

## Smile Esthetic Index - Turning Subjective Evaluation Of Smile Into Objective

Research Article

Asha.S.Hariharan<sup>1</sup>, Subhabrata Maiti<sup>2\*</sup>, Rakshagan V<sup>3</sup>

<sup>1</sup> Department Of Prosthodontics, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, India.

<sup>2</sup> Senior Lecturer, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, 600077, India.

<sup>3</sup> Senior Lecturer, Department of Prosthodontics, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, 600077, India.

### Abstract

The aim of the study was to evaluate the effectiveness of Smile esthetic Index in evaluation of anterior esthetics. The current study was designed to be photographic evaluation of 100 photos of subjects to evaluate the smile esthetic index. The study was conducted in Saveetha Dental College, Chennai. The photos were selected from the institute's patient database after obtaining patient consent. The smiles were graded based on the esthetic smile index and this score was compared to the mean of VAS score given to those photos by two other observers. The results of Esthetic Smile Index were compared with mean esthetic scores graded on 10 by two observers and Pearson correlation was done. Positive Correlation was found between these values (0.87). Smile Esthetic Index could be used for quantification of esthetic parameters of smile. Smile Esthetic Index proved to be a reliable index to evaluate the aesthetics of smile.

**Keywords:** Smile Esthetic Index; Smile line; Aesthetic Index.

### Introduction

Society places a major importance on physical appearances, especially the attractiveness of a smile [1-4]. The smile acts as a cornerstone in social interactions and plays a significant influence in a person's attractiveness. Research by Shaw et al., [5] displayed the impact, the dentofacial appearance had on the interpersonal relations of a person. The aesthetics of smile is dependent on a multitude of factors such as facial midline, smile line, smile arc, type of smile, any apparent discolouration, black triangles, buccal corridors and so on [6-11]. Garber and Salama suggested that these factors have a comprehensive effect on smile, and the esthetics mainly depend on three primary components: The teeth, gingival scaffold and the lips [12-15].

Since attractiveness of a smile is a subjective entity it is difficult to quantify it, and makes it difficult to establish treatment goals

based on this [16]. Attractiveness is usually measured as ordinal or interval scale as they represent a scale of judgement from least to most attractiveness [17]. Authors such as Howells DJ [17, 18], Peerlings RH [19] spoke about the use of VAS scale, rank-order scale, and categorical scales such as Q-sort to assess dento facial esthetics. But these factors are not specific to the elements of smile and give a ranked data just based on visual attractiveness [20, 21]. The Smile Esthetic Index proposed by Roberto Rutando in 2015 [22] consisted of 10 variables that were identified as determinants of esthetics. Of this,

- Two variables dealt with facial traits - smile line, facial midline
- Three variables dealt with dental characteristics - tooth alignment, deformity and dichromy.
- Five variables dealt with periodontal status - gingival dischromy, gingival recession, gingival excess, gingival scars and diastema / missing papillae.

#### \*Corresponding Author:

Subhabrata Maiti,  
Senior Lecturer, Department of Prosthodontics, Saveetha Dental College and Hospitals, Saveetha Institute of Medical and Technical Sciences, Saveetha University, Chennai, 600077, India.  
Tel: 9007862704  
E-mail: subhabratamaiti.sdc@saveetha.com

**Received:** November 10, 2020

**Accepted:** December 15, 2020

**Published:** December 18, 2020

**Citation:** Asha.S.Hariharan, Subhabrata Maiti, Rakshagan V. Smile Esthetic Index - Turning Subjective Evaluation Of Smile Into Objective. *Int J Dentistry Oral Sci.* 2020;7(12):1275-1278. doi: <http://dx.doi.org/10.19070/2377-8075-20000252>

**Copyright:** Subhabrata Maiti©2020. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution and reproduction in any medium, provided the original author and source are credited.

The index was applicable when the smile reveals all the teeth. Each variable is marked as present (1) or absent (0) and the total sum of the variables gives the Smile Esthetic Index or SEI. Higher the score signifies higher attractiveness, with 10 being the highest score achievable.

Effectiveness of such an index in quantifying a subjective data like esthetics enables to better score the aesthetics of the patient as well as to analyse the improvement in the aesthetics before and after treatment. Hence this study aims to analyse the effectiveness of the Smile Esthetic Index in scoring the attractiveness of smile.

## Materials and Methods

### Study design

The current study was designed to be a photographic analysis of smiles. The study was conducted during the month of March 2020- April 2020 at Saveetha Dental College. The study was approved by the institutional review board.

### Collection of data

100 photos were selected of patients from the institutions record maintenance system based on the inclusion and exclusion criteria. Consent was obtained from the patients and confidentiality was maintained.

### Inclusion Criteria

- Patients between the age group of 18-35 years
- Good oral hygiene
- All the maxillary anteriors present
- No gross facial deformities
- Full smile

### Exclusion criteria

- Patients having anterior crowns or restoration
- Caries in the anteriors
- Broken or fractured anterior teeth

### Description Of method

The photos were analysed using the Smile Esthetic Index and was scored on 10. Two other operators also graded the photos based

on general attractiveness using VAS scale. The mean of this score was calculated and correlated with obtained SEI.

### OBJECTIVE/EXTERNAL ASSESSMENT IN Smile Esthetic Index (SEI):

1. Correct Smile Line - Yes/No
2. Correct Facial Midline - Yes/No
3. Correct Tooth/Crown Alignment - Yes/No
4. Absence Of Visible Tooth Deformity- Yes/No
5. Absence Of Visible Tooth Dischromy - Yes/No
6. Absence Of Visible gingival Dischromy- Yes/No
7. Absence Of Visible Gingival Recession - Yes/No
8. Absence Of Visible gingival Excess - Yes/No
9. Absence Of visible gingival scars - Yes/No
10. Absence Of visible Diastema and/or missing Interdental Papillae- Yes/No

### Statistical test

The obtained data was tabulated using Excel sheets, and statistics was done using SPSS software Version [23]. Pearson correlation was done to analyse the relationship between the mean VAS score and the smile esthetic index.

## Results and Discussion

The results of the study showed that the most popular SEI score was 10(34.3%) followed by 9(32.3%) (Figure 1). Kappa statistics was performed to analyse the agreement between the operators assessing the smile using VAS scale. The Kappa value was found to be 0.65, suggesting substantial agreement. The results of Smile Esthetic Index were correlated with the mean of the VAS scores (Table 1) using Pearson's correlation. Positive Correlation was found between these values, (0.87) suggesting that SEI could be used for quantification of smile esthetics (Table 2).

The maximum correlation between the Smile esthetic Index and the VAS score was seen with the SEI of 8(48%), followed by 10(35%) (Figure 2).

The aim of the current study was to validate the effectiveness of the Smile Esthetic Index, in the quantification of a subjective data like esthetics or attractiveness. This index considered a combination of intraoral and extra oral factors involved in smile esthetics and the presence or absence of each factor was graded as '1' if present and '0' if absent. The sum of these 10 factors gave the

Figure 1. Bar graph representing frequency distribution of the Smile Esthetic Index scores.

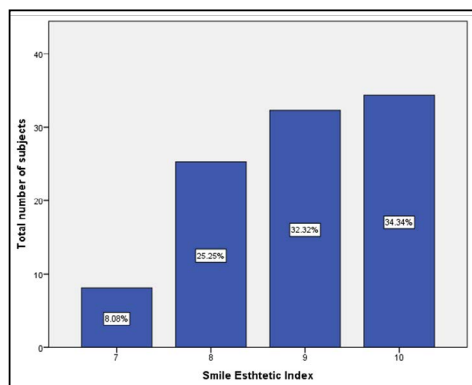


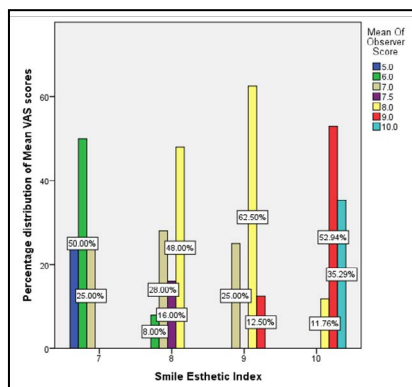
Table 1. Shows the frequency distribution of mean VAS scores given by the two observers. The most commonly given score was 8(26.3%).

VAS	Frequency	Percentage
5	2	2.00%
6	16	16.20%
7	17	17.20%
7.5	4	4.00%
8	26	26.30%
9	22	22.20%
10	12	12.10%

Table 2. Table shows the correlation of Smile esthetic Index with the mean VAS score, and the correlation coefficient. There is maximum coincidence with score 8 and 10 of the SEI with the VAS scores. The positive correlation between these scales show that SEI can be used in evaluation of smile esthetics.

Smile Es- thetic Index	Mean VAS score							Pearson Correlation
	5	6	7	7.5	8	9	10	
7	2(25%)	4(50%)	2(25%)	0(0%)	0(0%)	0(0%)	0(0%)	0.87- positive correlation
8	0(0%)	2(8%)	7(28%)	4(16%)	12(48%)	0(0%)	0(0%)	
9	0(0%)	0(0%)	8(22%)	0(0%)	24(66%)	4(12.5%)	0(0%)	
10	0(0%)	0(0%)	0(0%)	0(0%)	22(42%)	18(52.9%)	12(35.3%)	

Figure 2. Bar graph shows the Smile Esthetic Index (X-axis) in correlation with Mean VAS observer score (Y-axis) in relation to age group. The graph shows that a scores of 8 and 10 in SEI is the most likely to coincide with the corresponding VAS values of 8 (yellow) and 10 (light blue). This correlation between SEI and VAS scores shows a positive correlation of 0.87. (Pearson's correlation).



Smile Esthetic Index with 10 being the highest score associating with excellent smile and 1 being the lowest associating with poor esthetics of smile.

The 10 variables were selected based on various studies that investigate the factors that influence a person's perception on aesthetics. A major contribution to this was the studies by Witt M and Flores-Mir C et al., [23] that evaluated the ability of a layman to evaluate a possible defect in the smile, in particular regard to periodontal factors [23, 24]. The study showed that a layperson could perceive the changes in dental midline, smile line, tooth form, shape, deformity, any alignment issues and presence of diastema. Valuable inputs were obtained from studies by Nold SL et al [25], Calamia JR et al., [26] and Sousa Dias N et al., [27] who developed the Smile Aesthetic Evaluation Form (SAEF) to improve communication between clinician and patients.

Similar studies where smile was evaluated objectively were done by Brian J Gabel et al., where the Smile Mesh program was used

to evaluate the smile, but correlation could not be established between the smile attractiveness and the objectively gathered measurements [28]. Study done by Edral Iskial also tried to correlate the objective smile measurements obtained by using the Image tool in Windows version 3.00 (UTHSCSA, San Antonio, Tex), and compared that with the subjective measurements using VAS scale. His study showed that there was no statistically significant difference [29].

In a study done by Olivera Pedro Lima et al , VAS scale was compared with the Q-sort method to measure the level of agreement between dentists, orthodontists and laymen in assessing the attractiveness of a smile [30].

While the above mentioned indices and measures were for the dentist, the Orofacial esthetic scale(OES), is a self reported assessment for prosthodontic patients. OES scores range from 0-70 with 0 being the worst score and 70 being the best, allowing patients to understand, analyse and better communicate with the

dentist [31].

While this study showed promising correlations as compared to the existing literature, a possible limitation may be recognised in using photographs of posed smiles. Using a dynamic sample(video) could have yielded a better result and more significant understanding.

Though the use of SEI yielded statistically significant correlation in objectively assessing smiles the authors felt that the incorporation of a three point score instead of a dichotomous score could have better displayed the factors.

## Conclusion

Smile Esthetic Index proved to be a reproducible index allowing objective evaluation of attractiveness of smile. This index could very well be used to compare the pre and post treatment results of smile, and also enhances communication and better understanding. Further research with larger sample size and the use of dynamic samples instead of photographs could help us better understand the elements contributing to the esthetic of smile.

## Acknowledgement

We would like to acknowledge Saveetha dental college and hospital for providing complete patient details required for the study purpose and their constant help and support for this research.

## References

- Jain AR, Nallaswamy D, Ariga P, Ganapathy DM. Determination of correlation of width of maxillary anterior teeth using extraoral and intraoral factors in Indian population: A systematic review. *World J Dent.* 2018 Jan;9:68-75.
- Duraisamy R, Krishnan CS, Ramasubramanian H, Sampathkumar J, Mariappan S, Navarasampatti Sivaprakasam A. Compatibility of Nonoriginal Abutments With Implants: Evaluation of Microgap at the Implant-Abutment Interface, With Original and Nonoriginal Abutments. *Implant Dent.* 2019 Jun;28(3):289-295. PMID: 31124826.
- Duraisamy R, Krishnan CS, Ramasubramanian H, Sampathkumar J, Mariappan S, Navarasampatti Sivaprakasam A. Compatibility of Nonoriginal Abutments With Implants: Evaluation of Microgap at the Implant-Abutment Interface, With Original and Nonoriginal Abutments. *Implant Dent.* 2019 Jun;28(3):289-295. PMID: 31124826.
- Selvan SR, Ganapathy D. Efficacy of fifth generation cephalosporins against methicillin-resistant *Staphylococcus aureus*-A review. *Research Journal of Pharmacy and Technology.* 2016 Oct 28;9(10):1815-8.
- Shaw WC, Rees G, Dawe M, Charles CR. The influence of dentofacial appearance on the social attractiveness of young adults. *Am J Orthod.* 1985 Jan;87(1):21-6. PMID: 3855347.
- Moskowitz ME, Nayyar A. Determinants of dental esthetics: a rational for smile analysis and treatment. *Compend Contin Educ Dent.* 1995 Dec;16(12):1164. PMID: 8598015.
- Kokich VO Jr, Kiyak HA, Shapiro PA. Comparing the perception of dentists and lay people to altered dental esthetics. *J Esthet Dent.* 1999;11(6):311-24. PMID: 10825866.
- Jyothi S, Robin PK, Ganapathy D. Periodontal health status of three different groups wearing temporary partial denture. *Research Journal of Pharmacy and Technology.* 2017 Dec 1;10(12):4339-42.
- Ganapathy D, Sathyamoorthy A, Ranganathan H, Murthykumar K. Effect of Resin Bonded Luting Agents Influencing Marginal Discrepancy in All Ceramic Complete Veneer Crowns. *J Clin Diagn Res.* 2016 Dec;10(12):ZC67-ZC70. PMID: 28209008.
- Ranganathan H, Ganapathy DM, Jain AR. Cervical and Incisal Marginal Discrepancy in Ceramic Laminate Veneering Materials: A SEM Analysis. *Contemp Clin Dent.* 2017 Apr-Jun;8(2):272-278. PMID: 28839415.
- Dhanraj D, Dhanraj, Sathyamurthy A. Effect of Marginal Discrepancy induced by CAD/CAM and Retainers - A Systematic Review. *IOSR Journal of Dental and Medical Sciences.* 2014; 74-85.
- Garber DA, Salama MA. The aesthetic smile: diagnosis and treatment. *Periodontol 2000.* 1996 Jun;11:18-28. PMID: 9567953.
- Subasree S, Murthykumar K. Effect of aloe vera in oral health-A review. *Research Journal of Pharmacy and Technology.* 2016 May 1;9(5):609.
- Banu MF, Murthykumar K. Effect of Lycopene on Oral Lesions: A Short Review. *Research Journal of Pharmacy and Technology.* 2016 Jul 1;9(7):964.
- Harshitha C, Murthykumar K, Deepak A. Beneficial Effects of Olive Oil on Human Health-A Review. *Research Journal of Pharmacy and Technology.* 2016 May 1;9(5):593.
- Ackerman JL, Proffit WR, Sarver DM. The emerging soft tissue paradigm in orthodontic diagnosis and treatment planning. *Clin Orthod Res.* 1999 May;2(2):49-52. PMID: 10534979.
- De Smit A, Dermaut L. Soft-tissue profile preference. *Am J Orthod.* 1984 Jul;86(1):67-73. PMID: 6588762.
- Howells DJ, Shaw WC. The validity and reliability of ratings of dental and facial attractiveness for epidemiologic use. *Am J Orthod.* 1985 Nov; 88(5): 402-8. PMID: 3864374.
- Peerlings RH, Kuijpers-Jagtman AM, Hoeksma JB. A photographic scale to measure facial aesthetics. *Eur J Orthod.* 1995 Apr;17(2):101-9. PMID: 7781718.
- Ashok V, Nallaswamy D, Benazir Begum S, Nesappan T. Lip Bumper Prosthesis for an Acromegaly Patient: A Clinical Report. *J Indian Prosthodont Soc.* 2014 Dec;14(Suppl 1):279-82. PMID: 26199531.
- Venugopalan S, Ariga P, Aggarwal P, Viswanath A. Magnetically retained silicone facial prosthesis. *Niger J Clin Pract.* 2014 Mar-Apr;17(2):260-4. PMID: 24553044.
- Rotundo R, Nieri M, Bonaccini D, Mori M, Lamberti E, Massironi D, et al. The Smile Esthetic Index (SEI): A method to measure the esthetics of the smile. An intra-rater and inter-rater agreement study. *Eur J Oral Implantol.* 2015 Winter; 8(4): 397-403. PMID: 26669549.
- Witt M, Flores-Mir C. Laypeople's preferences regarding frontal dentofacial esthetics: periodontal factors. *J Am Dent Assoc.* 2011 Aug;142(8):925-37. PMID: 21804059.
- Kannan A, Venugopalan S. A systematic review on the effect of use of impregnated retraction cords on gingiva. *Research Journal of Pharmacy and Technology.* 2018 May 30;11(5):2121-6.
- Nold SL, Horvath SD, Stamp J, Blatz MB. Restorative of select facial and dental esthetic parameters. *Int J Periodontics Restorative Dent.* 2014 Sep-Oct;34(5):623-9. PMID: 25171032.
- Calamia JR, Levine JB, Lipp M, Cisneros G, Wolff MS. Smile design and treatment planning with the help of a comprehensive esthetic evaluation form. *Dent Clin North Am.* 2011 Apr;55(2):187-209. PMID: 21473988.
- Sousa Dias N, Tsingene F. SAEF - Smile's Aesthetic Evaluation form: a useful tool to improve communications between clinicians and patients during multidisciplinary treatment. *Eur J Esthet Dent.* 2011 Summer; 6(2):160-76. PMID: 21734965.
- Website [Internet]. [cited 2020 Jun 15].
- İşiksal E, Hazer S, Akyalçın S. Smile esthetics: perception and comparison of treated and untreated smiles. *Am J Orthod Dentofacial Orthop.* 2006 Jan;129(1):8-16. PMID: 16443472.
- Oliveira PL, Motta AF, Guerra CJ, Mucha JN. Comparison of two scales for evaluation of smile and dental attractiveness. *Dental Press J Orthod.* 2015 Mar-Apr;20(2):42-8. PMID: 25992986.
- Larsson P, John MT, Nilner K, List T. Reliability and validity of the Orofacial Esthetic Scale in prosthodontic patients. *Int J Prosthodont.* 2010 May-Jun;23(3):257-62. PMID: 20552093.