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RESEARCH ARTICLE

ASSESSMENT OF SMILE VARIABLES OF PRE AND POST ORTHODONTIC SMILE PHOTOGRAPHS WITH THE AID OF AUTOCAD SOFTWARE

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ABSTRACT

Introduction: Resting tooth-lip relationship virtually leads the clinician to analyse photographs of the smiles and test the reproducibility and reliability of posed smile. Aim of the study is to assess smile aesthetics using 'variables of smile' among pre and post orthodontic subjects and implicating it to the orthodontic treatment planning. **Methodology:** Pre and post-treatment smile photographs (50 subjects) were taken with DSLR Camera (Canon 700D) in NHP and assessed using AutoCAD version 2007. The variables considered in study are Buccal Corridor Space, Smile Arc, Occlusal Cant, Smile Symmetry, Maxillary Midline to Mandibular Midline. **Results:** Paired t-test was performed showing highly significant differences in buccal corridor space which is 0.000 with $p < 0.05$ and rest of the smile variables showing 100% positive changes after the treatment in all the compared groups. **Conclusion:** a) buccal corridor space, b) smile arc and have a distinct characteristic change which made a maximum impact on aesthetic visualization between all the groups. Maxillary and mandibular midlines, occlusal cant are the parameters which show significant changes hence compulsorily should be used in pre-orthodontic evaluation. Parameters like, smile symmetry is subject to ethnic and social variations hence objective assessment has limitations.

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INTRODUCTION

Dale Carnegie said, "smile is the only way to win anyone's heart and impress people surround us" (Ackerman, 1998). Often, the main reason people seek orthodontic treatment is to improve dental aesthetics. The smile, along with speech, is what most visibly displays the results of orthodontic treatment; therefore, smile aesthetics becomes a major goal in orthodontic treatment. Ideal occlusion should certainly remain the primary functional goal of orthodontics but the aesthetic outcome is critical for patient satisfaction (Kiyak, 2008 and Sarver, 2000). Smile analysis (Ackerman, 2002) and digital smile designing plays an important role in orthodontic diagnosis and treatment planning since few decades. There are vast innovations and studies being progressed for improvising the smile. It is a multifactorial process which involves study of both, patient's soft tissues and overall outcome of the treatment considering those factors. As aim of orthodontic treatment itself explains how the smile aesthetic is important along with structural balance and functional efficacy (Krishnan, 2008 and Sarver, 2003). The variables considered in study are Buccal Corridor Space, Smile Arc, Occlusal Cant, Smile Symmetry, Maxillary Midline to Mandibular Midline.

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An analysis of these components of the smile may lead to a better understanding of the composition of an attractive smile in pre and post orthodontic subjects.

MATERIALS AND METHODS

A total of 50 patients were chosen who perfectly fulfilled the inclusion and exclusion criteria (Table 1). Patients who met the selection criteria were randomly assigned for the study. Ethical approval was obtained from the Institutional Ethical Committee. Diagnostic Frontal view smile photographs of a posed smile were captured in natural head position with the lips in a relaxed state before and after orthodontic therapy was performed. Age of the patient ranged from 14 to 30 years for females and males. Camera used for this study was 700D Digital Single Lens Reflex (Fig.1) with lens of 18x55mm (Fig.2) in a portrait mode.

Table 1. Inclusion and exclusion criteria

Inclusion criteria	Exclusion criteria
14-30 years both male and female	Skeletal deformity of face
Full compliments of the teeth and 4 or less missing posterior teeth	Cleft lip.
Without any skeletal deformity of face	Ellis fracture of teeth.
Angle's malocclusion (Class I, II, III)	More than four missing teeth.
Teeth without any Ellis fracture	

Fig. 1. DSLR 700D CANON

Fig. 2. LENS 18X55MM

Images were cropped by using 4:3 ratio in landscape mode to extract smile images. Ideally, a series of photographs were taken before and after the orthodontic treatment to show different changes in smile. Everything else should stay the same: viewpoint, positioning, lighting, colour, magnification, perspective, contrast. Later these photographs were analysed and measurements were made utilizing the AutoCAD software version 2007.

Smile variables used in this study are mentioned below in Table 2

Table 2. The Variables

1	Buccal Corridor Space Fig.3
2	Smile Arc Fig.4
3	Maxillary and mandibular midlines. Fig.5
4	Occlusal Cant Fig.6
5	Smile Symmetry Fig.7

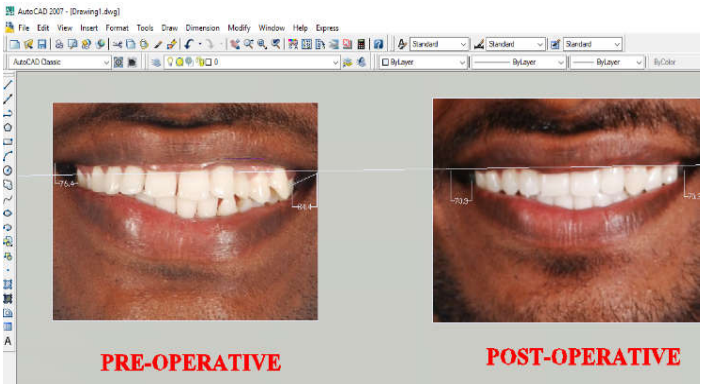

Fig. 3. Significant amount of changes in Buccal Corridor space in pre and post treatment photographs

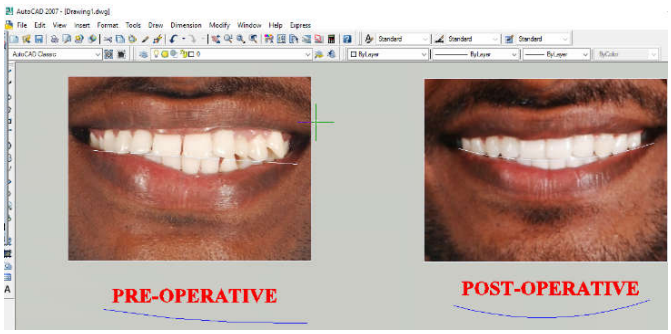

Fig. 4. Significant amount of changes seen in smile arc variable in pre and post treatment photographs

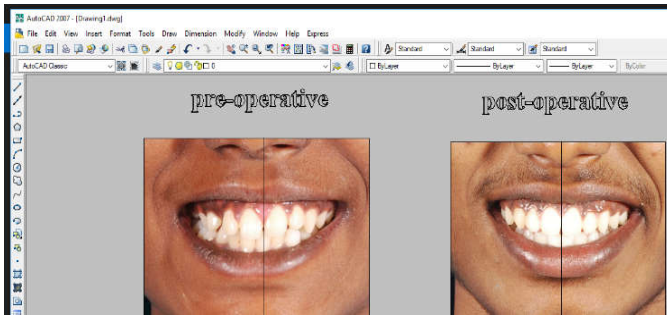

Fig. 5. Significant amount of changes seen in maxillary and mandibular midlines in pre and post treatment photographs

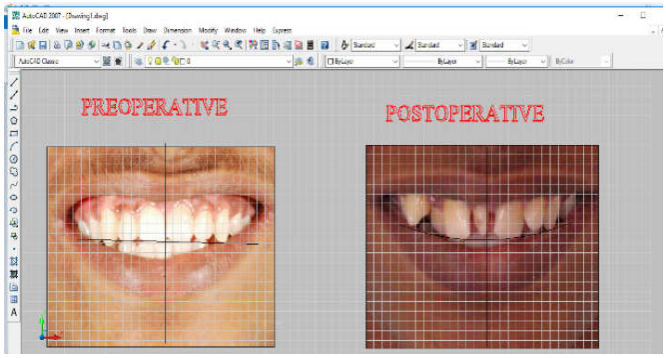

Fig. 6. Significant amount of changes seen in occlusal cant in pre and post treatment photographs

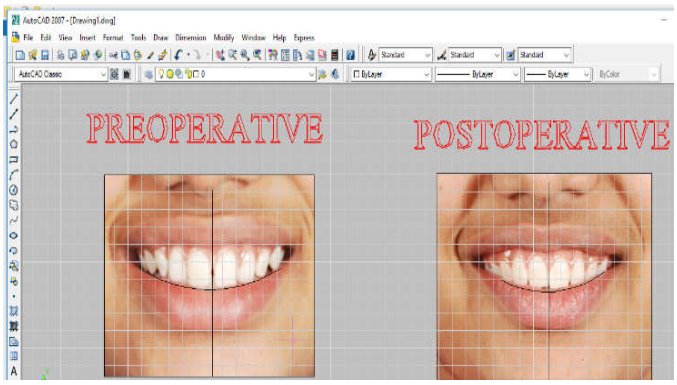

Fig.7. Significant amount of changes seen in smile symmetry in pre and post treatment photographs

Table 3. Paired sample t test

	Mean difference	t	p value
Buccal corridor space -Right	18.2	8.311	.000*
Buccal corridor space -Left	18.38	8.570	.000*

Statistical analysis

Total number of samples (50) were divided into 19 females and 31 males, age ranges from 17-38 years and mean age was 25.72 years. Paired "t "test was performed for buccal corridor space which shown statistically significant differences when compared between pre-operative treatment records and post-operative treatment records. Buccal corridor space shows significant value as shown in the above table. Rest other variables like smile arc, maxillary and mandibular midlines, occlusal cant and smile symmetry are assessed on the basis of percentage values gained from pre and post treatment records.

RESULTS

Table 4. Mean for buccal corridor space on right side is 29.48 and on left side 29.30 which has reduced to 11.28 on right side and 10.92 on left side and p value is 0.000 for right and left both sides. And P value is showing highly significant results with 0.000

Buccal corridor space		Minimum	Maximum	Mean	Std. Deviation
Pre-operative	Right	6	78	29.48	20.443
	Left	6	84	29.30	21.766
Post- operative	Right	0	70	11.28	13.369
	Left	0	70	10.92	13.909

Table 5. Pre-operative records show 6 samples i.e.12 % were showing consonant smile arc, 9 i.e. 18% were with flat smile arc, 35 i.e. 70% were showing non-consonant smile arc out of 50 and post-operative samples i.e. 50 out of 50 shows 100% consonant smile arc

Smile arc		Frequency	Percent
Pre-operative	Consonant	6	12.0
	flat	9	18.0
	Non-consonant	35	70.0
	Total	50	100.0
Post-operative	Consonant	50	100.0

Table 6. Out of 50 samples, 39 Maxillary midlines i.e. 78% were non-coinciding and 11 midlines i.e. 22% were coinciding with mandibular midline in pre-operative records whereas only 1 midline i.e. 2% was non-coinciding and rest 49 i.e. 98%were coinciding with mandibular midline in post-operative treatment records

Maxillary Midline		Frequency	Percent
Pre-operative	Coinciding	11	22.0
	Non-coinciding	39	78.0
	Total	50	100.0
Post-operative	Coinciding	49	98.0
	Non-coinciding	1	2.0
	Total	50	100.0

Table 7. In pre-operative records, out of 50, 40 samples were asymmetric i.e. 80% and 20% was symmetric i.e. 10 samples. After orthodontic treatment, it has changed to symmetric smile to 100%

Smile symmetry		Frequency	Percent
Pre-operative	Asymmetric	40	80.0
	Symmetric	10	20.0
	Total	50	100.0
Post-operative	Symmetric	50	100.0

Table 8. There was a noticeable change in occlusal cant in pre-operative and poste-operative records which shows out of 50 samples 35 i.e. 70% were showing cant and 15 samples i.e. 30% shows no occlusal cant whereas post-operatively there was no cant at all which shown 100%

Occlusal cant		Frequency	Percent
Pre-operative	Occlusal cant	35	70.0
	No cant	15	30.0
	Total	50	100.0
Post-operative	No cant	50	100.0

DISCUSSION

Smile mesh programme was the first multimedia software developed by J. L. Ackerman[1] in 1998 and it was commercially available worldwide which analysed 11 attributes of posed smile with the help of adjustable grids in treated and untreated subjects. Similarly, this study also determines the changes brought with the orthodontic treatment of 5 variables of smile which are buccal corridor space, smile arc, occlusal cant, incisor exposure, smile symmetry, midlines of the upper and lower jaw with the help of AutoCAD version 2007 which has a free version available on the official website so it is cost effective and time saving software over smile mesh program. Roden-Johnson et al. (2005) and Ritter et al. (2006), corroborated these findings with reporting that buccal corridor does not influence the aesthetic evaluation of smile photographs. Unlike these findings and agreeing with Dunn et al. (1996), present study also assessed that variations in the buccal corridor widths of subject, significantly affects the smile attractiveness which is not dependent or influenced by sex of the patient and ultimately these findings are coinciding with Moore et al. (2005). Several authors have considered smile arc (Flores-Mir, 2004; Pinho et al., 2007; Morley, 2001;

Christie, 1977), as an aesthetic enhancement factor of smile and flat or else non-consonant smile arc can be modified into consonant smile arc in which incisal border follows the border of lower lip but according to few authors like Mackey (Mackey, 1993), Hulsey (Charles, 1970) and Tjan (Anthony, 1984) are contradictory to this study which demonstrates that there is a high percentage of change in smile arc into flat or neutral after orthodontic therapy (Gerardo Castruita Cruz, 2015).

The results for this present investigation (table no. H) have shown that change in smile arc pattern from flat or non-consonant to consonant which aggravates the facial beauty in which 12% subjects were having consonant smile arc and 18% were having flat smile before the treatment and after orthodontic treatment, it has changed to 100% giving a pleasant appearance. Kokich et al. (Kokich, 1999), is considered as a pioneer of many researches; digital imaging technology was also used by some authors for scientific researches and consistent references. Just like buccal corridor space, midlines also play a very crucial role on facial beauty whereas it is true that midlines are hardly noticed by the lay-people; 2mm of midline deviation is well accepted and already proven in many studies, if not then it should be correction will be done by the end of active orthodontic therapy (Andre Wilson Machado, 2014).

In a same way, present study also explains about changes in different parameters of smile variables before and after orthodontic therapy. Waeil Batwa et al. (Waeil Batwa, 2012), determined the effect of occlusal plane on smile attractiveness in 2012 who explained that occlusal plane changes are directly proportional to the attractiveness of the smile which gave a similar finding with this study and also used smiling photographs of a person to see those changes in occlusal plane. This was a widely used method to know the occlusal plane differences in the literature**.**

Dunn (1966) et al and Kowner in 1996, found that smile with symmetry is more attractive. 80% of asymmetrical smile in pre-orthodontic subjects which was turned into 100% symmetrical after orthodontic treatment which correlates with the study of Kowner in 2014.

Conclusion

The variables a) buccal corridor space, b) smile arc have a distinct characteristic change which made a maximum impact on aesthetic visualization between all the groups. Maxillary and mandibular midlines and occlusal cant are the parameters which show significant changes hence compulsorily, should be used in pre-orthodontic evaluation. Aesthetic parameter like smile symmetry is subject to ethnic and social variations hence objective assessment has limitations.

REFERENCES

Ackerman JL, Ackerman MB, Brensinger CM, Landis JR.1998. A morphometric analysis of the posed smile. *Clin Orthod Res.,* 1:2,11.

Ackerman M, Ackerman J. 2002. Smile analysis and design in the Digital era. *J Clin Orthod*., 36: 221-236.

Andre Wilson Machado10 commandments of smile esthetics: *Dental Press J Orthod., 2014* July-Aug;19(4):136-57

Anthony H. L. Tjan, Dr. Dent., D.D.S., Gary D. Miller, D.D.S. and Josephine G. P: Some esthetic factors in a smile. The, Dr. Dent. Fixed orthodontics, operative dentistry, January 1984 volume 53 number 1.

Charles M. Hulsey, D.D.S. 1970. Tachibawa, Japan, an esthetic evaluation of lip-teeth relationships presents in the smile *Amer. J. Orthodontics.* volume 57

Christie TE 1977. Cephalometric patterns of adults with normal occlusion *Angle orthodontics*, 47(2): 128-135.

Daltro Eneas Ritter, 2006. Esthetic influence of negative space in the buccal corridor during smiling, *Angle Orthodontist* vol76 no 2.

Daltro Enéas Ritter1 Luiz Gonzaga Gandini Jr2 Ary Dos Santos Pinto2 Dirceu Barnabé Ravelli2 Arno Locks, Analysis of the smile photograph: *World J Orthod* 2006; 7.

Dunn WJ, Murchison DF, Broome JC. 1996. Esthetics: patients' perceptions of dental attractiveness. *J Prosthodont.*, 5(3) :166-71.

Dustin Roden-Johnson, A Ronald Gallerano, B And Jeryl Englishc, 2005. The effects of buccal corridor spaces and arch form on smile Esthetics, *Am J Orthod Dentofacial Orthop.,* 127:343-50

Flores-Mir, Silva E., Barriga MI, Lagravere MO, Major P.W. Lay-person's perception of smile aesthetics in dental and facial views 2004; 31: 204-209.

Gerardo Castruita Cruz, Antonio Fernandez Lopez, Francisco Marichi R Rodriguez: Association between the smile arc and buccal corridors with the facial biotype in subjects with normocclusion: Revista Mexicana de Ortodontia: vol.3 no.1 Jan -March 2015 pp-8-12

Kiyak HA.2008. Does orthodontic treatment affect patients' quality of life? *J Dent Educ.*, 72:886-94.

Kokich VO, Jr, Kiyak HA, Shapiro PA. Comparing the perception of dentists and lay people to altered dental esthetics. *J Esthet Dent.*, 11:311-24.

Kowner R. 1996. Facial asymmetry and attractiveness judgment in developmental perspective. Journal of Experimental Psychology: Human Perception and Performance, 22(3): 662e675.

Krishnan, V., et al., 2008. Characterization of posed smile by using visual analog scale, smile arc, buccal corridor measures, and modified smile index. *Am J Orthod Dentofacial Orthop,* 133(4): p. 515-23.

Mackey, R.J.,1993. An evaluation of smiles before and after orthodontic treatment. *Angle Orthod,* 63(3): p. 183-9; discussion 190.

Moore T, Southard KA, Casko JS, Qian F, Southard TE. 2005. Buccal corridors and smile esthetics. *Am J Orthod Dentofacial Orthop.,* 127(2):208-13.

Morley J, Eubank J: 2001. Macroeathetic elements of smile design J, Am Dent Assoc., 132 (1) 39-45

Pinho S. Ciriaco C. Faber J, Lenza M. 2007. Impact of dental asymmetries on the perception of smile aesthetics *American journal of orthodontics.,* 132,748-753.

Sarver DM, Ackerman JL. 2000. Orthodontics about face: The re-emergence of the esthetic paradigm. *Am J Orthod Dentofacial Orthop.*, 117:575-6.

Sarver, D.M. and M.B. Ackerman, 2003. Dynamic smile visualization and Quantification: Part 2. Smile analysis and treatment strategies *Am J Orthod Dentofacial Orthop,* 124 (2): p.116 -27.

Waeil Batwa; Nigel P. Hunt; Aviva Petrie; Daljit Gill: 2012. Effect of occlusal plane on smile attractiveness Angle Orthod., 82:218–223

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