

Comparative analysis of pink and white esthetics of anterior full veneer crown: Indian scenario

Aman Merchant,
Subhabrata Maiti,
Vaishnavi Rajaraman¹,
Ashok Velayudhan,
Dhanraj M. Ganapathy¹

Departments of Prosthodontics and
¹Prosthodontics and Implantology,
Saveetha Dental College and Hospital,
Saveetha Institute of Medical and
Technical Science, Saveetha University,
Chennai, Tamil Nadu, India

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ABSTRACT

A goal of modern dentistry is to make an esthetic outcome as one of the major modalities in dental treatment. In recent years, more emphasis has been given to esthetic parameters, especially in the anterior regions. The aim of this study was to evaluate the presence of change in pink and white esthetics scores after giving crowns in a single tooth. Subjects for this retrospective study were chosen by randomization from June 2019 to May 2020. A total of 120 subjects were selected which were equally divided with respect to age and gender. The analysis was done with a photographic assessment. The study test was done using paired *t*-test, and the correlation was evaluated using the Chi-square test. In this study, we observed that there is an increase in pink and white esthetic scores (WES) after the prosthesis is delivered. There was a clinical and statistically significant difference seen with the WES and total score, whereas only clinical but no statistical difference was seen with the pink esthetic score. After giving crowns, there is an increase in overall esthetic score. It is important to have certain standardized indices to score esthetics by which the overall esthetic outcomes can be improved. One such popular index is the pink and white esthetic index, which scores the soft and hard tissue.

Key words: Esthetics, innovation, pink esthetic score, white esthetic score

INTRODUCTION

One of the major goals of modern dentistry is to make an esthetic outcome as one of the major modalities in dental treatment. In recent years, more emphasis has been given to esthetic parameters, especially in anterior regions.^[1,2] The basic considerations for giving an esthetic smile are the position of the gingival tissue, lip position, color, shape,

and position of the tooth.^[3] It is important to have adequate knowledge about the condition of the natural dentition and its surrounding tissues to rehabilitate the stomatognathic system for an esthetic restoration.^[4] Harmonious integration of the prosthesis or restoration with the patient's overall appearance is a definitive criteria for success for a single prosthesis in the esthetic zone.^[5,6]

It is very important to compare the professional evaluation of esthetic parameters and the patient's satisfaction and hence the need for formulation of esthetic parameters to judge the soft and hard tissue in a professional manner.^[7,8] Many indices were established to evaluate the level of the papillae and gingival margins.^[9] Fürhauser *et al.* proposed a distinguished index known as pink esthetic score (PES)

Address for correspondence:

Dr. Subhabrata Maiti,
Department of Prosthodontics, Saveetha Dental College,
Saveetha Institute of Medical and Technical Sciences,
Saveetha University, Chennai - 600 077, Tamil Nadu, India.
E-mail: drsubhoprosthodont@gmail.com

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to evaluate soft-tissue conditions surrounding the teeth.^[10] Belser *et al.* proposed the white esthetic score (WES) to evaluate the crown portion.^[11] The PES and WES are very widely used since they are easy to use and practice-oriented, which makes them the gold standard to comprehensively evaluate single esthetics of implant-supported restoration.^[11] Asymmetry between the affected side and the contralateral side will lead to a less esthetic score.^[12] Hence, it is important to match it according to contralateral sides and adjacent teeth. This study is done to evaluate the changes in PES and WES after giving crown prostheses to the patients. Our research^[13-23] has resulted in high-quality publications from our team^[24-32] which has inspired us for the current study.

MATERIALS AND METHODS

Study design and Sample selection

The current retrospective cross-sectional research was conducted in the Department of Prosthodontics, Saveetha Dental College, India. The present study was approved by the Institutional Review Board with ethical approval number-IHEC/SDC/PROSTHO/21/175. The study was performed by photographic assessment. The data were obtained for all the patients from the case sheets of the patients. From June 2019 to May 2020, the subjects were chosen by simple randomization. Inclusion criteria include patients of 18 years old or greater, healthy subjects with no history of systemic illness, any gender, and a single crown required in the maxillary anterior tooth. All recruited subjects signed informed consent before their participation in the study. Exclusion criteria include patients with systemic illness, alcoholism, missing anterior teeth, root stumps, and patients not willing for the treatment.

After evaluation of the inclusion and exclusion criteria, the number of subjects was reduced from 24638 to 60. A total of 60 patients were evaluated with photographic analysis. The evaluation was done by three observers, and an average was taken to reduce bias.

Pink esthetic score and white esthetic scores assessment

The PES and WES were evaluated using the photographs obtained from the institutional database. PES was evaluated based on the following five variables – mesial and distal

papilla, curvature and level of facial mucosa, and root convexity/soft-tissue color and texture at the facial aspect. A score of 0, 1, or 2 was given [Table 1 and Figure 1]. WES was evaluated based on five variables – tooth form, outline, volume, and color when compared to the adjacent teeth and surface texture, translucency, and characterization. A score of 0, 1, or 2 was given [Table 2 and Figure 1]. The total score was calculated by adding the PES and WES.

Statistical analysis

The descriptive statistics (mean, standard deviation, and frequency) were derived for each model. To evaluate changes between preoperative and postoperative scores, a paired “*t*” test was used (IBM SPSS 20 [SPSS Inc.; Chicago IL, USA]).

RESULTS

There was an increase in mean values of preoperative and postoperative PES from 7.75 ± 1.910 to 8.02 ± 1.408 , respectively. There is a clinical difference between the scores, but no statistical difference ($P > 0.05$) [Table 3]. There was an increase in mean values of preoperative and postoperative WES from 5.40 ± 1.976 to 7.72 ± 1.698 , respectively. There was both clinical and statistical significant difference observed in WES after cementation of the crown [Table 3]. There was an increase in mean values of preoperative and postoperative total esthetic scores from 13.15 ± 3.118 to 15.70 ± 2.773 , respectively. There was a clinical as well as statistically significant difference observed in the total esthetic scores after the crown was cemented [Table 3].

Preoperative PES and age ($P > 0.05$) showed no statistical significant relation [Table 4]. Score of 10 (light blue) is most commonly witnessed in the age of 31–40 years [Figure 2]. There is no statistical significant association between preoperative WES and age ($P > 0.05$) [Table 4]. Score of 10 (light blue) is most commonly seen in male patients as compared to female patients [Figure 3]. There is no statistical significant association between preoperative WES and age ($P > 0.05$) [Table 5]. Score of 4 (yellow) was most commonly found in age 20–30, score of 5 (red) was most commonly found in age 31–40, and score of 6 (light blue) was most commonly found in age 41–50 [Figure 4]. There is no statistical significant association between preoperative

Table 1: The scoring criteria for the pink esthetic score

Parameters	PES		
	Absent	Incomplete	Complete
1. Mesial papilla	0	1	2
2. Distal papilla	0	1	2
Parameters	Major discrepancy	Minor discrepancy	No discrepancy
3. Curvature of facial mucosa	0	1	2
4. Level of facial mucosa	0	1	2
5. Root convexity/soft-tissue color and texture	0	1	2

PES: Pink esthetic score

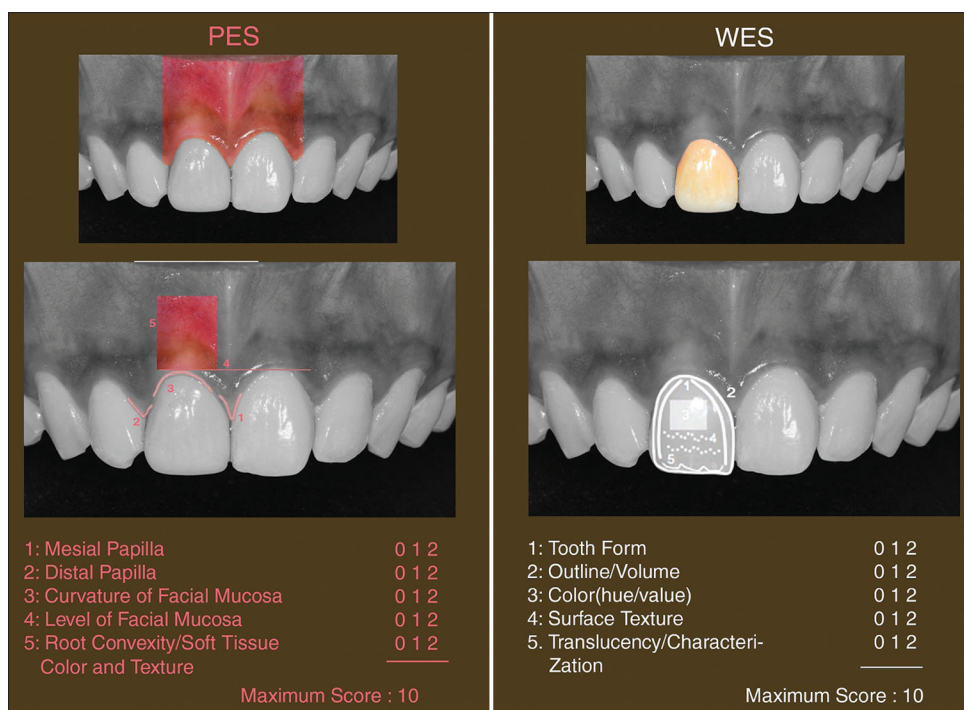


Figure 1: Figure depicting the scoring criteria and parameters for PES and WES. Pink esthetic score, WES: White esthetic score

Table 2: The scoring criteria for the white esthetic score

Parameters	WES		
	Major discrepancy	Minor discrepancy	No discrepancy
1. Tooth form	0	1	2
2. Tooth volume/outline	0	1	2
3. Color (hue/value)	0	1	2
4. Surface texture	0	1	2
5. Translucency	0	1	2

WES: White esthetic score

Table 3: The means, standard deviations, standard errors, and P values of the pink esthetic score, white esthetic score, and total esthetic scores before and after the treatment

	Mean ±SD	SE	P (<0.05)
Pre-PES	7.75 ± 1.910	0.247	0.159
Post-PES	8.02 ± 1.408	0.182	
Pre-WES	5.40 ± 1.976	0.255	0.001*
Post-WES	7.72 ± 1.698	0.219	
Pretotal	13.15 ± 3.118	0.403	0.001*
Posttotal	15.70 ± 2.773	0.353	

*P at the level 0.05 significant. There was an increase in mean PES between preoperative and postoperative (8.02). There was an increase in mean WES between preoperative (5.40) and postoperative (7.72). There was an increase in total esthetic score between preoperative (13.15) and postoperative (15.70). SD: Standard deviation, SE: Standard error, PES: Pink esthetic score, WES: White esthetic score

WES and age ($P > 0.05$) [Table 5]. Score of 5 (red) was most commonly found in the male subjects and score of 8 (maroon) in the female subjects [Figure 5].

DISCUSSION

This retrospective research evaluated the esthetic outcomes of 60 patients using PES/WES. The PES was higher than WES, both preoperative and postoperative. This is because the gingiva has fibroblast and other growth factors which influences the gingival to grow around the teeth. Cosyn *et al.*^[5] evaluated the threshold for clinical acceptance of at least 6/10. It was seen that the scores of the PES were seen better in females than males as females are usually more concerned about esthetics as compared to males.^[33]

Furthermore, the scores of preoperative PES were more in the young and middle-aged. This can be seen in periodontal changes in elderly patients. There are more chances of recession and periodontitis in elderly patients. However, the postoperative PES was found to be equal in aged patients as compared to the younger population. This implies that geriatric patients must have undergone periodontal therapy to improve the esthetics. It also displays the ability of the operators to render equally effective treatment for geriatric patients as compared to the young group of patients.

It was also seen that the preoperative scores of the white esthetic index were more in females than in males. The reason can be that males have more parafunctional habits. Furthermore, due to heavy masticatory force and deleterious habits, more attrition, abrasion, and erosion are seen in males than in females.^[34] Furthermore, the incidence of caries is more in males in comparison to females. Owing to these reasons, the WES of females is greater than males.

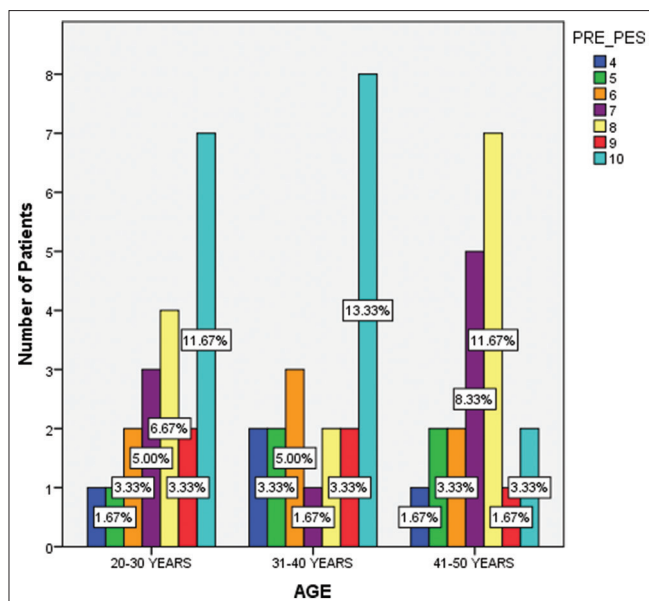


Figure 2: The association between preoperative PES and age. There is no statistical significant association between preoperative PES and age (Chi-square value: 10.823, $P = 0.544$). Score 10 (Light blue) is most commonly seen in the age group of 31–40 years. PES: Pink esthetic score

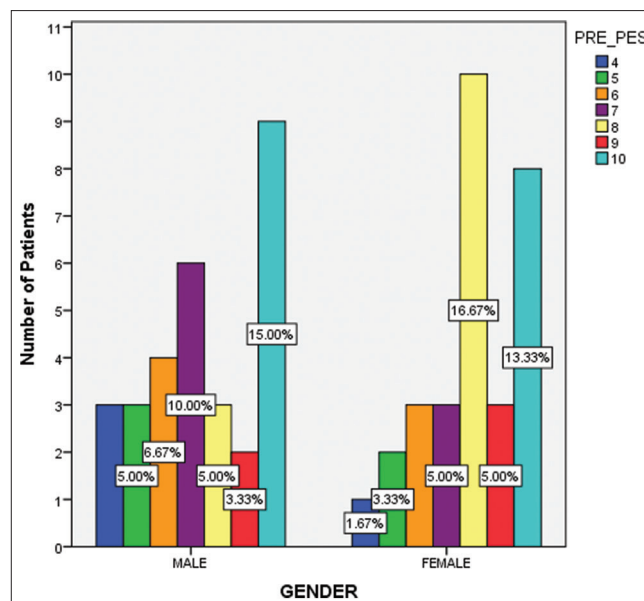


Figure 3: The association between preoperative PES and gender. There is no statistical significant association between preoperative WES and age (Chi-square value: 6.371, $P = 0.383$ ($P > 0.05$)). Score 10 (Light blue) is most commonly seen in males as compared to females. PES: Pink esthetic score, WES: White esthetic score

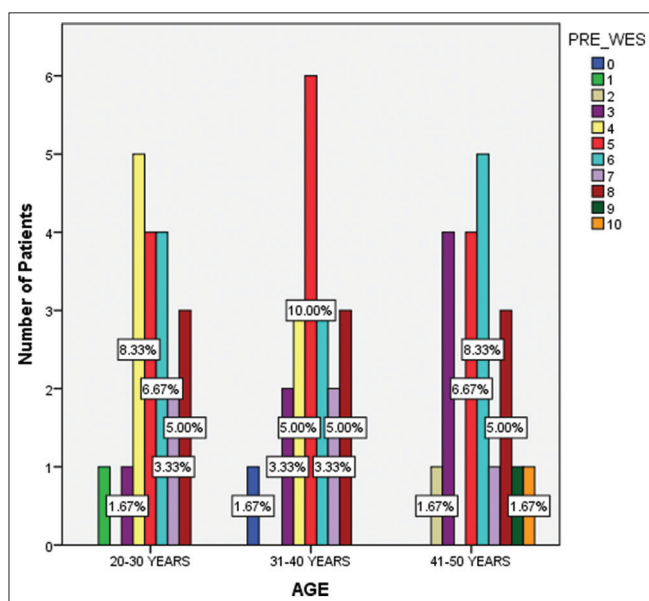


Figure 4: The association between preoperative WES and age. There is no statistical significant association between preoperative WES and age (Chi-square value: 18.221, $P = 0.573$ ($P > 0.05$)). Score 4 (yellow) was most commonly seen in 20–30 years, Score 5 (red) in 31–40 years and score 6 (light blue) in 41–50 years. WES: White esthetic score

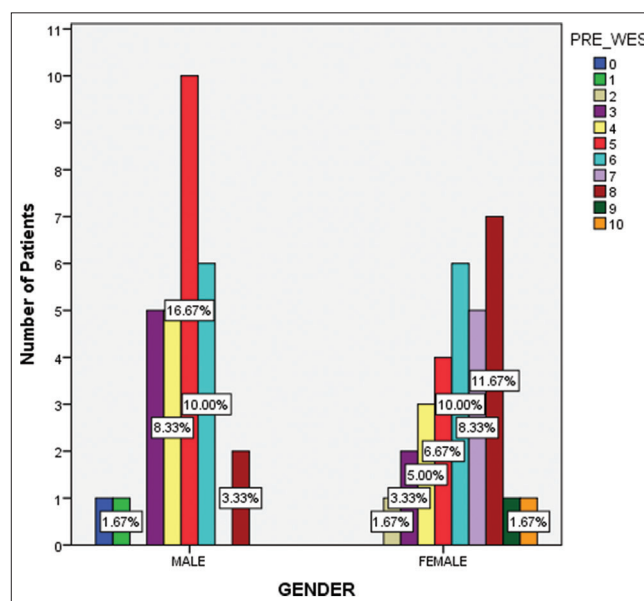


Figure 5: The association between preoperative WES and gender. There is no statistical significant association between preoperative WES and age (Chi-square value: 17.135, $P = 0.71$ ($P > 0.05$)). Score 5 (red) was most commonly seen in males and score 8 (maroon) in females. WES: White esthetic score

After the treatment, the postoperative WES of males increased significantly when compared to females.

The prevalence of preoperative WES was somewhat equally distributed. This is in contrast to the normal belief that WES

decreases with age due to caries, parafunctional habits, etc.^[35] Furthermore, as age increases, the tooth weakens and is more prone to fracture, mobility, and discoloration, which decreases the WES. Hence, the results obtained from this study are in contrast to most of the studies.

Table 4: The age and gender distribution in association with preoperative pink esthetic score and corresponding Chi-square and P values

PES	Age (%)			Gender (%)	
	20-30 years	31-40 years	41-50 years	Male	Female
1	0	0	0	0	0
2	0	0	0	0	0
3	0	0	0	0	0
4	1 (1.7)	2 (3.3)	1 (1.7)	3 (5.0)	1 (1.7)
5	1 (1.7)	2 (3.3)	2 (3.3)	3 (5.0)	2 (3.3)
6	2 (3.3)	3 (5.0)	2 (3.3)	4 (6.7)	3 (5.0)
7	3 (5.0)	1 (1.7)	5 (8.3)	6 (10.0)	3 (5.0)
8	4 (6.7)	2 (3.3)	7 (11.7)	3 (5.0)	10 (16.7)
9	2 (3.3)	2 (3.3)	1 (1.7)	2 (3.3)	3 (5.0)
10	7 (11.7)	8 (13.3)	2 (3.3)	9 (15.0)	8 (13.3)
χ^2		10.823			6.371
P		0.544			0.383

PES: Pink esthetic score

Table 5: The age and gender distribution in association with preoperative white esthetic score and corresponding Chi-square and P values

White esthetic index	Age (%)			Gender (%)	
	20-30 years	31-40 years	41-50 years	Male	Female
0	0	1 (1.7)	0	1 (1.7)	0
1	1 (1.7)	0	0	1 (1.7)	0
2	0	0	1 (1.7)	0	1 (1.7)
3	1 (1.7)	2 (3.3)	4 (6.7)	5 (8.3)	2 (3.3)
4	5 (8.3)	3 (5.0)	0	5 (8.3)	3 (5.0)
5	4 (6.7)	6 (10.0)	4 (6.7)	10 (16.7)	4 (6.7)
6	4 (6.7)	3 (5.0)	5 (8.3)	6 (10.0)	6 (10.0)
7	2 (3.3)	2 (3.3)	1 (1.7)	0	5 (8.3)
8	3 (5.0)	3 (5.0)	3 (5.0)	2 (3.3)	7 (11.7)
9	0	0	1 (1.7)	0	1 (1.7)
10	0	0	1 (1.7)	0	1 (1.7)
χ^2		18.221			17.135
P		0.573			0.71

The patient's perception of dental esthetics can slightly vary from the operator's perception. Hence, patients should be explained the outcome prior and efforts should be put by the dental practitioner to achieve maximum PES and WES using a multidisciplinary approach. The PES can be increased by the use of gingival porcelain and gingival composites. Adequate shade matching and mimicking the adjacent teeth can increase the WESs. The limitation of the study is that photographic analysis highly depends on the quality of the photographs. There might be a minor discrepancy between the photographs and the actual scenario which can lead to errors. Hence, the scores should be checked in the patient's mouth through an *in vivo* study.

CONCLUSION

Patients' attitude toward dental esthetics has changed in the past decade. Hence, efforts should be taken to maximize the esthetic appearance of the patient by delivering an esthetic smile. The PES and WES help the practitioners to visualize and correct minor discrepancies which hamper esthetics. More numbers of *in vivo* studies need to be done for the same to evaluate the difference in the PES and WES after prosthetic treatment.

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Conflicts of interest

There are no conflicts of interest.

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