**Table 1**

<table>
<thead>
<tr>
<th>VARIABLES</th>
<th>DEFINITION</th>
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<tbody>
<tr>
<td>ANGLE OF FACIAL CONVEXITY (C)</td>
<td>Formed by the intersection of the line that passes through the glabella point (G) and the subnasale point (SN) and another line from the subnasale point to the soft pogonion point (Pog). Ideally it should be 112° according to Downs.</td>
</tr>
<tr>
<td>ANGLE (H.1.P)</td>
<td>Formed by the intersection of S-line with H-line. For Holdaway and identified the value of this angle should be 73°.</td>
</tr>
<tr>
<td>NASOLABIAL ANGLE (NLA)</td>
<td>Formed by the intersection of the line that passes through the cromella(c) and subnasale (SN) points and the line that passes through the labrale superius (Ls) and subnasale (SN) points. According to Shioderman, the nasolabial angle must be 110° with a clinical deviation from 90° to 130°.</td>
</tr>
<tr>
<td>MENTOLABIAL ANGLE (MLA)</td>
<td>Formed by the intersection of the line that passes through the lower lip vermilion point (LV) up to point B and a line from point B to the soft pogonion point (Pog) which, according to Nguyen and Turley must to be 139.5° with a clinical deviation of ± 13°.</td>
</tr>
<tr>
<td>UPPERLIP - S-LINE</td>
<td>Distance from the most anterior point of the upper lip convexity to the S-line of Steiner. According to Steiner the ideal distance would be 0 mm.</td>
</tr>
<tr>
<td>LOWERLIP - S-LINE</td>
<td>Distance from the most anterior point of the lower lip convexity to S-line of Steiner. According to Steiner the ideal distance would also be 0 mm.</td>
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class III of 30.39°. Nasolabial was a 100.68° with highest value in class I group (101.12°) and lowest in class III group (100.22).
DISCUSSION

Long before lateral cephalographs became established, soft tissue profiles were analyzed for diagnostic purposes. When lateral cephalogram was first used for diagnosing and assessing skeletal and dental disharmony by Broadbent and Hofrath, this marked the new beginning of orthodontics. Soft tissue diagnostics in cephalometry has proven to be superior from extra oral photography. Many angles, measurement and analysis are given by different authors. Angle of convexity as a measure of profile convexity was given by (Muzj 1956; Burstone 1958; Subtelny and Rochester 1959). In this study the mean angle of convexity (31.40°) came out to be far more than that given by previous authors (-11±4°), which depicts a convex profile. This may be because 68 out of 102 patients included in the study were female who have a tendency towards convex profile. As there are no significant differences in angle of convexity value between the three groups, this angle cannot be used to assess skeletal disharmony.

Our mean value for the H.SN angle (62°) came out less than the normal value in previous studies.8-10 This also represents the convexity of the facial profile in Asian population. This consistent retrusive profile is a new finding and is not supported by any literature in the past. When the sagittal position of lip in considered, lip prominence is dependent upon the tonicity of lip muscles, inclination of incisors, prominences of jaws, prominence of nose and chin. Upper and lower lip has been measured with various reference line for e.g. H line, E line, S line. The upper lip to S line value as 2.18mm is more than the same value found out by Bokhari Fet al in class II patients only that is 1.96mm.24 Joshi M et al conducted a similar study to ours and found out upper lip to S-line value in class II,III and III groups to be 4.32, 5.35,4.55 mm respectively, and lower lip to S-line value in all the same classes to be 4.22, 3.47, 5.83 mm respectively. Upper lip protrusiveness in class II group is expressed in both studies. Retrusive lower lip in class III group is expressed from our study only, this finding does not fall with agreement to any previous evidence. Rehan A et al conducted a study in march 2014 comparing soft tissue parameters in class I and class II patients concluded upper lip protrusion in Class I and bilip protrusion in Class II samples with reference to rickets E line instead of S line.25 The value of nasolabial angle in this study was in agreement to ours i.e more in class 2 than in class 1.

Soft tissue analysis can be used to assess skeletal disproportion but not always does it show the correct malocclusion therefore radiographs and latest imaging techniques have a huge weight age in diagnosis, treatment planning and case based approach.

The inclusion on class III in this study gives it the advantage over other similar studies that only include class I and II.9,25 The wide variety of variables and gender dimorphism make this a one of a kind soft tissue diagnostic soft tissue study.

CONCLUSION

We determined that both class I and class II groups had convex profiles, represented by increased angle of convexity. Nasolabial angle was most obtuse in class I and mentolabial

* The mean difference is significant at the 0.05 level.
angle showed the highest value in class II groups. Angle H.SN was highest in class III groups. Upper lip and lower lip to S-line was highest in class II groups. Gender dimorphism was present in all the variables.

CONFLICT OF INTEREST

None declared

REFERENCES


