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ORIGINAL ARTICLE

Comparison between soft tissue profile in patient with Class II division I and Class II Division II malocclusion.

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ABSTRACT… Objective: To assess effect of class II division I and class II division II malocclusion on facial profile by utilizing soft tissue paradigm of modern orthodontics for efficient clinical diagnosis and treatment planning. **Study Design:** Analytical Cross-sectional study. **Setting:** Ibn-e-Siena Hospital, Multan. **Period:** July-December 2025. **Methods:** A total of 114 orthodontics patient between 16-40 years were enrolled. Patients with complete maxillary anterior teeth, non restored maxillary anterior teeth, presenting with class II division I and class II division II malocclusion for orthodontic treatment were included. Patient's profile, nasolabial angle, facial angle, type of nose, chin prominence and lip position was compared between class II division I and class II division II using chi-square test p-value <0.05 was considered significant. **Results:** The study revealed statistically significant differences ($p < 0.05$) in soft tissue profile characteristics between Class II Division I and Class II Division II malocclusion. Class II Division I patients predominantly exhibited convex facial profile, acute nasolabial angles, upward-sloping nose form, retrusive chin and higher frequency of protrusive or retrusive lip positions. In contrast, Class II Division II patients more commonly displayed straight profile, normal nasolabial angles, straight nose form, prominent or normal chin and normal lip position relative to Steiner's S-line. **Conclusion:** This study confirms distinct soft tissue phenotypes between Class II divisions, with Division I exhibiting convexity and retrusion versus Division II's straighter, balanced profiles. Consequently, orthodontic management requires tailored treatment planning based on specific soft tissue analyses to ensure optimal aesthetic and functional outcomes.

Key words: Class II Division I, Class II Division II, Malocclusion, Soft Tissue Profile.

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INTRODUCTION

Human facial harmony is often considered to be synonymous with beauty and aesthetics. Every visual content has make the facial attractiveness the most desired thing among the groups[1] Any malocclusion, misalignment, mal-positioning or abnormality in the jaw line, teeth, and bite pattern can disrupt facial harmony.[2]

Most known cause of disturbance in facial harmony is malocclusion. It has three classes, namely class I, class II and class III. Class II is one of the most recurrent among adults and brings significant changes in the soft tissues, linking it to the changes in the facial profile.[3] Class II malocclusion's causes are multifactorial which includes both hereditary and environmental factors.[4]

Class II div I malocclusion have undesirable facial esthetics due to increased overjet and convex profile. Proclination of upper incisors, retrusion of lower lip, decreased mento-labial angle and short chin throat distance makes smile and facial look undesirable.[5] Class II division II is described as profile of sharp facial contours with concave lower third of face and retruded lips. Rima oris of such patients are so high, giving the appearance of a gummy smile. Effects of this malocclusion on facial profile is characterized by protrusion of nose, subnasale and mental region. However, there is variability in dento-skeletal characteristics like normognathia of maxilla with mild retrognathia of mandible, skeletal deep bite, retroclination of upper incisors and strong chin.[6]

In previous study, 100 profile photographs of class II malocclusions that included 50 males and 50 females with the age range of 13 to 30 years revealed the significant association of these malocclutions with chin prominence of 11%, 8% and 79 % for normal, protrusive and retrusive chin.

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Lip positions showed 21% of protusion and 45 % of normal position. Significant results of facial profiles reported according to Arnett's value showed 18 % of orthoprofile, 35 % of convex profile and 13 % of concave profile.[7] In another study, total 15 photographs of 25 years old Iranian adult females were evaluated by 18 orthodontists, 18 oral and maxillofacial surgeons and 18 laypeople by using visual analogue scale (0-100) and found significant score by orthodontist as compare to lay people in terms of small nose and deviation of chin prominence was noted in the ratings of photographs ($P < 0.001$). Small nose and deviations of the chin prominence got higher score by Orthodontists than lay people ($P = 0.015$). Significantly higher score was given by art students than laypeople to photographs with a prominent chin and deviations in the nose prominence ($P = 0.012$).[8]

This study aimed to assess the effect of class II division I and class II division II malocclusion on facial profile by utilizing soft tissue paradigm of modern orthodontics for the efficient clinical diagnosis and treatment planning.

METHODS

This analytical cross sectional study was conducted at Department of Orthodontics, Ibn -e -Siena Hospital/ Multan Medical & Dental College, Multan from July 2025 to December 2025 after taking approval from Institutional Ethical Review Committee (Reference No. C-106-1064 Dated 08-09-2025) and informed consent from each patient. A total of 114 orthodontics patient (50 males and 64 females) from Department of Orthodontics, Ibn -e -Siena hospital Multan within the age group of 16 -40 years participated in study. The inclusion criteria were complete maxillary anterior teeth, non restored maxillary anterior teeth presenting with class II division I and class II division II malocclusion for orthodontic treatment. Subjects with missing or artificial prosthesis, restored anterior teeth, presence of spacing between the teeth, previous orthodontic treatment and Cranio-facial syndromes on clinical examination were excluded from the study. Baseline demographic data including age, gender, ethnicity and class II malocclusion (division I and division II) was taken Class II division I and class II division II was diagnosed by using lateral cephalogram of patient. Photographs were taken against a blue background with natural head position at a distance of 1.5 meter by using Nikon D3500 after taking consent from patients. By using adobe Photoshop CS version 7.0, Adobe system (San Jose California USA) reference lines was plotted on profile photograph to analyze type of profile, lip position, facial angle, chin form, shape of nose, Facial angle and Nasolabial angle. Data collection was done on a purposely designed Proforma. Each measurement was done three times and the mean value was calculated. The quantitative variables like patient's profile, Nasolabial angle, facial angle was presented as mean standard deviation. Qualitative variables like gender, type of nose, chin prominence, lip position and class II division I and II was presented as frequency and percentages. The variables like patient's profile, Nasolabial angle, facial angle, type of nose, chin prominence and lip position was compared between class II division I and class II division II using chi-square test and p -value < 0.05 was taken as significant. Data was stratified on age group and gender to determine the effect of facial soft tissue thickness between class II division I and class II division II. Post stratification chi –square test was applied with p –value <0.05 was taken as significant.

RESULTS

The study included a total of 117 participants (50 males and 67 females) aged 16–40 years, diagnosed with either Class II Division I (n = 63) or Class II Division II (n = 54) malocclusion. Comparative analysis of soft tissue profile parameters including facial profile, lip position, chin form, nose form, facial angle, and nasolabial angle revealed statistically significant differences between the two groups ($p < 0.05$) across multiple variables. These findings underscore distinct soft tissue characteristics associated with each malocclusion subtype, providing valuable insights for diagnosis and treatment planning in orthodontic practice.

Class II DIV I patients overwhelmingly present with a convex profile, while Class II DIV II patients predominantly exhibit a straight profile. This difference is highly significant ($p < 0.001$), aligning with known dento-skeletal patterns (proclined incisors in DIV I vs. retroclined in DIV II).

TABLE-I

Comparison of facial profile between class II Div I and Div II

Profile Type	Class II DIV I (N=60)	Class II DIV II (N=54)	P-Value
Convex	52 (86.7%)	12 (22.2%)	<0.001
Straight	8 (13.3%)	40 (74.1%)	
Concave	0 (0%)	2 (3.7%)	

Lip protrusion is significantly more common in Class II Div I (p = 0.002), reflecting maxillary incisor proclination. In contrast, Class II Div II shows more normal lip positions, consistent with retroclined upper incisors and balanced soft tissue drape.

TABLE-II

Lip position according to Steiner's S-Line

LIP Position	Class II DIV I (N=60)	Class II DIV II (N=54)	P-Value
Protrusive	16 (26.7%)	3 (5.6%)	0.002
Normal	20 (33.3%)	30 (55.6%)	
Retrusive	24 (40.0%)	21 (38.9%)	

A retrusive chin is markedly more frequent in Class II Div I (66.7% vs. 27.8%), while prominent/normal chins dominate in Class II Div II (p = 0.031), supporting the notion that Div II often features a strong mandibular symphysis despite mild retrognathia.

TABLE-III

Chin prominence (Chin Form)

Chin Form	Class II DIV I (N=60)	Class II DIV II (N=54)	P-Value
Prominent	2 (3.3%)	7 (13.0%)	0.031
Normal	18 (30.0%)	32 (59.3%)	
Retrusive	40 (66.7%)	15 (27.8%)	

Acute nasolabial angles (indicating increased upper lip protrusion or nasal tip rotation) are significantly more prevalent in Class II Div I (p = 0.024), correlating with proclined upper incisors pulling the lip forward.

TABLE-IV

Nasolabial angle classification

Nasolabial Angle	Class II DIV I (N=60)	Class II DIV II (N=54)	P-Value
Acute (<92°)	22 (36.7%)	10 (18.5%)	0.024
Normal (92–107°)	20 (33.3%)	28 (51.9%)	
Obtuse (>107°)	18 (30.0%)	16 (29.6%)	

An upward-sloping nasal tip is significantly more common in Class II Div I (56.7% vs. 29.6%; p = 0.008), possibly due to altered nasolabial musculature or compensatory soft tissue adaptation to maxillary protrusion.

TABLE-V

Nose form characteristics

Nose Form	Class II DIV I (N=60)	Class II DIV II (N=54)	P-Value
Upward Sloping	34 (56.7%)	16 (29.6%)	0.008
Straight	20 (33.3%)	30 (55.6%)	
Hooked/Downward	6 (10.0%)	8 (14.8%)	

The study revealed statistically significant differences ($p < 0.05$) in soft tissue profile characteristics between Class II Division I and Class II Division II malocclusion. Class II Division I patients predominantly exhibited a convex facial profile, acute nasolabial angles, upward-sloping nose form, retrusive chin, and a higher frequency of protrusive or retrusive lip positions. In contrast, Class II Division II patients more commonly displayed a straight profile, normal nasolabial angles, straight nose form, prominent or normal chin, and normal lip position relative to Steiner's S-line. These distinct soft tissue patterns underscore the diagnostic and aesthetic implications of each malocclusion subtype and support tailored orthodontic treatment planning.

DISCUSSION

The present study demonstrates that Class II Division I and Class II Division II malocclusions are not only distinct in their dento-skeletal configurations but also exhibit significantly different soft tissue profile characteristics, as evidenced by multiple statistically significant associations ($p < 0.05$). These findings reinforce the principle that soft tissue morphology is intrinsically linked to underlying dental and skeletal relationships, and that each Class II subdivision presents a unique facial phenotype requiring tailored diagnostic and therapeutic strategies.[9]

One of the most prominent differences observed was in facial profile convexity. A striking 86.5% of Class II Division I patients exhibited a convex profile, compared to only 22.2% in Division II ($p < 0.001$). This aligns with classic descriptions in orthodontic literature, where Division I malocclusion characterized by proclined maxillary incisors and

increased overjet tends to produce a protrusive upper lip and retrusive lower lip, resulting in a convex silhouette.[10]

In contrast, Class II Division II patients predominantly displayed a straight profile (74.1%), consistent with retroclined upper incisors that allow the upper lip to drape more vertically, often masking mild mandibular retrognathia.[10]

Both groups showed a mix of protrusive, normal, and retrusive lip positions, protrusive lips were significantly more frequent in Division I (26.7% vs. 5.6%; p = 0.002). This reflects the direct influence of maxillary incisor proclination on upper lip posture. Conversely, Division II patients more commonly demonstrated normal lip positions (55.6%), supporting the notion that retroclined incisors permit better soft tissue balance despite underlying skeletal discrepancies.[11]

Chin morphology also differed significantly. Retrusive chin was observed in 66.7% of Division I cases versus only 27.8% in Division II (p = 0.031), whereas prominent or normal chins were more prevalent in Division II (Fig. 3: Chin Form: Normal, Prominent, Recessive). This corroborates Perović's observation that Class II Division II patients often possess a strong, well-defined chin that compensates aesthetically for retroclined incisors and a potentially short lower face height.[12] The robust mandibular symphysis in Division II may explain this favorable chin prominence, even in the presence of mild skeletal Class II patterns.

The nasolabial angle a critical indicator of upper lip and nasal base relationship was significantly more acute (<92°) in Division I (36.7% vs. 18.5%; p = 0.024). An acute angle typically results from protrusive upper incisors pulling the upper lip forward, reducing the angle between the columella and the lip. This finding is consistent with literature which reported that increased overjet directly correlates with reduced nasolabial angles in adults.[13,14] In contrast, Division II patients more frequently exhibited normal nasolabial angles (92°–107°), reflecting harmonious lip-nose relationships due to retroclined incisors.

Interestingly, nose form also varied between groups. An upward-sloping nasal tip was significantly more common in Division I (56.7% vs. 29.6%; p = 0.008) While nasal morphology is largely genetically determined, soft tissue adaptation to maxillary protrusion or altered lip tension may influence perceived nasal tip rotation. Orthodontists place high aesthetic value on nasal proportions, and deviations (including upward rotation) can impact overall facial attractiveness ratings.[15,16]

Notably, no significant differences were found in facial angle or gender-stratified analyses after post-hoc testing, suggesting that the observed soft tissue variations are primarily driven by malocclusion type rather than age or sex within the studied cohort (16–40 years). This supports the clinical utility of soft tissue assessment as a reliable diagnostic adjunct across adult populations.

Our findings validate that Class II Division I presents with a less harmonious soft tissue profile convex, retrusive chin, acute nasolabial angle, and altered lip posture whereas Class II Division II often exhibits a more balanced or even aesthetically favorable profile due to strong chin support and normal lip positioning. These distinctions underscore the importance of division-specific treatment planning: Division I may benefit from retraction mechanics and profile refinement, while Division II requires careful management of deep bite and incisor torque to preserve existing soft tissue harmony.

CONCLUSION

This study confirms distinct soft tissue phenotypes between Class II divisions, with Division I exhibiting convexity and retrusion versus Division II's straighter, balanced profiles. Consequently, orthodontic management requires tailored treatment planning based on specific soft tissue analyses to ensure optimal aesthetic and functional outcomes.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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AUTHORSHIP AND CONTRIBUTION DECLARATION	
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2	**Ehsan Haider:** Proof reading.
3	**Farhan Ali:** Data analysis.
4	**Saba Habib:** Manuscript writing.
5	**Muhammad Usman Chishti:** Data analysis.
6	**Saira Zafar:** Data collection.