

## Original Article

### Perception of facial attractiveness in CLASS II Patients by Maxillary Advancement

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#### ABSTRACT:

**Aim:** The aim of this study was to determine the perception of attractiveness in profile modifications in male and female subjects of skeletal Class I, changing maxillary prominence simulating skeletal Class II profile, by Laypersons, General dentists and Orthodontists. **Methodology:** A profile photograph of a male and female subject was digitally modified to create 10 photographs, each of 5 stepwise maxillary advancement by 2mm, 4mm, 6mm, 8mm and 12mm using Dolphin Imaging Solutions Software Version 10.5. Three groups of raters were selected. A total of 60 raters (20 Orthodontists, 20 General Dentists, and 20 Laypersons) with 10 males and females from each group were asked to score each photograph using a VAS rating scale. Kruskal-Wallis and Mann-Whitney tests were used to analyse the data. **Result:** The baseline profile was rated most attractive by all the groups. Nevertheless, profiles near to baseline were also rated attractive. Profiles with 12 mm maxillary advancement were considered least attractive. Female raters were found to be more sensitive to changes in profile than male raters. **Conclusion:** A straight profile can be considered most attractive than a convex profile. Attractiveness decreases with the increase in convexity. The most convex profiles were the least attractive.

**Key words:** Maxillary advancement; Attractiveness; Orthodontists; Class II patients.

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#### INTRODUCTION

Esthetics in dentistry has increasingly become a major concern for patients and often serves as a primary reason for seeking dental care. To obtain optimal aesthetic result, it is of paramount importance for clinician to follow aesthetic guidelines. For many years these parameters are based only on the author's opinion rather on evidence based literature. Studies have often shown that attractive people are treated more positively in a variety of settings. According to the outcomes of many studies, an orthognathic profile is considered most attractive, whereas profiles with distinct prognathic and retrognathic mandibles are judged to be less attractive.<sup>1</sup>

In the last two decades, combined orthodontic and orthognathic treatment gained widespread acceptance. One of the major reasons patients opt for this treatment versus orthodontic treatment alone is the potential for change in the facial profile. For diagnosis, treatment planning and patient counselling, orthodontists and oral surgeons used cephalometric analysis combined with subjective clinical judgement. That judgement was based on preferences acquired during their professional training and subsequent clinical experience.<sup>2</sup>

One of the reasons for many patients to consult an orthodontist is their wish to improve their dental and facial esthetic appearance. Profile lines are an important factor in the perceived

attractiveness of a person. To be able to improve the esthetic impact of a face, orthodontists need a target image.<sup>3</sup>

Thus, this study determined the perception of attractiveness in profile modifications in male and female subjects of skeletal Class I, changing maxillary prominence and chin prominence simulating skeletal Class II profile, by laypersons, general dentists and orthodontists.

## MATERIALS AND METHODOLOGY

**SOURCE OF DATA:** 1 female and 1 male (15-30yrs) were chosen, who have a skeletal class I malocclusion with average maxilla and mandible, as described in the literature.

**METHOD OF DATA COLLECTION:** A colour photograph of each subject was taken in profile position. A lateral cephalogram of each patient was also taken. The subjects were explained about the type of the study and consent was obtained from them regarding the same.

**RATERS:** Three groups of raters were selected. First group consisted of 20 Lay persons (10 men and 10 women) selected among the patients visiting the Department of Orthodontics and Dentofacial Orthopedics, Rajarajeswari Dental College and Hospital, Mysore road, Bangalore. Second group consisted of 20 General Dentists (10 males and 10 females) selected from Rajarajeswari Dental College and Hospital, Mysore road, Bangalore for cross-checking the results obtained from laypeople. Third group will consist of 20 Orthodontists (10 males and 10 females) selected randomly from Bangalore city.

### INCLUSION CRITERIA:

#### 1) Profile facial image

- A. Subjects having a skeletal class I malocclusion and straight profile.
- B. Subjects with no facial asymmetry

#### 2) Raters

- a. Lay people.
- b. General Dentists.

- c. Orthodontists.

### EXCLUSION CRITERIA :

1. Subjects with developmental abnormalities of jaws affecting maxilla or mandible
2. Presence of cleft lip, cleft palate
3. History of previous facial surgeries like maxillofacial surgeries, genioplasty, rhinoplasty etc.

### PROCEDURE:

1. Identification of the subjects were done based on inclusion criteria and exclusion criteria.
2. Profile facial photograph of male and female subjects were obtained using a digital DSLR camera. Photographs were cropped using commercially available Adobe Photoshop.
3. The lateral cephalogram of the subjects were taken, cephalometric markings were done and the sizes were standardized according to the size of the profile photograph using Dolphin Imaging Solutions Software version 10.5. Maxillary advancement was done based on linear measurements 2mm, 4mm, 6mm, 8mm, 12mm from base image to produce 5 different images.
4. Each new image was altered digitally using Dolphin Software to produce maxillary prominence, according to cephalometric alteration.
5. For each patient, 6 new images were created, marked from A to F which were digitally printed on standard A4 size format photographic papers.
6. Each rater was given a brief information about the study and asked to evaluate the attractiveness of image by means of a questionnaire.
7. Along with album each rater received a form with 100mm Visual Analogue Scale (VAS). The scale had a range from very unattractive on the far left to very attractive at the far right and the center line on the VAS indicated average attractiveness respectively.

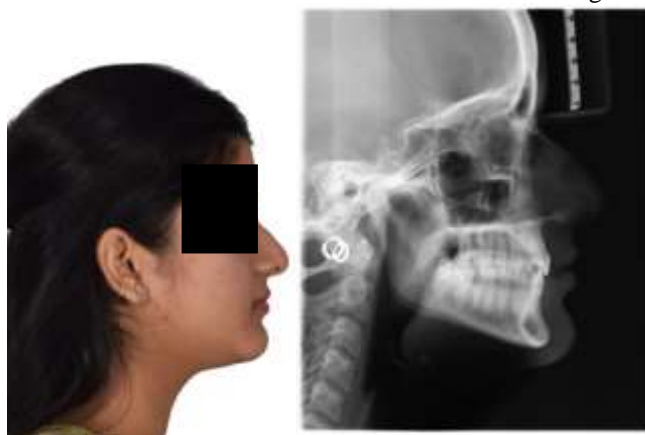


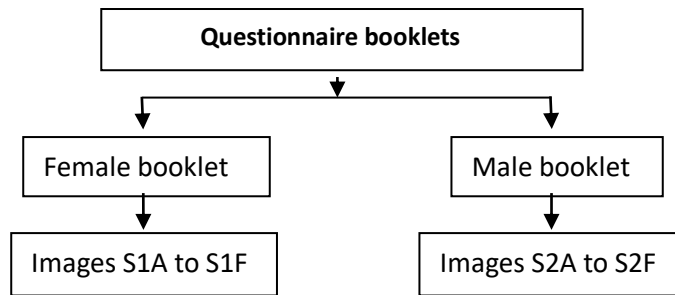
Figure 1(a) and (b): Profile photograph and Lateral cephalogram of Subject No: 1 (Female)



**Figure 2(a) and (b): Profile photograph and Lateral cephalogram of Subject No: 2 (Male)**

**RECORDING OF THE DATA:**

1 male and 1 female booklet with 6 images each were provided to the raters along with visual analogue scales (VAS) ranging from 0 to 100 where 0 is the least attractive and 100 is the most attractive. This was aimed at detecting the esthetic preference of the raters. The questionnaire was completed by the raters.



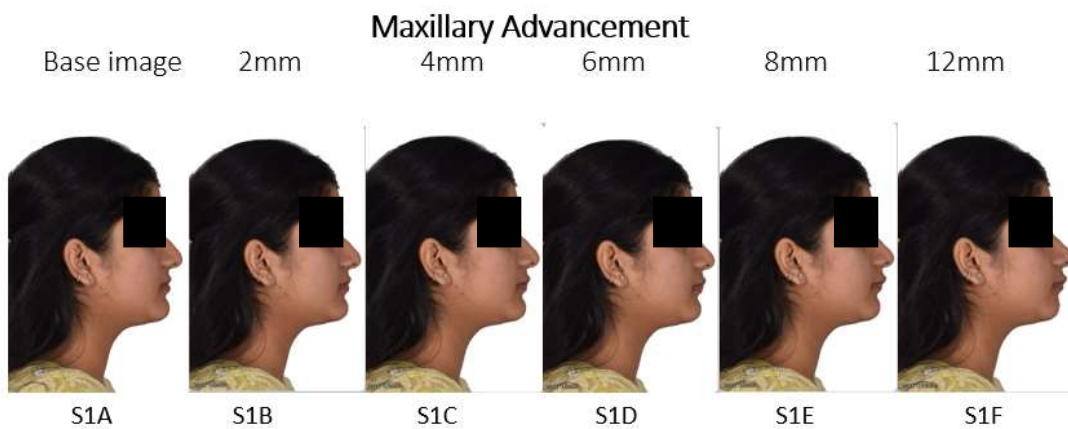
The ratings given by each rater were duly tabulated for each questionnaire of both the subjects.

**Least Attractive**

**Most Attractive**

**Figure 3: Visual Analogue Scale**

0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100
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**Figure 4: Digitally Altered pictures of Female Subject**

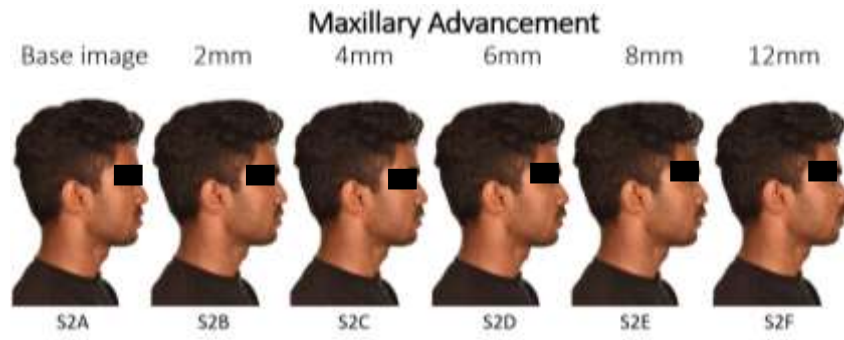


Figure 5: Digitally Altered pictures of Male Subject

**STATISTICAL ANALYSIS**

Data was entered in Microsoft excel and analyzed using SPSS (Statistical Package for Social Science, Version 22.0, Released 2013. Armonk,NY: IBM. corp) package. Kruskal Wallis Test followed by Mann Whitney Post hoc analysis was used to compare the mean VAS scores for males & females' profile between the three different study groups. Mann Whitney Test was used to compare the mean scores between genders for male and female profiles in each study group. In all the above tests “p” value of less than 0.05 was accepted as indicating statistical significance.

**RESULTS**

Comparison of mean scores for the Female Profiles between different groups showed no significant differences when orthodontists were compared with general dentists and laypersons for S1A, S1B, and S1C (S1 = Subject 1). Photograph S1D showed standard deviation between orthodontists and laypersons at P=0.01 and between general dentists and laypersons at P=0.008. For photographs S1E, S1F, standard deviation was seen between orthodontists and laypersons (P<0.001) and between general dentists and laypersons (P<0.001).

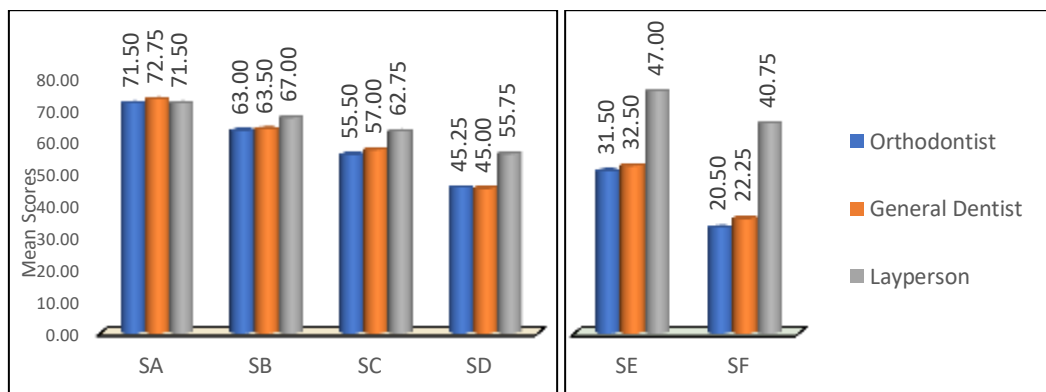


Figure 6: Mean scores of Female Profiles between different groups of raters

Comparison of mean scores for the Male Profiles between different groups showed no significant differences when orthodontists were compared with general dentists and laypersons for photographs S2A, S2B, S2C. Photograph S2D showed standard deviation between orthodontists and laypersons (P=0.02\*). For photograph S2E, standard deviation was seen between orthodontists and general dentists (P=0.04\*) and between orthodontists and laypersons (P<0.001\*). For S2F, significant differences were seen between orthodontists and laypersons (P<0.001\*) and between general dentists and laypersons (P=0.01\*).

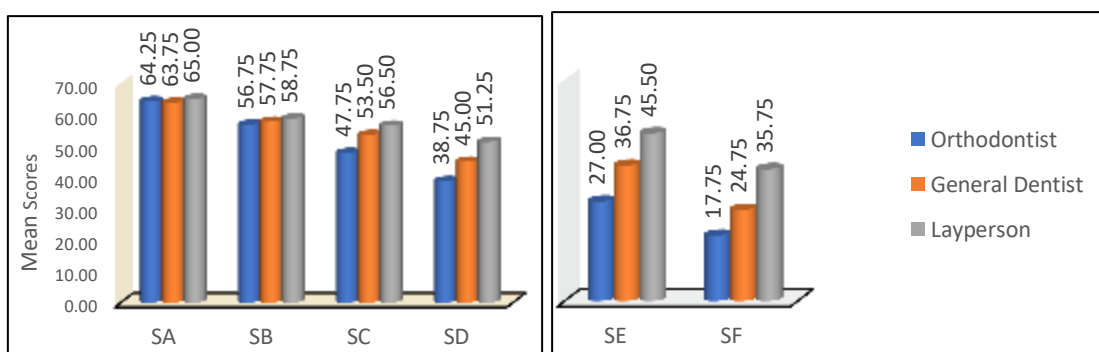
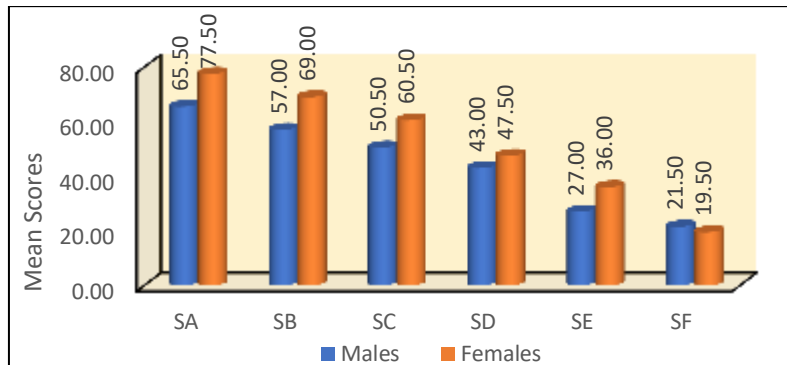


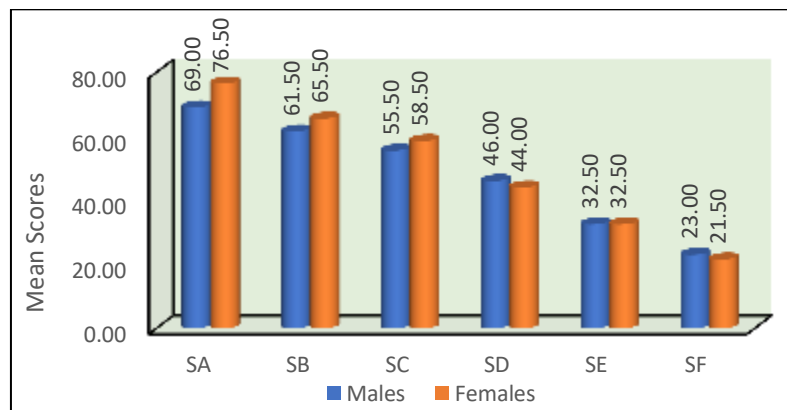
Figure 7: Mean scores of Male Profiles between different groups of raters

Gender wise differences in mean scores for Female Profiles in each group was done using Mann Whitney Test. In the Orthodontist group, significant differences in rating were found for photographs S1A (P=0.01\*), S1B (P=0.006\*), S1C (P=0.02\*) and S1E (P=0.009\*) between males and females of the group. No significant differences were found on remaining photographs. In the General Dentist group, no

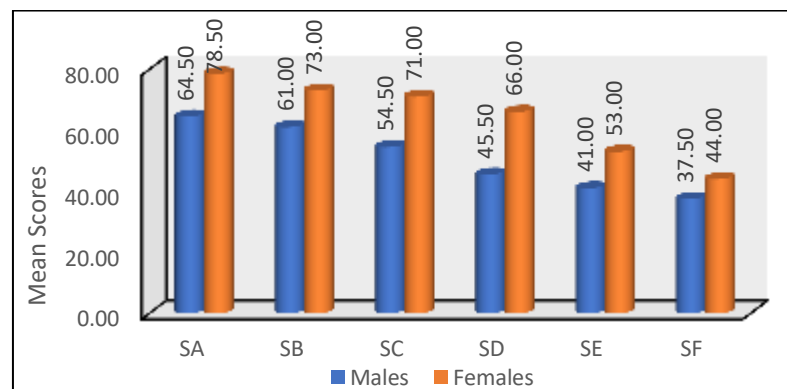
significant differences were found among males and females in any of the photographs. In the Layperson group, significant differences in rating were found for photographs S1A (P=0.02\*), S1B (P=0.04\*), S1C (P=0.01\*), S1D (P=0.001\*) and S1E (P=0.007\*) between males and females of the group. No significant differences were found in relation to S1F.



**Figure 8:** Gender wise difference in mean scores for Female Profiles in Orthodontist group.



**Figure 9:** Gender wise difference in mean scores for Female Profiles in General Dentist group.



**Figure 10:** Gender wise difference in mean scores for Female Profiles in Laypersons group.

Gender wise differences in mean scores for Male Profiles showed no significant differences in all the three groups.

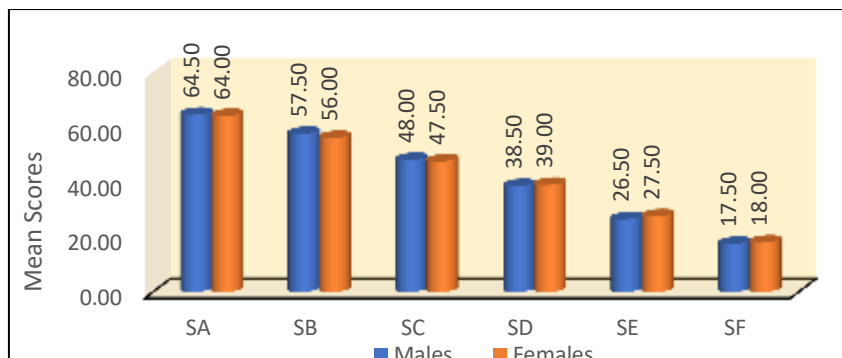


Figure 11: Gender wise difference in mean scores for Male Profiles in Orthodontist group

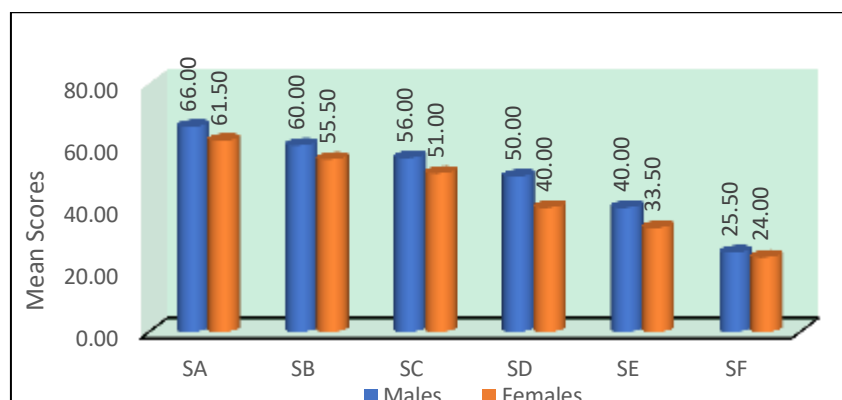


Figure 12: Gender wise difference in mean scores for Male Profiles in General Dentist group

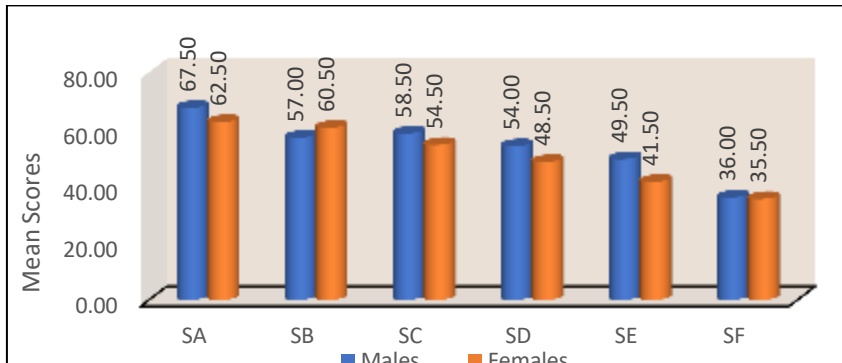


Figure 13: Gender wise difference in mean scores for Male Profiles in Laypersons group

**DISCUSSION**

Physical appearance has been found to be an important determinant of an individual’s social status. Facial and dental esthetics plays an important role in quality of life. An important aspect of orthodontic diagnosis and treatment depends on placing the dentition in the skeleton to achieve maximum soft – tissue esthetics. Aufricht was one of the first to describe the esthetic significance of chin prominence on the perceived attractiveness of the nose.<sup>4</sup> Aesthetic perception varies from person to person. Lay people or patient’s perception and expectation of facial esthetics may not coincide with the professional opinions

Ricketts described his “esthetic plane” (E-plane), a line extending from the tip of the nose to the tip of the

chin, and concluded that it was a convenient reference line for the analysis of lip position.<sup>5</sup> Steiner described the S-line, drawn from the midpoint between the subnasale (Sn) and pronasale (Prn) to the soft tissue pogonion (Pog), and lip prominence with reference to this line should ideally be 0 ± 2 mm.<sup>6</sup> Previous studies have looked at lip positions favoured by laypeople and orthodontists as well as chin positions individually. A class III profile was considered to be more attractive than class II profile with a similar amount of skeletal discrepancy.<sup>7</sup> For male faces, a straight profile with a slightly concave face seemed more attractive and a straight facial profile was also greatly valued.<sup>8</sup>

Jenny R. Maple *et al*, in 2005, had conducted a study to evaluate the perception of facial

attractiveness in profile digital photographs that were incrementally altered to produce different combinations of mandibular antero-posterior positions and lower anterior facial heights, and concluded that the results suggest that preferences of facial attractiveness by laypersons, orthodontists, and oral surgeons in central Ohio are generally in agreement. This information might assist clinicians in treatment planning and making recommendations.<sup>9</sup>

Honn et al and Maple et al found that when a set of profiles was presented separately in a random sequence to a panel of judges, an orthognathic profile was preferred.<sup>1</sup> Profiles deviating more from orthognathic were judged less attractive. Almeida-Pedrin et al and Ng et al studied improvements of post treatment profile attractiveness in camouflage treatment and mandibular advancement, respectively. Both studies concluded that treatment resulted in significant improvement of attractiveness.<sup>10,11</sup>

This study was done to determine the perception of attractiveness in profile modifications in male and female subjects of skeletal Class I, changing maxillary prominence simulating skeletal Class II. Profile photograph and lateral cephalogram of a female subject and a male subject was taken, standardised using commercially available Adobe Photoshop. In this study, a full-face profile was used to create multiple images to be shown to the raters. The standardised profile photograph and lateral cephalogram were superimposed using Dolphin Imaging Solutions Version 10.5 software and modified to produce 5 photographs each of maxillary advancement. These images were given names from A to F, where A is the unaltered original base image. Accordingly B, C, D, E, F indicated maxillary advancement in the order: 2mm, 4mm, 6mm, 8mm, 12mm. The modified photographs along with the original photograph were mounted in an album and given to the raters. The raters included 3 categories consisting each of 20 orthodontists, 20 general dentists and 20 laypeople having 10 males and 10 females in each group. By using profile image, the effect of different variables influencing facial attractiveness was confined.

Similarly profile photographs were modified and given to the raters in an album along with a questionnaire. The instrument for measuring the subjective phenomenon used in this study was a visual analogue scale (VAS) which contained values from 0 to 100, where a score of "0" indicated least attractive and a score of "100" indicated most attractive.

For subject no:1 female profile photographs, there were significant differences found between the orthodontists, general dentists and laypersons. For the first three photographs S1A, S1B, S1C, all the groups had given similar pattern of rating scores with S1A being considered as the most acceptable profile which is the baseline skeletal class I straight profile. Profiles S1D, S1E, S1F showed a

decreasing order of acceptance among all the three rater groups with orthodontists and general dentists rejecting it more than laypersons who found it to be attractive from their point of view with less attractive being S1F with maximum maxillary advancement. In all these photographs, there were close agreement between the ratings of orthodontists and general dentists, whose rating values were very much less as compared to laypersons. Even the least attractive profiles were considered attractive by laypersons to some extent in contrary to orthodontists and general dentists. As a whole, orthodontists and general dentists prefer straight profile to be more attractive for a female subject while laypersons consider straight and slight convex profile to be attractive.

Also a comparison was made between the male and female raters in all the three groups. Female raters preferred female profile modifications over male raters. There were significant differences in orthodontists group and laypersons group. In the orthodontists group, S1A, S1B, S1C, and S1E are statistically significant and females rated these photographs to be very attractive. In the similar manner, S1A, S1B, S1C, S1D, S1E are statistically significant in the laypersons group with females rating more generously than males. The General Dentists group did not show any difference in males or females on the other hand.

For subject no: 2 male profile photographs, significant differences between the three groups of raters were found. S2A, S2B and S2C did not show any statistical significance and were found to be acceptable by all the three groups of raters with S2A being the most attractive, since it is the baseline photograph. One of the main differences seen here, from the former female subject profile, was that the raters had given almost the same ratings irrespective of being orthodontist, general dentist or layperson, in terms of VAS score. But for profiles S2D, S2E, S2F, significant differences were seen. S2D was found to be more attractive for laypersons as compared with orthodontists who rated it less attractive. Profile S2E was perceived to be attractive for laypersons and general dentists when compared with orthodontists' opinion who rated it less to almost least attractive. This profile had created difference within the orthodontists and general dentists. Profile S2F was given the least rating score with the maximum advancement value making it the least attractive by all groups of raters. Though it was rated unattractive, laypersons had given good rating irrespective of what orthodontists and general dentists had given when they were compared. In all the photographs, all the rater groups generally considered profiles S2F to be the least attractive and unacceptable, showing maximum maxillary advancement. As a whole, it can be said that straight profiles are considered to be most attractive by all groups though laypersons considered slight convex to moderate convex profiles to be also attractive.

When male and female raters were compared within the three groups of raters, there were no significant differences found between them. Though female raters rated female profile photographs more attractive, their observations were found to coincide with those of male raters for the male profile photographs.

## CONCLUSION

This study determined that there was a significant difference on perception of attractiveness in profile modifications between orthodontists, general dentists and laypersons. Though general dentists and orthodontists had similar opinions on perceptions, scoring variations existed between them. On observing male profile modifications, there were difference in opinions that a more convex profile due to prognathic maxilla was considered acceptable by general dentists for male subjects. On the other hand, laypersons were not able to distinguish minor changes made to both male and female profiles. They were able to identify changes when the magnitude of change was increased. Nevertheless, they considered it to be acceptable. In case of male profiles, both general dentists and laypersons considered moderate convexity in profiles to be acceptable.

Overall, it can be concluded that:

1. Orthodontists preferred a straight profile compared with convex profile
2. General dentists preferred a straight as well as moderate convex profile, especially among male subjects.
3. Laypersons preferred all the profiles acceptable except the most convex profile.
4. Female raters generously rated and preferred female profile modifications over male profile modifications.
5. Though straight profile was most attractive, especially for female subject, convexity upto a particular extend was acceptable for the male subject.

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