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Orthodontology

ROLE OF DYNAMIC SMILE ON OVERALL FACIAL ESTHETICS : A VIDEOGRAPHIC EVALUATION

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ABSTRACT

Introduction: Various studies have been done to analyze the posed smile with full facial features. But very scanty literature is present which establish the importance of dynamic smile in overall facial esthetics. Therefore this study was designed to capture smile in both static and dynamic form using photographic and videographic methods respectively; and assess the role of dynamic smile on overall facial esthetics.

Method: The study was carried out on 166 subjects from the local population. Both static and dynamic smile were recorded. Three static parameters that are non-smiling full face, smiling full face, smiling focus on nose and mouth and two dynamic parameters that smiling full face, smiling focus on nose and mouth. The screening was done by the panel of 5 judges comprising of an Orthodontist, a Dentist, a Photographer, a Beautician and a Layperson using visual analog scale.

Result: Among Males (Group I), score was highest with respect to (Group ID) ''Dynamic smiling focus full face'' followed by (Group IB) ''Static smiling focus on full face'' then (Group IA) ''Static non smiling focus on full face'' then (Group IC) ''Static smiling Focus on nose and chin'' (Group IE) ''Dynamic smiling focus on nose and chin'' respectively. Mean VAS scores of all the 5 parameters among Females (Group II), highest Mean scores was found with respect to (Group IID) ''Dynamic smiling focus full face'' followed by (Group IIA) ''Static non smiling focus on full face'' then (Group IIB) ''Static smiling focus on full'' face then (Group IIE) ''Dynamic focus on nose and chin'') and lastly (Group IIC) ''Static smiling Focus on nose and chin''.

Conclusion: Dynamic smile plays a very important role in overall facial esthetics thus can be used as an important clinical tool, as it allows not only to capture the best frame of smile for smile analysis

KEYWORDS : Smile, Dynamic smile, Static smile, Facial esthetics.

INTRODUCTION

Improving smile esthetics is a common factor motivating patients to seek orthodontic treatment. Therefore, it is important for orthodontists to control the esthetic effects of their treatment on smile design. Smile design requires an understanding of the principles that manage the balances between teeth and soft tissue, while a person smiles. The esthetics of the smile, the relationships between the soft tissues (lips and gingival tissue) and the teeth, are considered fundamental in facial esthetics. Earlier focus used to be on the profile because the lateral cephalogram is the key aid in orthodontic treatment planning. As a result of our efforts to be as scientific as possible in our diagnosis and treatment planning, we have tended to drift away from clinical examination of the patient and the art of physical diagnosis. The goal of enhancing patient appearance requires us to revisit fundamental concepts of art and beauty that were present during the early development of orthodontic doctrine.[1]

Its known that while assessing overall facial esthetics not only does the physical and facial attractiveness play an important role but so does the smile of an individual, and thus orthodontic treatment should carefully consider a patients facial appearance and particularly his/her smile. Earlier the treatment modalities were confined to the hard tissue and orthodontic corrections were done to correct the skeletal and dental problems, but now the whole paradigm has shifted to soft tissue or the overall esthetics. So it is necessary to understand the role and importance of various features that contribute to overall esthetical harmony. Most scientific studies examining smile esthetics used static photographs[2,3].

The characteristics of smile are determined by the interplay of static and dynamic relationship between the dentoskeletal and soft tissue component of the face and so consideration of facial esthetics has always been an inseparable part of the principles and practice of orthodontics. The word 'Dynamic' means energetic and dynamic smile is the interplay of dentition, musculature and surrounding orofacial structure. Thus analyzing smile, which is a dynamic process, in static images will be unfair. Various studies have been done to analyze the posed smile with full facial features. But very scanty literature is present which establish the importance of dynamic smile in overall facial esthetics[4]. Therefore this study

was designed to capture smile in both static and dynamic form using photographic and videographic methods respectively; and assess the role of dynamic smile on overall facial esthetics.

MATERIAL AND METHOD

The study was conducted in the Post-Graduate Department of Orthodontics and Dentofacial Orthopedics, Sardar Patel Post Graduate Institute of Dental & Medical Sciences, Lucknow. For Static and Dynamic capture of Data a photographic room was used including white background, photographic illumination light, tripod stand, digital single lens reflex camera and a chair which was kept at 1.5 meter away from camera stabilised on tripod stand. This study was carried out on subjects from the local population with pleasant faces who had given consent to be a part of this study. Subjects were screened and a brief questionnaire was completed for all individuals that included name, age, origin and history of previous orthodontic treatment. On the basis of the criteria's mentioned 166 individuals were included into the study 112 females and 54 males.

The samples included in the study were between the age group of 18-32 years, had complete permanent dentition except for third molars with no missing or supernumerary teeth, not having any craniofacial anomalies or other pathologies, no previous history of orthodontic treatment and orthognathic surgery. Individuals with any gross facial asymmetry, visible periodontal disease, caries, excessive dental attrition, history of trauma, any missing or supernumerary teeth visible on smiling or prosthodontic or restorative work on any teeth visible on smiling, lip surgeries or history of lip surgery were not included in the study.

The 3 sets of records were made for each subject of all the 5 parameters:
1. Standardized Frontal Non-Smile full face Photograph (Figure no: 1)
2. Standardized Frontal Smiling full face Photograph (Figure no : 2)
3. Standardized frontal smiling photograph focusing on nose and chin region (Figure no : 3)
4. Standardized video of full face recording the dynamics of the smile (Figure no : 4)
5. Standardized video focusing on nose and chin region recording the dynamics of the smile (Figure no : 5)
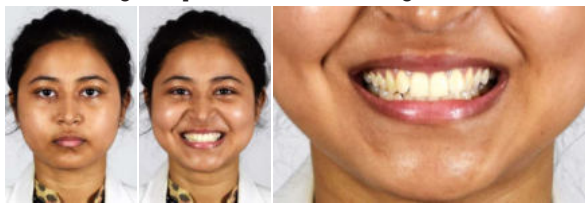

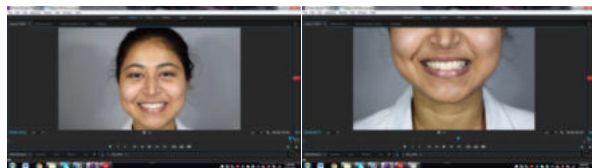FIG 1   FIG 2   FIG 3

FIG 4   FIG 5

Primary screening was done to short list the top 50 females and 50 males out of 166 individuals on the basis of the Standardized static non-smiling full face photographs. The screening was done by the panel of 5 judges comprising of an Orthodontist, a Dentist, a Photographer, a Beautician and a Layperson. The visual analog scale of **Lundstorm et al**[5] and **Johnson et al**[6] was used to score the subjects based on their overall facial esthetics. The shortlisted data was grouped into two groups.

**Group I comprised of all male subjects while Group II comprised of all females subjects.**
1. Group A – Static non-smiling full face
2. Group B – Static smiling full face
3. Group C –Static smiling focus on nose and chin
4. Group D –Dynamic smiling full face
5. Group E –Dynamic smiling focus on nose and chin
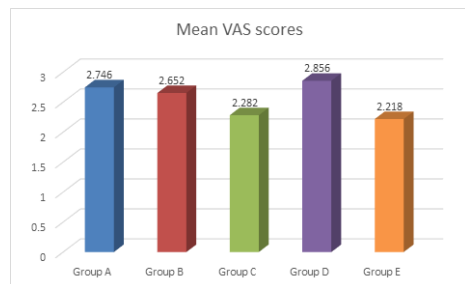
Graph 1: Comparison of parameters among males:
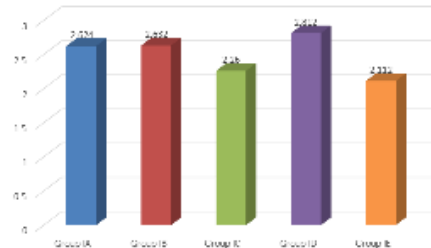
Group IA = static non-smiling full face, Group IB= static smiling full face, Group IC= static smiling focus on nose and chin, Group ID= dynamic smiling full face and Group IE= dynamic smiling focus on nose and chin

Graph 2: Comparison of parameters among females
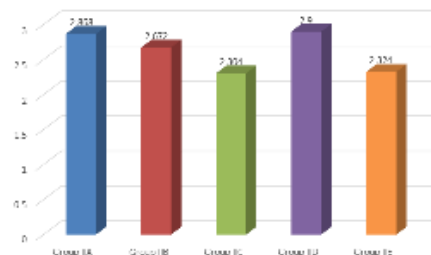
Group IIA = static non-smiling full face, Group IIB= static smiling full face, Group IIC= static smiling focus on nose and chin, Group IID= dynamic smiling full face and Group IIE= dynamic smiling focus on nose and chin

Graph 3: Overall Comparison of parameters:

Group A = Static non-smiling full face, Group B= static smiling full face, Group C= static smiling focus on nose and chin, Group D= dynamic smiling full face and Group E= dynamic smiling focus on nose and chin

Graph 4: Gender-wise comparison of all parameters:
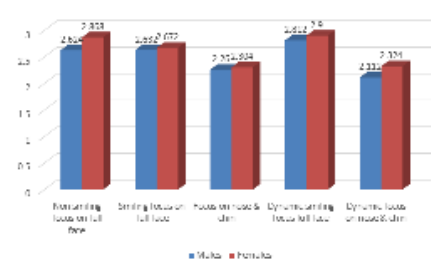
Final scoring of shortlisted subjects was done by the same group/panel of 5 judges comprising of an orthodontist, a dentist, a photographer, a beautician and a lay person on Visual Analog Scale. The scores observed were subjected to statistical analysis to assess the effect of dynamic smile on overall facial esthetics.

RESULTS
MALES (GROUP I):-
Among Males (Group I), score was highest with respect to (Group ID) "Dynamic smiling focus full face" 2.812 (0.399); followed by (Group IB) "Static smiling focus on full face" 2.632 (0.484); (Group IA) "Static non smiling focus on full face" 2.624 (0.484); (Group IC) "Static smiling Focus on nose and chin" 2.26 (0.518); (Group IE) "Dynamic smiling focus on nose and chin" 2.112 (0.478) respectively. Thus, mean VAS scores followed the order: **Group ID>Group IB>Group IA > Group IC > Group IE.**

FEMALES (GROUP II):-
Mean (SD) VAS scores of all the 5 parameters among Females (Group II), highest Mean (SD) VAS scores with respect to (Group IID) "Dynamic smiling focus full face" was found to be 2.9 (0.590); followed by (Group IIA) "Static non smiling focus on full face" 2.868 (0.514); (Group IIB) "Static smiling focus on full face" 2.672 (0.565); (Group IIE) "Dynamic focus on nose and chin" 2.324 (0.732); (Group IIC) "Static smiling Focus on nose and chin" 2.304 (0.654).

Thus this shows: **Group IID> Group IIA> Group IIB> Group IIE> Group IIC.**

OVERALL SAMPLES (N = 100):-
The comparison of all the parameter in overall samples, highest Mean (SD) VAS scores with respect to (Group D) "Dynamic smiling full face" was found to be 2.856 (0.503); followed by (Group A) "Static non smiling full face" 2.746 (0.512);

(Group B) "Static Smiling focus on full face" 2.652 (0.524); (Group C) "Static smiling focus on nose and chin" 2.282 (0.587); (Group E) "Dynamic smiling focus on nose and chin" 2.218 (0.624).
The order Mean VAS score follow is: **Group D> Group A> Group B> Group C.**

COMPARISION BETWEEN MALES AND FEMALES:-
Graph 4 are showing comparison of all the parameters among males and females. Mean VAS scores with respect to "Static Non smiling full face" among females was found to be significantly more among females as compared to males. While all the remaining 4 parameters doesn't show any statistical significance although females scored more than males.

DISCUSSION:-
Facial attractiveness plays a key role in social interaction; perception of facial esthetics is the beauty what we see but is it same for every individual or it differs from person to person? Well everyone have a different perception to see and analyze beauty. Facial features play a very pivotal role in perception of facial esthetics whether it is eyes, color of hair, skin, or the smile. Smile is a very crucial part of esthetics of an individual's face. Smile comprises of all the emotions and expressions an individual wants to express.[4]

Facial esthetics and smile esthetics appears strongly connected to each other. It is a known fact that during social interactions. When we talk about the emotions or expressing emotions, members of widely different cultures have much in common. Overview from an orthodontist's eye towards facial esthetics is enhancement of smile and profile.[1] Analysis of orthodontic case is done with the help of cephalometric parameters while majority of cephalometric analysis don't include soft tissue considerations. A well balanced smile should be an additional important treatment objective.[7] So to execute this various objective criteria exist for assessing attributes of the smile, establishing objective of treatment, or measuring soft tissue outcomes of treatment. It would be nice to have some sort of a tool to quantitatively assess beauty.[2] When we talk about the smile it can be assessed in two ways either in the static form or in the dynamic form.

So this study was designed to clinically examine the patient in three dimensions and use the digital photography and videography to examine the patient in both resting and dynamic relationships. An attempt was made to harmonize the discrepancy between their anatomic and physiologic relationship and their esthetics and functional desires, which can best be described as an appropriate positioning of the teeth and gingival scaffold within the dynamic frame. According to **Sarver et al**[1] it is necessary for an orthodontist to evaluate patient both statistically and dynamically, so fourth dimension was also added that is Time. **Tarantili et al**[8] explained that it is difficult to capture the peak of smile in photographic set up so it is better to take videographically.

All the subjects included in this study comprises of complete permanent dentition except for third molars with no missing or supernumerary teeth, no craniofacial anomalies or other pathologies and no previous history of orthodontic treatment and orthognathic surgery. Inclusion criteria are similar to the study done by **Krishnan et al**[9]. The select panel of judges was based on inputs taken from previous studies **Rubenstein et al**[10], **McNamara et al**[3], **Krishnan et al**[9]. Similar photographic setup was used in the study done by **Akerman et al**[11] **and Krishnan et al**[9].

On the basis of the results achieved it is implicated that Dynamic smile enhances the overall score and imparts to increase in overall facial aesthetics, while in static photographs the perception is limited to pure structural analysis of facial characteristics as stated by **Toole O et al (2001)**[12], **Rubenstein et al (2005)**[10].This might be due to presence of captured emotion in dynamic smile which become more relevant in the context of an attractiveness rating**.** The dynamic form of smile rated higher due to the fact that the standards used to evaluate static images is largely rooted in a structural analysis of the face and is therefore resistant to an attribution of emotion. **Ackerman et al (2002)**[11]**, Sarver et al (2002)**[1]**, Ackerman et al (2004)**[13]**, Tarantili et al (2005)**[8] **and Maulik et al (2007)**[14] have stated that study of esthetics and smile in its dynamics is better than static form. The probable reason as to why the non-smiling images of female group have scored more as compared to smiling photographs can be the presence of underlying malocclusion which became evident on smiling; also the smile line and tooth display on smile could have a negative impact on overall score. This result is in positive concordance with the results obtained by **Havens et al (2010)**[15]. This was in negative concordance with the findings of **Husley et al**[16], **Frush et al**[17] and **Zachrisson et al**[18]

The smile only photographs scored less and concluded that in non-orthodontically treated faces, the face with smile was rated as more attractive than the smile only photographs, as the unattractive smile region was camouflaged partially by the overall facial appearance similar findings were observed by **Maganzini et al (2014)**[19] and **Havens et al (2010)**[15].Studies by **Shaw WC (1985)**[20], **Tatarunaite E (2005)**[21], **Shaw WC (1981)**[22]also reported that the overall facial attractiveness that comprise of other facial features like eye, skin color and hairs are as important and the dental attractiveness cannot be the

only attribute towards facial attractiveness. Similarly, study done by **Lin AC et al (2013)**[23] stated that, not only the type of smile, the eyes to play a very important role in the esthetics of an individuals.

In females static non-smiling full face scored higher than males, and the difference was statistical significant this reflects that the facial appearance of females was perceived more esthetic as compared to males. On comparison of other parameters amongst males and females difference was not statistically significant which implies that static and dynamic smile does not get affected on the basis of gender although the females scored more than males which is in slight concordance with the study done by **Krishnan et al**[9]. The clinical significance of this study reminds us of **Tarantili et al**[8] and makes us rethink about esthetic assessment and record-taking. Static photographic records of the smile might involve errors that are related to capturing a time-evolving event at a single instant, and hence the resulting record will not capture the full extent of the smile and will not be a truly comparable reference. Furthermore, the smile might be restrained relative to the spontaneous smile, especially in patients who are aware of an unesthetic display. Thus there is need for continuous recording of spontaneous reactions, also we should overcome our preoccupied notion with measuring a single static image and take more time to observe the patient, during social contact, in a relaxed pleasant atmosphere to observe and record Dynamic smile for best clinical outcome.

CONCLUSION:

Dynamic smile increases the overall facial esthetics. Thus there is need for continuous recording of spontaneous reactions, also we should overcome our preoccupied notion with measuring a single static image and take more time to observe the patient, during social contact, in a relaxed pleasant atmosphere to observe and record Dynamic smile for best clinical outcome. Dynamic smile can be used as an important clinical tool, as it allows not only to capture the best frame of smile for smile analysis, but also patient's emotion which help to understand and assess the physiological standing of patients at that point of time pertaining to his/her confidence about smile and overall wellbeing.

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