

Relationship between Aesthetic Subjective and Objective Evaluation in Anterior Dental Implants

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Abstract

Recent technological developments have increased the popularity of dental implants. This has led to higher expectations for implants in both the functional and aesthetic areas. Aesthetic evaluations tend to be subjective, causing problems when trying to predict patients' satisfaction. The Pink Esthetic Score/White Esthetic Score (PES/WES) is an index used to objectively evaluate anterior implant restorations while the Orofacial Aesthetic Scale (OAS) is a questionnaire used to evaluate the patients' perceptions of their orofacial appearance. The current study assesses the relationship between the objective (using PES/WES) and subjective evaluation (using OAS) of an aesthetic implant restoration. Fifty-six intraoral photographs of anterior implant restorations (N=56) were taken and evaluated using PES/WES. Subjects were then instructed to fill out the OAS questionnaire. The mean total of PES/WES is 13.6 ± 1.67 (range: 11 to 15). The mean total of PES is 7 ± 0.70 (range: 6 to 8). The two PES parameters of the distal papilla and root convexity (1.6 ± 0.54) have the highest mean values, whereas the variable level of facial mucosa (1 ± 0.01) is the most difficult to satisfy. The mean total of WES is 6.6 ± 1.14 (range 5-8). From the results, a high PES/WES score does not correspond to a high OAS score.

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Introduction

Recent technological developments have increased the popularity of dental implants. The high success rate of dental implants, has attracted more people to replace their missing teeth with dental implants.¹ This increase in popularity has caused a higher expectation for implant restoration in both the functional and aesthetic areas.² Recently, there has been a shift in the pattern of dental treatments from functional restorative dentistry toward aesthetic dentistry.² Several researches propose that aesthetic dental restorations have significant impacts on the psychological condition of a person. Newton et al states that the initial impression of a person is significantly affected by his or her dental appearance.³ During social interactions, someone's attention tends to be directed toward the ocular

and oral areas; hence, the lips and mouth at the center of communication have an important role in conveying the subject's expression and appearance. Research shows that an aesthetic smile is often associated with a high intellectual level and social status, and it is also more attractive physically.⁴ Furthermore, Wolfart et al also states that depressed subjects tend to have a negative evaluation regarding their dental appearances compared to non-depressed subjects.⁵

The term aesthetic is defined as the ability to appreciate beauty. The aesthetic evaluation of a dental restoration is subjective and tends to differ from one person to another.⁶ The absence of a standardized method in evaluating the aesthetic aspect of a restoration causes some difficulties for dental practitioners; it becomes challenging when trying to predict patients' satisfaction after an anterior dental implant treatment.⁷ In 2005, an index, called the Pink Esthetic Score (PES), was developed to objectively evaluate the soft tissue part of an anterior dental implant.⁸ This index was then simplified and combined with the White Esthetic Score (WES), which evaluates the hard tissue

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aspect of an anterior dental implant. The PES/WES index is widely used by researchers in Europe and the United States as an objective criteria for assessing patients' satisfaction of an aesthetic restoration.⁷ To evaluate an aesthetic restoration, the Orofacial Aesthetic Scale was developed in 2010 to evaluate the orofacial aesthetic aspect of patients who had received prosthodontic treatments. The orofacial aesthetic itself is an important aspect that explains the relation between oral hygiene and psychological condition.⁹ The objectives of this research are to analyze the relation between anterior dental implant restorations (assessed with the PES/WES index) and patients' satisfaction toward their orofacial appearances (assessed with the OAS questionnaire). At the end of this research, it is expected that the researchers will obtain a standard of aesthetic evaluation that may help dental practitioners improve the quality of aesthetic restoration and increase patients' satisfaction.

Materials and methods

The experiment is an analytic descriptive study performed in the the dental teaching hospital Universitas Indonesia and several other private clinics that have undergone calibration processes regarding the methods of this research. The research is performed as follows: (1) each participants who met the inclusion criteria was asked to fill out the Orofacial Aesthetic Scale (OAS) questionnaire; (2) the operator took an intraoral photograph of the dental implants, according to the PES/WES guideline provided; (3) intraoral photograph was then evaluated by dental practitioners (guidelines for the evaluation were calibrated beforehand); (4) OAS scores were then calculated and compared with the evaluation of the intraoral photograph.

The participants of this research had to meet the following inclusion criteria: (1) willing to participate in the research described above. (2) adult, 17–80 years old; (3) has been rehabilitated using a minimum of one dental implant in the anterior area; (4) has a natural tooth in the contralateral area of the dental implants; (5) does not suffer from diabetes mellitus; (6) dental implants have been placed for a minimum of 6 months. The exclusion criteria are the following: (1) subjects are not willing to sign the informed

consent; (2) subjects are not willing to be photographed; (3) subjects have communication difficulties.

Results

All five anterior maxillary single-tooth implants meet the criteria of success, such as stable osseointegration, the absence of peri-implant radiolucency, implant mobility, suppuration, and pain. The detailed PES/WES scores of the five examined single-tooth implants are presented in Table 1. The mean total PES/WES was 13.6±1.67 (range: 11 to 15). Only one of the five anterior single-tooth implants has an overall score of <12, (11), which is slightly below the threshold of clinical acceptability. The mean total PES is 7±0.70 (range: 6 to 8). The two PES parameters of distal papilla and root convexity (1.6±0.54) have the highest mean values, whereas the variable level of facial mucosa (1±0.01) is the most difficult to satisfy; none of the five implant sites attain the maximum value of 2 (Table 2). For the papillary area, the mean scores are 1.4±0.54 for the mesial papilla and 1.6±0.54 for the distal papilla. For the total PES, none of the five single-tooth implants score <6 (Table 2). For the WES, the mean total is 6.6±1.14 (range 5-8), and of the five implant crowns examined, one (20%) has a score slightly below the threshold of 6.

	Mean	SD	Min	Max	
PES	Mesial Papilla	1.4	0.54	1	2
	Distal Papilla	1.6	0.54	1	2
	Curvature of Facial Mucosa	1.4	0.54	1	2
	Level of Facial Mucosa	1	0.01	1	1
	Root Convexity, Soft Tissue Color & Texture	1.6	0.54	1	2
	Total PES (maximum 10)	7	0.7	6	8
WES	Tooth Form	1.6	0.54	1	2
	Tooth Volume / Outline	1	0.01	1	1
	Color (Hue / Value)	1.6	0.54	1	2
	Surface Texture	1.2	0.44	1	2
	Translucency & Characterization	1.2	0.44	1	2
	Total WES (maximum 10)	6.6	1.14	5	8
Total PES + WES		11.2			

Table 1. Description of PES and WES questionnaire

Five patients returned the completed questionnaire and correctly filled it out according to the instructions. The OAS's score is retained through the patients' own subjective perception of his or her orofacial aesthetic. According to the statistical analysis, the mean score of OAS is 65.2±3.76 (range 61–69). The linear regression

analysis does not reveal any statistically significant correlations between the total PES/WES and the OAS score. This further confirms the hypothesis that the patient's perception of dental restorations from an aesthetic point of view often differs significantly from the dental professional's opinions.

Discussion

This cross-sectional and descriptive study analyzes the aesthetic outcomes of five anterior maxillary single-tooth implants. The aesthetic outcomes are assessed using the PES/WES index with the mean total of 13.6 ± 1.7 (range: 11 to 15), indicating an overall success of aesthetic outcomes. Only one of the five anterior single-tooth implants has an overall score of <12 (11), which is slightly below the threshold of clinical acceptability. The PES mean score is 7 ± 0.7 (range: 6 to 8), which is slightly higher than the corresponding WES score of 6.6 ± 1.1 (range: 5-8). This result may be because of the condition that PES is mainly influenced by the local anatomy and because of the implant placement surgical protocols being used. Therefore, the skills of the dental practitioners play a key role in the aesthetic outcome of the soft tissues.

The WES mean score is 6.6 ± 1.1 (range 5-8), and of the five implant crowns examined, one (20%) has a score slightly below the threshold of 6, which is slightly below the level of clinical acceptability. However, this study is carried out in three different, respectable dental clinics that may have fabricated the implant crowns in different laboratories, explaining the slightly lower results compared to the PES score. This study also shows that the PES/WES index fulfilled other significant characteristics of an aesthetic scoring system, such as inclusion of the peri-implant soft tissues and the restoration-inherent parameters, definition of a threshold of clinical acceptability, ease of use, and reproducibility. However, future studies, ideally with the same surgeon, prosthodontist, and dental technician, are needed to evaluate this index to further define its strengths or weaknesses and to officially establish it as an integral piece of the literature assessing implant success in the maxillary anterior area.

Conclusions

This descriptive study shows that a relatively high PES/WES score does not correspond to a high OAS score, confirming the initial hypothesis that patients' perceptions of dental restorations from an aesthetic point of view often differs significantly from the dental professionals' opinions. Further studies are needed to validate and confirm this result.

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