

## Digitalized Assessment of PES/WES in Young Adults

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### Abstract

**Objective:** Evaluate the PES/WES found in natural dentition in young adults.

**Materials and methods:** Seventy-four students aged 18 to 25 from the Dentistry Program of the College Technology and Science, Salvador campus were studied. Was held pictures of all the volunteers, standardized by the focal length and positioning perpendicular to the long axis of the objective. The two-dimensional tracings were made in AutoCAD 2016 software to standardize the PES/WES. The tabulated data in Microsoft Office Excel 2016 software were submitted to statistical analysis in the non-parametric test  $\chi^2$  (chi-square) of  $\beta$ ostat 5.3 software with 5% significance level.

**Results:** The mean values were  $7.53 \pm 1.27$  for PES; WES  $8.13 \pm 0.94$  and mean total score  $15.7 \pm 1.8$ , classified as satisfactory esthetic overall outcome.

**Conclusion:** The PES/WES is valid, however rigorous, and its maximum score is not observed in healthy individuals (natural dentition); The WES is more prevalent than PES in healthy individual.

**Clinical Implications:** No study has collected PES/WES data on natural dentition of young adults, the data collected in study may provide an important benchmark for clinicians and educators to compare PES and WES scores on single tooth esthetic implant restorations to that found on natural dentition of young adults.

**Keywords:** Dentistry; Orthodontic; PES/WES

### Introduction

The rehabilitation treatment with dental implants has presented high biological success rate, however are not always the best esthetic option [1-10]. In this context, several esthetic index have emerged to improve the diagnosis, benchmark the progress of treatment, and evaluate objectively the outcome. Among them Soft tissue Index periimplant [11-15]. Esthetics of measurement supported implant crowns and adjacent soft tissues [16,17] Subjective esthetic criteria modified [18,19] Pink Esthetic Score/White Esthetic Score (PES/WES) index [20-24] Complex esthetic index, the index proposed by Belser. It quantifies the pink and white esthetic (PES/WES) in five objectives requisites (Table 1). When related pink and white esthetic index the maximum score is 20 determining perfections; excellent overall esthetic result if the total score obtained for 17; satisfactory esthetic overall result if the sum is 15 and clinical acceptance threshold score 12. Values below 12 were considered unsatisfactory from the esthetic point of view. The authors 20-23 verified the difficulty in obtaining the perfect score 20 even in those esthetically satisfactory cases. Furthermore, no other study collected data on PES/WES in natural dentition of adults providing a clinically relevant base line and important reference for clinicians and educators to compare the results found in subjects with natural dentition compared single restorations implants in the esthetic zone. The objective of this study was to provide the clinically relevant basic PES/WES found in natural dentition to set realistic expectations between clinicians, researchers and patients of the possible results of the implants in the esthetic region.

### Materials and Methods

#### Evolution of the study

The study was approved by the ethics in research committee of maintainer institute of higher education protocol N° 3402, SISNEP project N° CAAE-0015.0.449.000-11.

### Study population

Seventy-four students of dentistry course of the college of technology and sciences, Campus Salvador, aged from 18 to 25 years, 37 men and 37 women, were selected based on the exclusion criteria:

- 1) Prosthetic crowns in the upper anterior teeth.
- 2) Orthodontic brace on upper anterior teeth.
- 3) Gum or periodontal disease (bleeding on probing).
- 4) Carie.

### Clinical photographs

All volunteers were photographed using camera (EOS Rebel T3i; Canon Inc.), lens EF 100mm Macro (Canon Inc.), flash ring (Canon Macro Ring Lite MR-14EX; Canon Inc.), and camera arm (Wt3560; Weifeng). Photographs and evaluation of the tracings performed by a single calibrated examiner.

Photographs of all volunteers were standardized by the focal length and positioning perpendicular to the long axis of the objective. The head positioning was guided by cephalostate (Dabi HF 100; Dhabi

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**Received** January 30, 2018; **Accepted** February 05, 2018; **Published** February 15, 2018

**Citation:** Azevedo VLB, de Andrade OS, Silva FAP (2018) Digitalized Assessment of PES/WES in Young Adults. J Res Development 6: 163. DOI: [10.4172/2311-3278.1000163](https://doi.org/10.4172/2311-3278.1000163)

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Atlantean Industries Medical Dental Ltd). The front photo of the teeth was done with focus on the contact region and help of graph paper (Block milimetrically graded; Canson) to adjust the measurement in software (AutoCAD 2016; Autodesk, Inc.) (Figure 1).

**Realization of tracings and evaluation of the outcomes**

The two-dimensional tracings made in software (AutoCAD 2016, Autodesk, Inc.) by a single calibrated examiner (Figures 2 and 3). The graph papers the picture standardized the scale of image in software for linear measurements. The score of 2, 1 or 0 was assigned to each parameter PES/WES (Table 1). Therefore, the largest possible combination (20) was considered perfectly, (12) clinical acceptability threshold and values less than 12 was considered unsatisfactory from the esthetic point of view (Tables 2 and 3).

**Results**

The evaluation details of PES/WES of 74 individuals are shown in Tables 4 and 5, while scores summarized, including standard deviations. The item highest to the PES was root convexity/soft tissue color and

Parameter PES	Absent	Incomplete	Complete
Mesial papilla	0	1	2
Distal papilla	0	1	2
	Major discrepancy	Minor discrepancy	No discrepancy
Curvature of facial mucosa	0	1	2
Level of facial mucosa	0	1	2
Root convexity/soft tissue color and texture	0	1	2
Maximum total PES score			10
Parameter PES	Major discrepancy	Minor discrepancy	No discrepancy
Tooth form	0	1	2
Tooth volume/outline	0	1	2
Color (hue/value)	0	1	2
Surface texture	0	1	2
Translucency/Characterization	0	1	2
Maximum total WES score			10

Table 1: Assessment criteria - PES/WES.

PES	Men			Women		
	0	1	2	0	1	2
Mesial papilla	0	4	33	0	5	32
Distal papilla	1	12	24	0	17	20
Curvature of facial mucosa	3	19	15	5	17	15
Level of facial mucosa	2	24	11	2	24	11
Root convexity/soft tissue color and texture	0	0	37	0	0	37
WES	0	1	2	0	1	2
Tooth form	0	4	33	0	3	34
Tooth volume/outline	9	28	0	8	29	0
Color (hue/value)	0	1	36	0	1	36
Surface texture	0	10	27	0	1	36
Translucency/Characterization	0	2	35	0	0	37

Table 2: Total values found in the central incisors.

PES	Men			Women		
	0	1	2	0	1	2
Mesial papilla	1	14	22	0	19	18
Distal papilla	1	26	10	0	25	12
Curvature of facial mucosa	4	13	20	7	15	15
Level of facial mucosa	8	24	5	14	16	7
Root convexity/soft tissue color and texture	0	0	37	0	0	37
WES	0	1	2	0	1	2
Tooth form	1	8	28	0	3	34
Tooth volume/outline	10	27	0	8	29	0
Color (hue/value)	0	1	36	0	2	35
Surface texture	0	9	28	0	1	36
Translucency/Characterization	0	2	35	0	0	37

Table 3: Total values found in the lateral incisors.

texture, the lowest were curvature of facial mucosa and Level of facial mucosa. With respect to WES item more increased are related to color (hue/value), translucency and more lowered tooth volume/outline. The mean PES/WES for central and lateral incisors were respectively 16.5 and 14.8

**Discussion**

There is considerable subjectivity regarding the esthetic issue implants, and most studies do not include well-defined esthetic

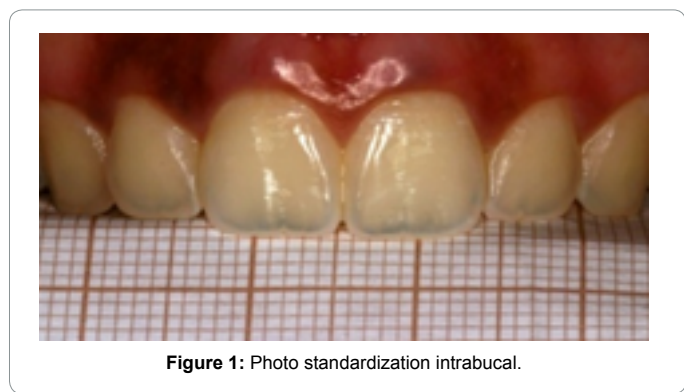


Figure 1: Photo standardization intrabucal.

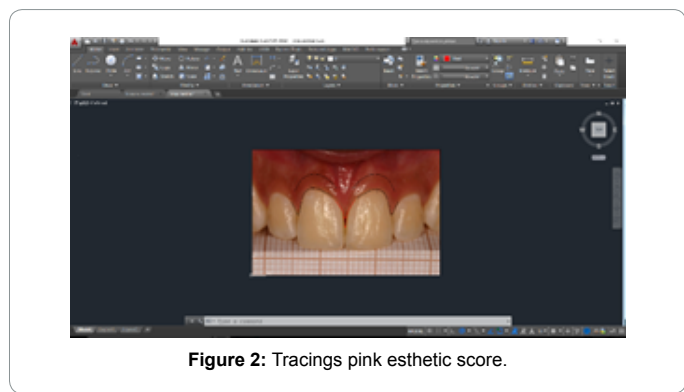


Figure 2: Tracings pink esthetic score.

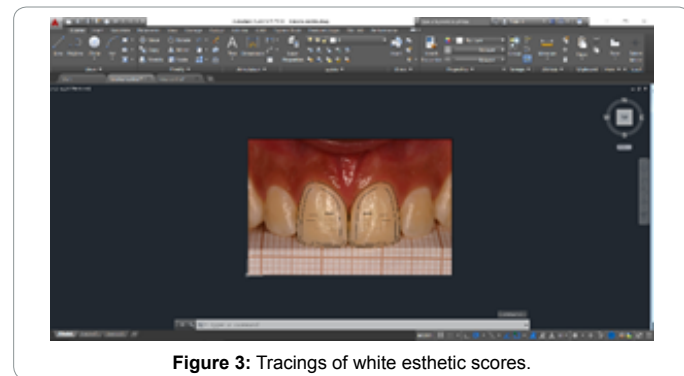


Figure 3: Tracings of white esthetic scores.

PES	Mesial papilla	Distal papilla	Curvature of facial mucosa	Level of facial mucosa	Root convexity, soft tissue color and texture	Total PES (Max 10)
Mean	1.87	1.56	1.29	1.32	2	8.06
SD	0.2	0.52	0.65	0.52	0	1.08
WES	Tooth form	Tooth volume/outline	Color (hue/value)	Surface texture	Translucency/Characterization	Total WES (Max 10)
Mean	1.90	0.77	1.97	1.85	1.97	8.47
SD	0.29	0.42	0.16	0.35	0.16	0.74

Table 4: Summarized the PES/WES of 74 individuals for central incisors.

PES	Mesialpapilla	Distal papilla	Curvature of facial mucosa	Level of facial mucosa	Root convexity, soft tissue color and texture	Total PES (Max 10)
Mean	1.52	1.28	1.32	0.86	2	7
SD	0.52	0.48	0.72	0.66	0	1.22
WES	Tooth form	Tooth volume/outline	Color (hue/value)	Surface texture	Translucency/Characterization	Total WES (Max 10)
Mean	1.59	0.31	2	1.89	1.97	7.77
SD	0.66	0.46	0	0.31	0.16	0.98

Table 5: Summarized the PES/WES of 74 individuals for lateral incisors.

parameters. This situation has completely changed in the current days with the emergence of several indices to measure the esthetic result that provided objective data to assist in diagnosis, planning, execution and final evaluation of rehabilitation.

The achievement of excellence in esthetic rehabilitation of the anterior maxilla is a factor of extreme difficulty, which can be verified in the study of Belser et al. 20 where none of the 45 cases evaluated achieved a maximum score of 20, and measured the highest value of 18 and 21 have managed a score of 16 but 22 found value of 16.75. According to Azevedo and Silvam said 23 have assessed a total score 16 and Hae-Lyung said 24 found score of 12.81. In this study of 74 individuals, the maximum value was 19 (excellent esthetic overall outcome), most found in score 16, this considered by Belser 20 index a satisfactory esthetic overall outcome. Healthy people have high rates, which denotes good esthetics. Based on the results of this study, the score 19 can be considered a perfect score because the score 20 was not observed in people with natural dentition.

The minimum value found by Belser et al. is 20 in which 11 in only one patient. The total score of 12 is the threshold of clinical acceptance. In this study, the minimum value was 10 and three patients had scores below the clinical acceptance threshold. The mean of total amount found in the study was  $15.7 \pm 1.8$  (satisfactory esthetic overall outcome). According to Belser et al. 20 obtained  $14.7 \pm 1.18$  (satisfactory esthetic overall outcome) and Hae-Lyung et al. said 24 found global score of  $11.19 \pm 3.59$  (clinical acceptance threshold). There was no significant difference between the averages found with Belser et al. and Hae-Lyung et al. The present study, corroborating that the PES/WES and mean values for Belser et al. 20 are within standards of esthetic normality of the natural dentition.

With respect to PES, Furhauser et al. 11 obtained a result of  $9.24 \pm 3.8$  and Belser et al. 20 achieved a mean score of  $7.76 \pm 0.88$ . Buser et al. [25] found value of 8.10. Hae-Lyung et al. 24 found score of  $5.17 \pm 2.29$ . In this study the mean value obtained was  $7.53 \pm 1.27$ . The maximum value achieved by Belser et al. In 20 was 9 and the minimum 4. In this study, the maximum value is 10 and the minimum was 4, confirming that the PES / WES. The mean values found by Belser et al, 20 are in standards of esthetic normality of natural teeth and results found in the

study Hae-Lyung et al. 24 present below this esthetic standard. It can be assumed that healthy people have high rates for PES, which shows good esthetic, therefore, in rehabilitation with single implants expected index is 10. However, the score 8 can be considered an excellent esthetic result.

For WES Belser et al. 20 achieved a mean score  $6.9 \pm 1.47$  where the maximum score obtained was 10 and the minimum 4. Hae-Lyung et al. 24 obtained a mean of  $6.02 \pm 1.96$ . Buser et al. 22 have managed 8.65. In this study the mean was  $8.13 \pm 0.94$  where the maximum score was acquired 9 and the minimum 6. These results confirm the previous statement.

Unlike the result of Belser et al. 20 and where the average PES (7.76) was higher than the WES (6.9) in this study was the reverse. The WES (8.13) was higher than the PES (7.53), a result also seen in the study by Hae-Lyung et al. This may be related to PES to be less resistant to traumas (abrasion, bone defects, gingival recession) and WES is dependent on the laboratory part and professional skill to its making, independent of the body to its esthetic harmonization.

The index proposed by Belser et al. 20 quantifies the pink and white esthetic objectives in five requisites. However, studies have shown that although the questions are objective, there is an influence of the observer's expertise in esthetic perception 12 even when used objective data as the classification of PES/WES. 23 Proposing to eliminate the influence of the observer's expertise, this study used a precise measurement software and the evaluator was calibrated prior to the strokes and quantification of scores in this study. AutoCAD is a software that fits the concept of CAD technology used worldwide for the creation of architectural design, civil engineering, mechanical and electrical, as well as technical drawing in two dimensions (2D) or three-dimensional models (3D). By allowing measurement of linear, angular and proportionality through images, are widely used in studies of medicine and dentistry that utilize photographs as evaluation [26-35].

It is known that when talking about the esthetics of the smile, canine and premolars should be involved. However, the present study evaluated only the central and lateral incisors. The choice made by the authors was based on the dominance of the central and lateral incisors to analyze the smile in the frontal plane, 26 in addition to the difficulty

of obtaining an excellent esthetic result, when it comes to simple rehabilitation with implants. Providing a base line clinically PES/WES found in natural dentition and establishing realistic expectations between clinicians, researchers and patients of the possible results of the implants in the esthetic zone.

Belser et al. 20 used in their study 45 crowns on implants made by different professionals. They analyzed 20 crowns made by the same professional and the average increased to 8.65. The human being has natural asymmetry which shows the visual esthetic harmony. Fact proven by Camara35 which reported that absolute symmetry is not what is expected between the two halves, but the balance. Therefore, small differences between the right and left sides are expected and considered normal. This statement may explain why the maximum value obtained was 19 and the score 20 not be observed in the natural dentition.

## Conclusion

With the results of this study, could be concluded that: The PES/WES index is valid, however rigorous, and its maximum score is not observed in healthy individuals (natural dentition); The WES is more prevalent than the PES in healthy individuals.

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