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Facial Profile study using photographs to assess esthetic preferences of Orthodontic Patients, Laypersons and Clinicians

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Abstract

Background: Creating the perfect occlusion while enhancing facial aesthetics is one of the goals of orthodontic therapy. Orthodontists frequently place a strong emphasis on profile aesthetic results while planning treatment. Patient decisions regarding the best course of treatment are greatly influenced by their orthodontists. Based on their clinician's expertise, patients may be encouraged to undergo orthodontic and surgical therapy. The decision to seek orthodontic treatment is sometimes influenced by self-consciousness about one's facial and dental appearance therefore it would be particularly interesting to compare patients and general practitioners opinions of attractiveness.

Aim: The study aims to assess and compare the aesthetic perception of different facial profiles among orthodontic patients, lay persons and clinicians.

Materials and Methods: A facial profile photograph and a lateral Cephalometric radiograph of an Asian male and female adult with a normal profile were digitalized to create a baseline template. Computerized digital photographic image modification was carried out on the template to obtain 7 facial profiles [bimaxillary protrusion, protrusive mandible, retrusive mandible, normal profile /Orthognathic (class –I incisor, Class I molar and skeletal class I pattern), retrusive maxilla, protrusive maxilla and bimaxillary retrusion] for each gender. These sets of photographs were shown to laypersons, patients taking Orthodontic treatment and clinicians (general practitioners). They rated their

esthetic perceptions of the photographs on the basis of a 100 mm visual analogue scale (VAS) from 0 (very unattractive) to 100 (very attractive).

Results: Orthognathic(Asian male profile was perceived as the most attractive profile by clinicians, orthodontic patients and lay person. In case of Asian female profile it is the bimaxillary retrusion that is perceived as the most attractive profile by clinicians while the orthodontic patients and lay persons perceived that the orthognathic female profile as the most attractive. A male or female profile with a protrusive mandible was judged to be the least attractive by all 3 groups The differences in rank scores between all the profile types were statistically significant .The most influential feature for ranking facial profile esthetics is given as upper lip, lower lip and chin by clinicians where as it is upper lip and lower lip by orthodontic patients and nose by lay persons.

Conclusion: This study helps us to know the esthetic perception will differ for gender, occupation.

Keywords: Baseline Template, Digitalization, Esthetics, Perception, Influential Feature, Lay Persons, Clinicians, Orthodontic Patients.

Introduction

Facial attractiveness is a crucial physical quality upon which society bases its conception of perceived personality traits and social aptitude.[1-6] According to cognitive research , assessment of facial attractiveness as shown sexual dimorphism and cross-cultural similarity in the selection of facial traits that comprise an appealing face. [7–9]

Despite appealing to our scientifically focused education, the dictionary definition of esthetics, "the science of beauty in nature and the arts," cannot be an accurate since beauty is the product of imagination and feeling.[10]

According to Plato , "measures and proportions always make for beauty and excellence. The philosophers believed that beautiful works obeyed certain geometric laws, because true beauty required harmony. As a result, they coined the term "Esthetics" to refer to the study of beauty as well as the philosophy of art.[11]

In a larger sense, esthetics is an intellectual phenomenon. When the terms esthetic or unesthetic are employed, they evoke an emotion that denotes what is pleasant or unpleasant.[12-14]

The foundation of aesthetic morphology is the idea of beauty and a proportionate body. Facial symmetry and average proportion were discovered to be important facial traits that influence esthetics. An essential patient element in the acceptance of orthodontic treatment is self-perception of dentofacial attractiveness. [15]

The desire to enhance facial esthetics is the primary driving force behind orthognathic surgery in adults.[16-18]

A recent study on the psychosocial impacts of orthognathic surgery showed that patients having orthognathic surgery had higher self esteem, better body and face image, and better social integration.[19]

Visual perception is required for esthetic appreciation in the same way that visual inspection is required in clinical research. As a result, it has been discovered that evaluating the extent of dental attractiveness by utilizing illustrated attractiveness scales to assess the esthetic impairment associated with different grades of severity of malocclusion.[20-23]

Orthodontic therapy can result in significant soft tissue changes, and profile images can be used to assess their esthetics. Analysis of patient soft-tissue profiles in comparison to a soft-tissue aesthetic standard is one way to evaluate esthetics in orthodontic research.[24-30]

When assessing esthetic preferences in treatment groups of different ethnicities and sexes, lip position in relation

to Ricketts' E-line (esthetic line) is frequently utilized. Ricketts' E-line is traced from the nasal tip's most protruded point (pronasale) to the soft tissue chin contour's most protruded point (pogonion).[31]

Because of its ease of use and understanding, as well as its frequent use in orthodontic research and clinical treatment planning, this reference line is frequently utilized in profile analysis.

Some authors have utilized photographs for esthetic evaluations because seeing all features of a patient's face provides a true representation of what we perceive and how we might interpret the face as esthetic or attractive.[32]

The goal of the present study was to analyze the similarities and differences in esthetic lip position preference using profile images.This study wanted to assess the difference between esthetic perception of orthodontic patients, lay persons and clinicians.

Sample size calculation: Sample size was calculated using G* power software version 3.1.9.2

Considering Effect size = 0.45,

α-error = 0.05

Power of the study = 90%

As 3 groups were considered, each group with sample size were taken.

Inclusion criteria

1. One male and female with Class I skeletal pattern aged between 20-25 years were taken in the study.

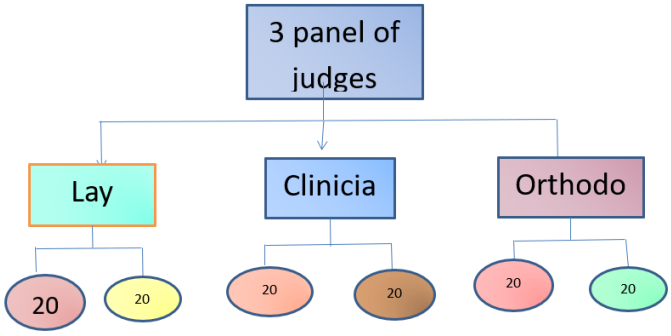
2. Judges of age between 18-50 years were recruited to vote for the study.

Exclusion criteria

1. Male and female subjects with other than class II dental or skeletal relation were excluded from the study .

2. Judges below the age of 18 years and above were excluded in the study.

Sample size and distribution



Materials & Methods: A total of 2 subjects (1 male and 1 female) with dento skeletal class -1 aged between 20-25 years who volunteered, were explained about the study and written informed consent was obtained from them.

Equipment and design

1. A lateral Cephalogram of both the patient taken in a standardized manner

2.Facial profile photo were obtained from both subjects having dento skeletal Class I relation for base line template usingCanon EOS 1300D digital SLR camera with 18-55 mm f 1: 4 - 5.6 IS zoom lens set at 55mm in Manual Mode, ISO 800, and shutter speed set to 1/60th second..

3.A computer with Adobe photo shop version 2021.

Method for obtaining photographs

To avoid possibly compromising external esthetic variables, their hair was covered, make-up and Jewellery were removed while taking profile photos.Each model got a facial image of themselves taken with a neutral expression. Each dento-skeletal Class I image was converted into six additional images with various dento-skeletal relationships.In total, two sets of seven images each were produced. Each alteration of a face profile was based on a 1-3 mm antero-posterior displacement in relation to the E-line using Adobe photo shop version 2021.

As judges, Asians between the ages of 18 and 50 were sought. Three pannel of judges i.e lay persons, clinicians, orthodontic patients with 40 people in each group. Each group were again divided into 20 males and 20 female judges.

Each judge assessed 14 images on a 100 mm visual analog scale (VAS) ranging from 0 (extremely unattractive) to 100 (very nice). When judging photographic sequences, judges were not given a time constraint. The following photograph was shown after the judges had recorded their scores.

At the end of scoring, the judges were asked to mark the most influential feature in the face based on which they had given the scores.

Statistical analysis

Collected data was entered in Microsoft excel sheet and analysed by using Statistical Package for Social Sciences (SPSS) version 22.0. Intra group variability for mean ranking was checked by Kruskal-wallis test and ranking was checked by chi square test. P value of <0.05 was considered as statistically significant.

Results

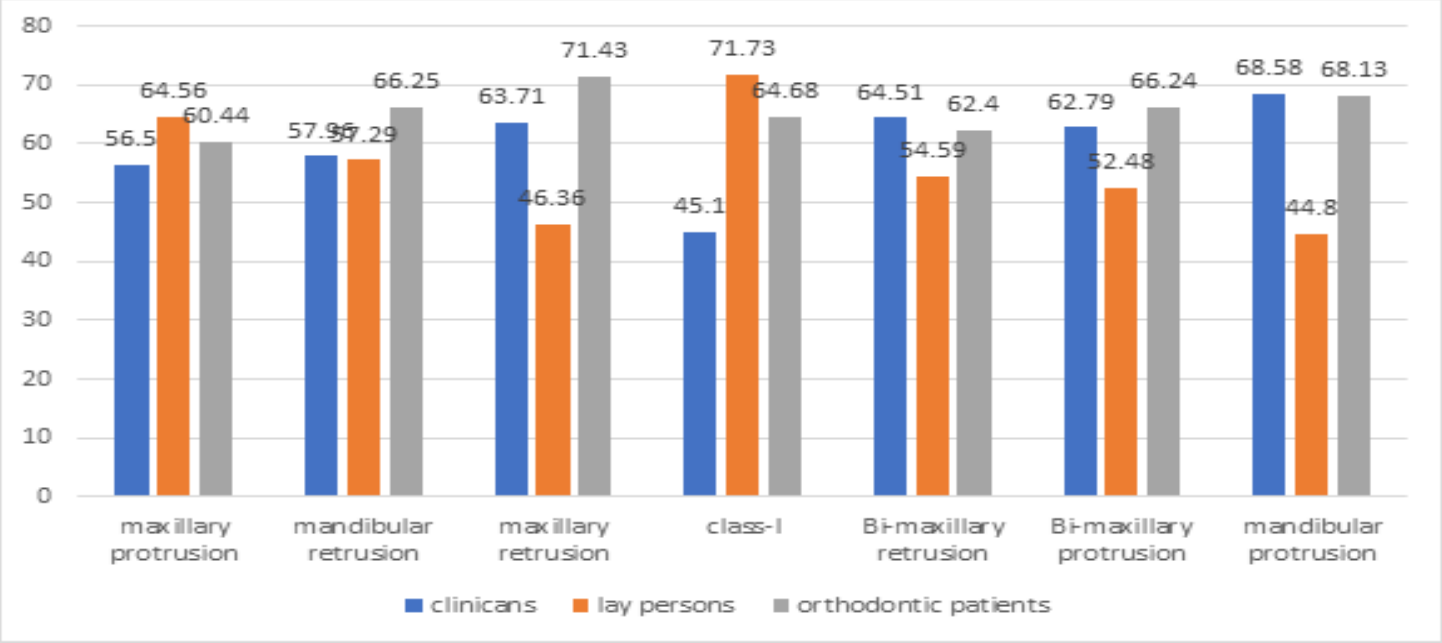
A total of 120 judges were recruited for this study. These include three groups namely laypersons, clinicians and orthodontic patients. In the overall analysis based on number of votes the dento skeletal class I was ranked as most attractive profile for both genders by almost all judges except the male clinicians who voted for Bimaxillary retrusion for female profile

Table 1: Ranking of different facial profiles according to judges on the basis of number of votes

Male facial profile						
Ranking	Lay person male judges	Lay person female judges	Clinician male judges	Clinician female judges	Orthodontic patient female judges	Orthodontic patient male judges
1	Class 1	Class 1	Class 1	Class 1	Class 1	Class 1
2	Mandibular protrusion	Mandibular retrusion	Maxillary protrusion	Maxillary protrusion	Mandibular protrusion	Mandibular retrusion
3	Bimaxillary retrusion	Bimaxillary retrusion	Mandibular retrusion	Mandibular retrusion	Maxillary retrusion	Maxillary protrusion
4	Maxillary retrusion	Mandibular protrusion	Bimaxillary retrusion	Bimaxillary retrusion	Bimaxillary retrusion	Maxillary retrusion
5	Mandibular retrusion	Maxillary protrusion	Bimaxillary protrusion	Maxillary retrusion	Mandibular retrusion	Bimaxillary retrusion
6	Maxillary protrusion	Maxillary retrusion	Maxillary retrusion	Mandibular protrusion	Bimaxillary protrusion	Mandibular protrusion
7	Bimaxillary protrusion	Bimaxillary protrusion	Mandibular protrusion	Bimaxillary protrusion	Maxillary protrusion	Bimaxillary protrusion
Female facial profile						
Ranking	Lay person	Lay person	Clinician	Clinician	Orthodontic	Orthodontic

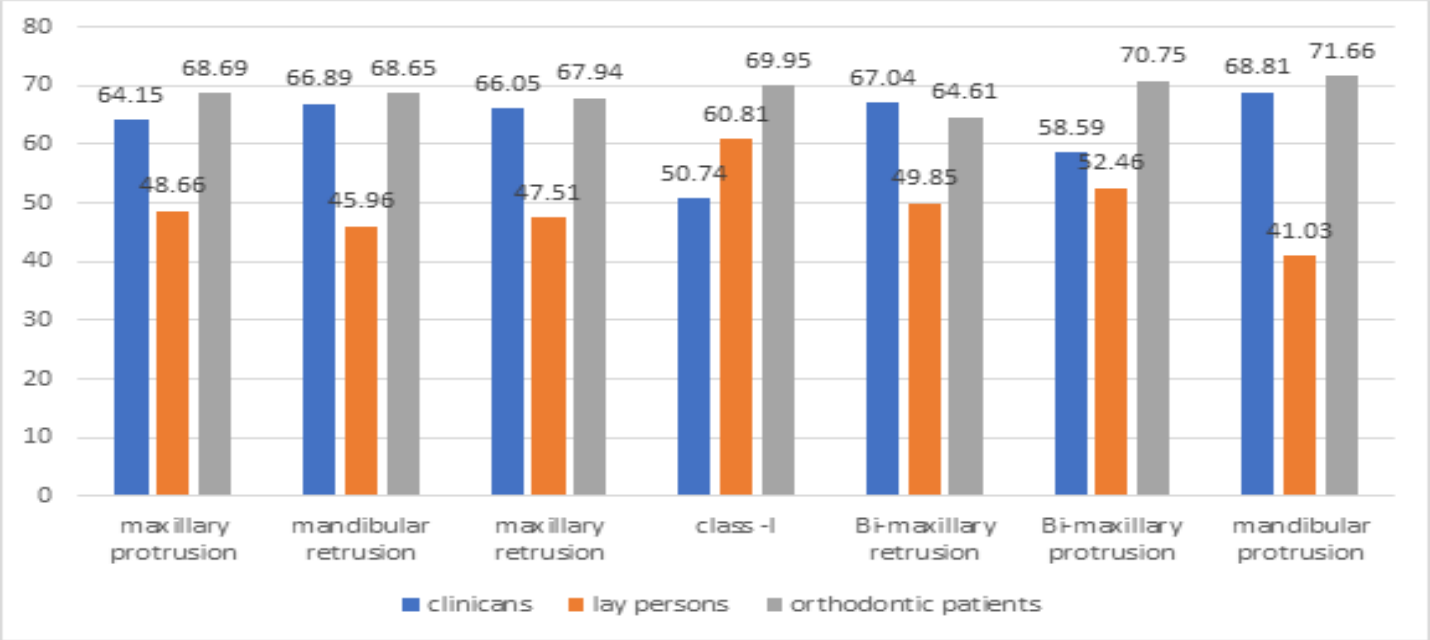
	male judges	female judges	male judges	female judges	patient female judges	patient male judges
1	Class 1	Class 1	Bimaxillary retrusion	Class 1	Class 1	Class 1
2	Bimaxillary retrusion	Bimaxillary protrusion	Class 1	Bimaxillary protrusion	Mandibular protrusion	Bimaxillary protrusion
3	Mandibular protrusion	Bimaxillary retrusion	Bimaxillary protrusion	Bimaxillary retrusion	Bimaxillary protrusion	Bimaxillary retrusion
4	Maxillary retrusion	Mandibular protrusion	Mandibular retrusion	Mandibular retrusion	Bimaxillary retrusion	Mandibular protrusion
5	Mandibular retrusion	Mandibular retrusion	Mandibular protrusion	Mandibular protrusion	Mandibular retrusion	Mandibular retrusion
6	Bimaxillary protrusion	Maxillary protrusion	Maxillary retrusion	Maxillary retrusion	Maxillary retrusion	Maxillary protrusion
7	Maxillary protrusion	Maxillary retrusion	Maxillary protrusion	Maxillary protrusion	Maxillary protrusion	Maxillary retrusion

(Table-1).The least attractive profile for male was Bimaxillary protrusion voted by most of the judges followed by maxillary and mandibular protrusion.For female profile most of the judges voted Maxillary protrusion as least attractive followed by maxillary retrusion.When comparing overall and subgroup data, rankings of beautiful facial profiles of female varied more than a male. The mean VAS scores for various face profiles are plotted in Graphs 1 (for men) and 2 (for women).



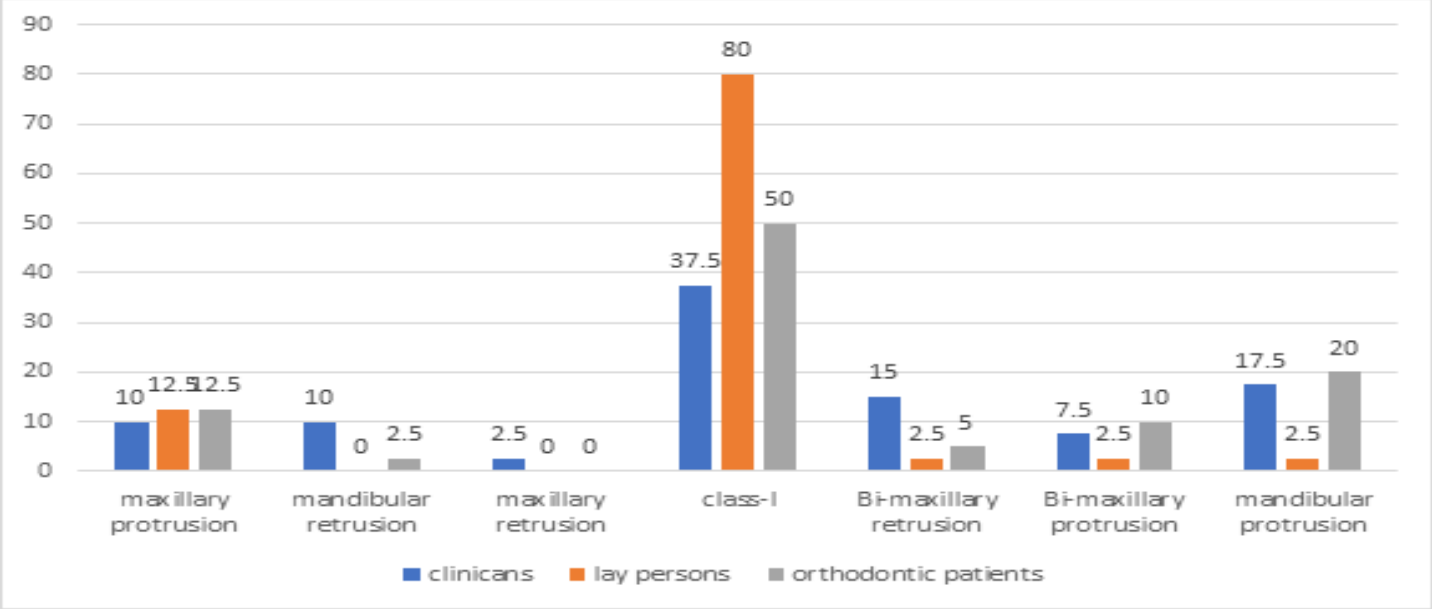
Graph 1: Mean ranks of male profiles given by clinicians, lay persons and orthodontic patients.

Inference: Mean rank for Male mandibular protrusion was more according to clinicians and orthodontic patients, according to lay persons and it is more for Class –I male profile.



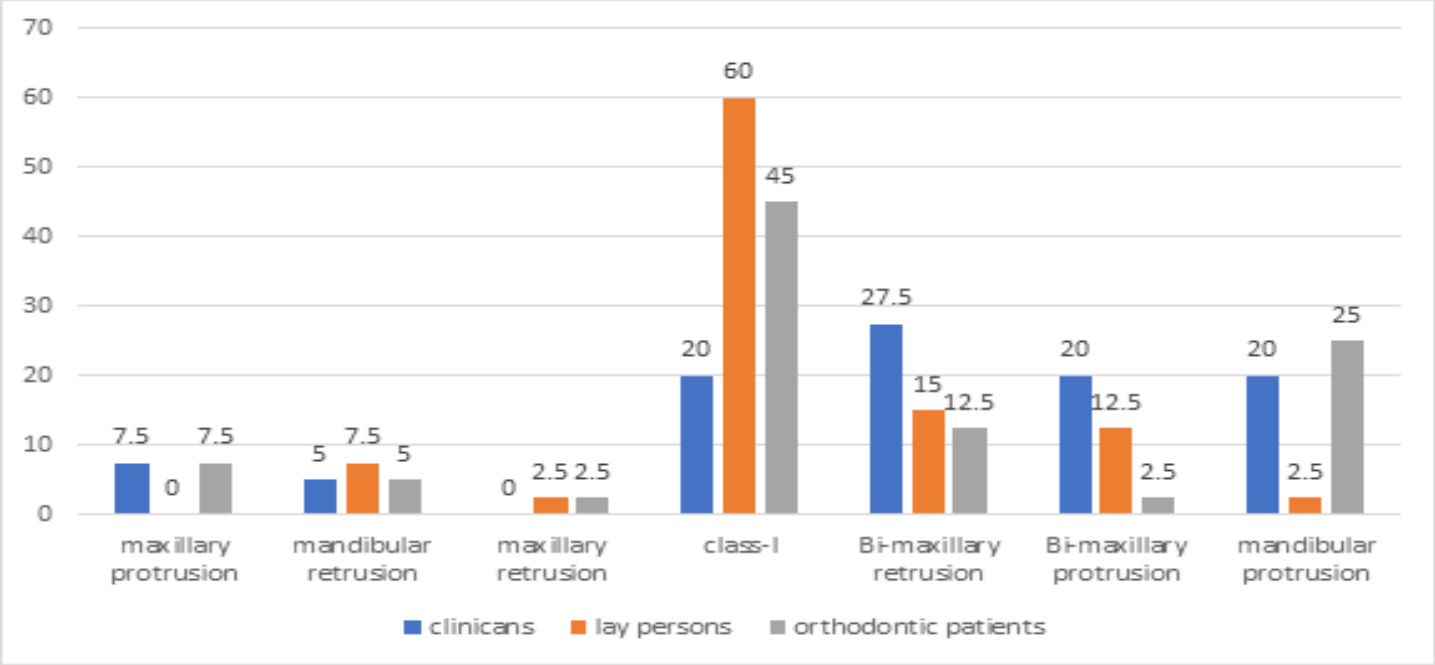
Graph 2: Mean ranks of female profiles given by clinicians, lay persons and orthodontic patients

Inference: Mean rank for Female mandibular protrusion was more according to clinicians and orthodontic patients, according to lay persons and it is more for Class –I Female profile.



Graph 3: Most attractive profile for male given by clinicians, lay persons and orthodontic patients

Inference: Class –I profile was voted as the most attractive profile by clinicians, lay persons and orthodontic patients.



Graph 4: Most attractive profile for female given by clinicians, lay persons and orthodontic patients.

Inference: The most attractive profile for female was class I according to laypersons and orthodontic patients. According to clinicians it is Bimaxillary retrusion.

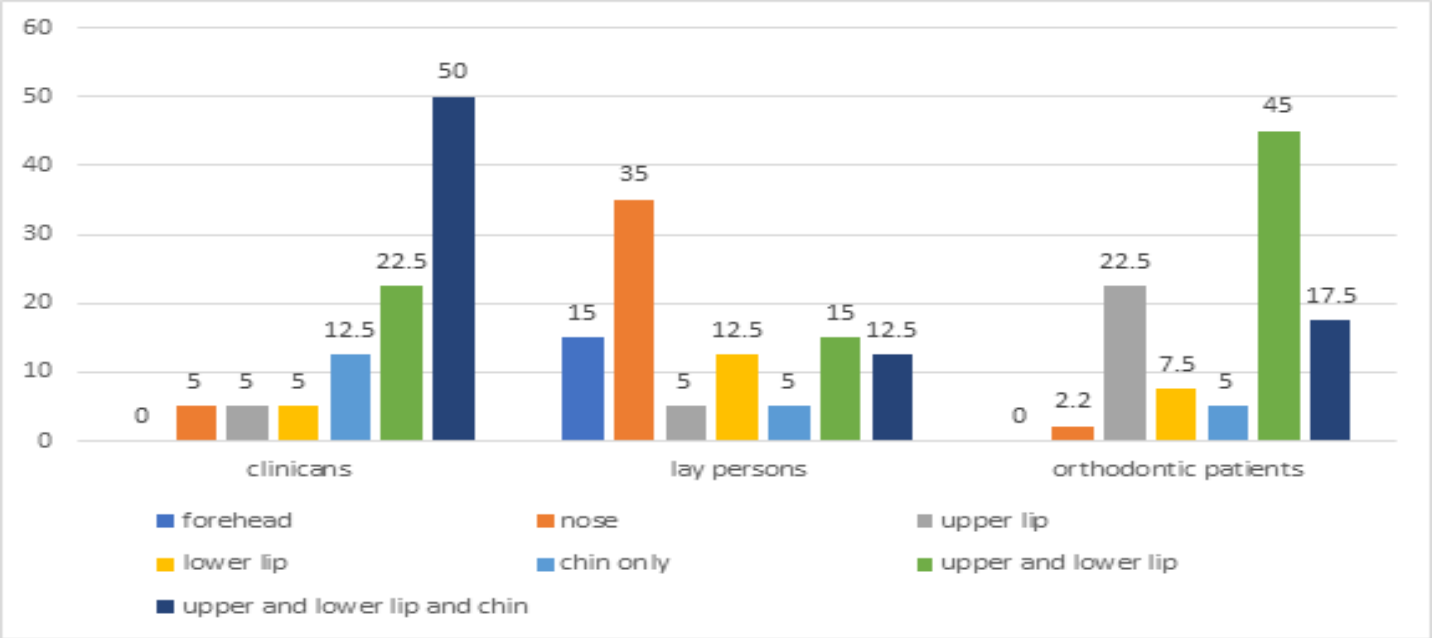
In addition to the most attractive profile the judges were asked to vote for most influential

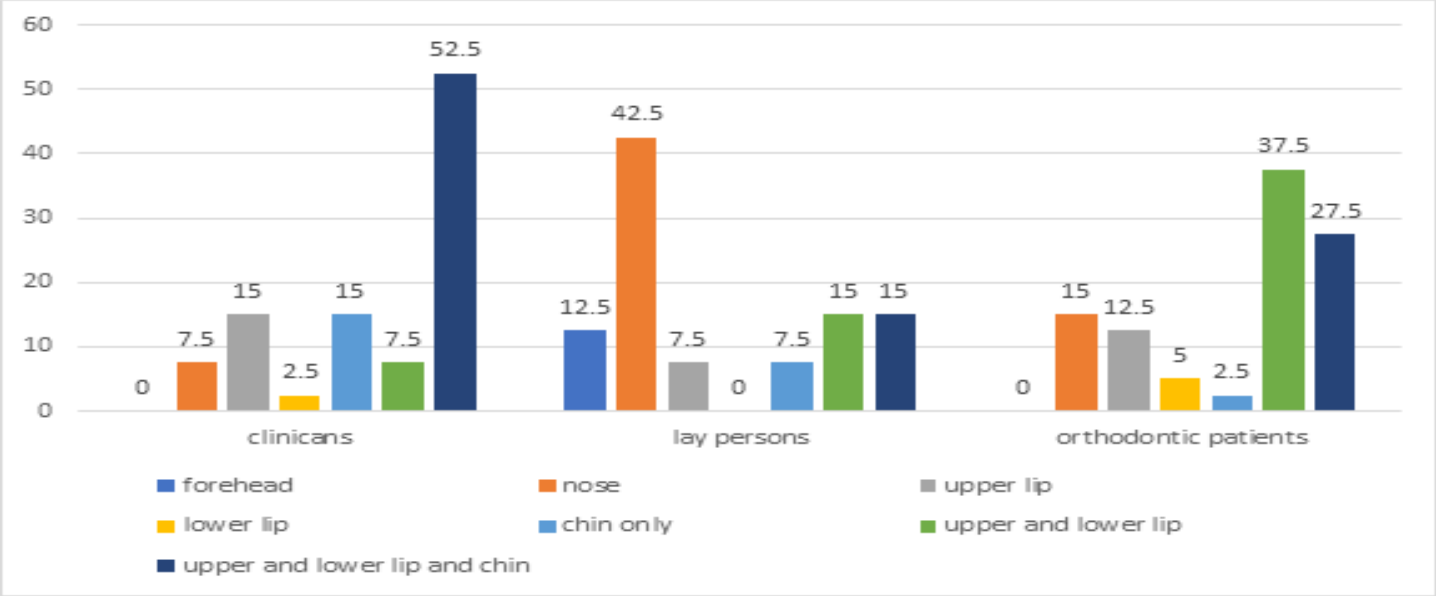
Feature and they voted as follows.

Graphs 5 &6 shows the most influential profile for both profiles is upper ,lower lip and chingiven by clinicians.

According to lay persons it was nose and according to orthodontic patients it was upper lip and lower lip.

Graph 5: Most influential profile feature for male used for ranking facial profile esthetics.





Graph 6: Most influential profile feature for female used for ranking facial profile esthetics.

Discussion

Pioneering research has proven that patients with facial deformities from any culture have psychosocial challenges and must overcome social prejudices.

It has been discovered that a person's mental wellbeing and social acceptance are influenced by the shape of their lower face. Compared to the earlier study by Lew et al., this study's research approach was improved.[33]

The major goal of this research was to establish which profile was favoured by the Asian population. By asking laypeople of Asian heritage to rate various facial profile kinds, the orthodontic and dental care industries can gain insight into how Asians evaluate various facial profile types.

According to Andrew Hockley et al silhouettes can be beneficial for quantifying a linear or angular change in the profile, but they may not be effective for quantifying an esthetic change.By letting the raters assess the esthetic lip positions in profile images of the same patient, the authors were able to examine their aesthetic preferences.[28]

The equilibrium of the face is impacted by lip position and facial features.[34]Because the orthodontist can alter it, lip evaluation in the patient's pre-treatment exam becomes crucial.[35]

Ricketts' E-line is frequently used to determine lip position. It gauges the lips' protrusion in relation to the chin and nose tips.[36]In this study Rickett's E-line is taken as a reference line to create different facial profiles.

The results of this study revealed a clear choice for the most esthetic profile of orthognathic profile in both male and female lay persons, orthodontic patients. But for a female profile according to clinicians the most attractive profile was bimaxillary retrusion.

Graph-5 and 6 shows that facial attractiveness can be influenced by facial features. Every individual perception regarding the most influential feature and attraction is different.

Sushner utilized evaluators to look at images of African American facial profiles and then choose the ones that were the most aesthetically pleasing.In the detailed pictures, the lip positions were measured relative to the E-line. His research resulted in an esthetic lip level of +2 mm in front of the E-line for males and +1 mm in front of the E-line for females for African Americans. As a

result, we chose to employ Sushner's E-line standard in our research.[37]

Yehezkel and Turley examined African American female profiles from fashion publications published from the 1940s to the 1990s to discover changes in esthetic preference during the twentieth century.They discovered that throughout time, a preference for higher convexity and lip projection (fullness) emerged.[38]

Andrew hockley et al carried out research on photos versus silhouettes for evaluation of African

American profile esthetics. They concluded that when evaluating soft-tissue esthetic profile preferences, rater preferences in the photographs were closer to the established esthetic norm than were their preferences in the silhouettes.[28]

Vincent J. Arpino et al carried out studies on Presurgical profile preferences of orthognathic patients and clinicians. They concluded that there were differences in tolerance for profile change among orthodontists, surgeons, and patients.[39]

In the present study Asian male and Female profile photos were rated by Asian lay persons, clinicians and orthodontic patients and the results were different based on gender,ethnicity and occupation.

Conclusion

1. For Males, profile that is orthognathic is perceived to be highly attractive by clinicians, lay persons, Orthodontic patients. For Females, Profile that is orthognathic is perceived to be highly attractive by laypersons and orthodontic patients and according to clinicians it is Bimaxillary Retrusion.The least esthetic profile for both the genders is Maxillary Retrusion.

2.Most influential feature for male and female profiles: For lay persons-Nose, for clinicians- upper lip, lower lip, chin for Orthodontic patients-upper lip, lower lip.

It is difficult to simply define what the public finds attractive because the people's perception on facial profiles can vary depending on several characteristics, including age, sex, socioeconomic status, educational attainment, and cultural constraints.[40-47]

This highlights the significance of identifying the esthetic ideals among various demographic types.Patients seeking treatment have been encouraged to follow these profile ideals due to the general public's desire for orthognathic profiles. This introduces the idea of treating patient profiles in accordance with their choices rather than orthodontic standards, as the public would gain from or at least influence our treatment.

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Legend Figures

Figure 1: Male profile photo

Figure 2: Female profile photo