

EVALUATION OF WHITE AESTHETIC SCORES IN DIRECT AND INDIRECT VENEERING - A RETROSPECTIVE STUDY

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ABSTRACT

Introduction

This study is required as the aesthetic concerns of the population have increased exponentially in recent decades especially in the anterior aesthetic zone. This research will aid dentists in taking these scores into account before performing restorations. Limited number of substantial research studies exist on the use of white aesthetic scores for the assessment of aesthetics in direct and indirect veneering.

Aim

The aim of this study was to compare the white aesthetic scores between direct and indirect veneering.

Materials and Methods

This was a comparative, descriptive study, where all the data of the patients who reported to the dental clinics in saveetha dental college, SIMATS, Chennai, India, was obtained from the dental information archiving software (DIAS). Patient records were collected between March 2020 and March 2021. Data was collected and tabulated. The collected data was further analyzed, recorded in Microsoft Excel software and was subjected to statistical analysis using IBM SPSS statistics analyzer v.23.0.

Results and Discussion

The total sample size of this study was 60 cases. We observed that the mean age, color, surface texture and total white aesthetic scores were higher in indirect veneering whereas mean tooth form, outline and translucency were higher in direct veneering. male predominance was observed with 78.33% of the study population being males.

Conclusion

Within the limitations of the current study, indirect veneering was found to have overall better white aesthetic scores compared to direct veneering.

Keywords: veneering, direct veneers, indirect veneers, white aesthetic score, aesthetic dentistry.

INTRODUCTION

Aesthetic dentistry can be defined as the art and science of dentistry applied to create or enhance beauty of an individual within functional and physiological limits [1,2]. In modern days, there is an increased awareness regarding the aesthetics of dental restorations among the general population and the need to have restorations which resemble natural tooth structure and is pleasing to the eye is necessary especially in the case of anterior restorations [3–5]. On analysis of literature, it was observed that there were a variety of indices which assessed the aesthetics of teeth and surrounding structures one of which is the white aesthetic scores [6–9]. The white aesthetic score was introduced by Belser et. al in order to evaluate the visible part of the restoration and the adjacent hard tissue component [10,11]. WES was found to be a comparatively more effective and consistent index to other aesthetic indices like PICI and ICAI [12]. WES is based on a total of 5 variables which determine the overall score. Tooth form, translucency and characterization, outline, colour (hue and value) and surface texture [11,13]. The WES could also provide

a more unbiased understanding into the aesthetics associated with a daily dental practice. These indices were found to have excellent reproducibility and validity to be used in everyday practice [14,15].

Dental veneers also known as dental laminates are thin restorations which are tooth coloured that cover the facial surface of the tooth and have been a mainstay of aesthetic dentistry in recent decades [16–18]. These veneers or laminates can either be direct or indirect. Direct veneers indicate those fabricated using site based restorative materials that are directly applied to the tooth surface in order to alter the shape and color of the tooth [19,20]. Indirect veneers have been fabricated usually with dental porcelain but can also be constructed with composite resins. Indirect veneers are constructed outside the oral cavity and are then cemented [21,22]. It was found that direct composite veneers were less preferred for their poor colour stability, retention and surface wear and tear and that dentists found indirect porcelain veneers to be more effective and have better survival even if it required a greater degree of irreversible tooth alteration [23]. However, direct composite restorations were observed to be more aesthetic with preservation of sound tooth structure and greater repairability [24–26].

This study is required as the aesthetic concerns of the population have increased exponentially in recent decades especially in the anterior aesthetic zone. This research will aid dentists in taking these scores into account before performing restorations. Limited number of substantial research studies exist on the use of white aesthetic scores for the assessment of aesthetics in direct and indirect veneering. Our team has extensive knowledge and research experience that has translated into high quality publications [27–46]. The aim of the current study is to compare the white aesthetic scores between direct and indirect veneering.

MATERIALS AND METHODS

This research study was defined as a descriptive study where all the patient's data who reported to saveetha dental college and hospitals, SIMATS, Chennai, India and have undergone direct and indirect veneering were obtained from the dental information archiving software (DIAS).

This study setting was a university setting and the research study was conducted in the dental clinics of saveetha dental college. This setting came with various pros and cons. The pros included the presence of a larger population and an abundant availability of data. Some of the cons included the study taking place in an uncentred setting and possessing a very limited demographic. The dependent variables in this study included the white aesthetic scores between direct and indirect veneering. The independent variables include the age of subject and gender of the subject. The selection of the study population was performed at random. This population was selected from the patients who visited the undergraduate and postgraduate dental clinics in saveetha dental college. The approval to undertake this research study had been approved by the ethical board of saveetha university (applied). n = 60 cases (30 direct veneering cases and 30 indirect veneering cases) were reviewed and cross verification was performed by an additional reviewer. The minimisation of sample bias was performed by an additional reviewer, acquiring all the data from within the university and as an additional measure, simple random sampling was performed. There was a presence of high internal and low external validity. Sample collection was performed from march 2020 to march 2021.

The data was then arranged in a methodical manner using Microsoft Excel software and was tabulated. The data was validated by an additional reviewer. Any incomplete or censored data that was present in the collected data was excluded from the study.

Statistical analysis of the compiled data was performed using IBM SPSS statistical analyzer V.23.0. Chi square test was done for statistical analysis. The inclusion criteria for this study was outpatients who have undergone direct and indirect veneering irrespective of their gender. The exclusion criteria included outpatients who did not undergo either direct or indirect veneering.

RESULTS AND DISCUSSION

The main aim of the current was to compare the white aesthetic scores between direct and indirect veneering. When assessing whether a restoration is better than the other, assessment of aesthetics alone will not suffice. Assessment of failure rates, degree of hard tissue destruction, expenses of the restoration, time taken and the reparability of the restoration has to be taken into consideration as well. However in the current study, the aesthetics of the visible part of the restoration is taken into consideration. The data was collected and sorted as mentioned previously.

On comparison of the mean scores for each parameter, the mean age, colour, surface texture was higher in indirect veneering, whereas mean tooth form, outline and translucency was higher in direct veneering (Table-1 and Table-2, Figure-2-8). It was found on analysis of literature that direct composite veneers exhibited poor colour stability and were prone to staining compared to indirect veneering [47–49]. Indirect veneers also exhibited better surface texture compared to direct veneers, the reason for which was suggested by N.Fahl et.al, that indirect veneers, have the benefit of precise extraoral margin finishing and polishing compared to direct veneering where the polishing has to be performed intraorally [50]. Tooth form was found to be better in direct veneering as there is ease of modification and sculptability of the restoration compared to indirect veneering, however it has been noted that, although the initial tooth form is better with direct veneering, retention of that anatomic form over a period of time was better in indirect veneering as direct veneers are more prone to surface wear [51–54]. It was also found in the current study that the outline form was better in direct veneers compared to indirect veneers. Outlines especially at the margins were found to be flawed in indirect restorations in multiple studies. Reasons given by some of the authors include, inaccuracies during fabrication of the restoration extraorally as it is done on a cast or digital impression of the dentition. Polymerisation shrinkage in indirect composite veneers and lack of modifiability of the margins compared to direct veneers [54–57]. It was also found that lack of marginal integrity was a major reason for the failure of indirect restorations [58–60]. Finally, the translucency was found to be comparatively better in direct veneers than indirect veneers. It was found in a study conducted by Lee et al., that composite restorations possessed better translucent and characterization compared to indirect restorations also stating that flowable composites had the best translucency [61].

However, when assessment of the total white aesthetic scores of direct and indirect veneers were made, it was found that indirect veneers had overall better white aesthetic scores (7.43 ± 1.431) compared to direct veneers (7.30 ± 1.803). This association was found to be statistically significant ($p = 0.013$, $p < 0.05$) using the Pearson chi square test. Numerous studies with c=similar results suggesting that indirect veneers had better aesthetics were noted [62–65]. It was also found that many studies suggested direct veneers were more aesthetic [66–68]. This suggests that the aesthetics of direct and indirect veneers is multifactorial and may vary from practice to practice.

Secondary findings in our study was the male predominance in veneer restorations contradictory to literature as females are more concerned about aesthetics and are more keen to seek dental treatment [69,70] (Figure-1).

Study limitations: presence of a smaller sample size along with the study being an unicentered one with a limited demography and a lack of variety in the collected data.

Future scope: this study could pave the way for newer research with improved assessment of direct and indirect veneers and selection of not only aesthetics but also other factors to truly determine which is the better restoration.

Conclusion

Within the limits of the current study, it was observed that indirect veneers have overall better white aesthetic scores compared to direct veneers.

TABLES AND FIGURES

Table 1: Mean and Standard Deviation in Patients Undergoing Direct Veneering

	N	Minimum	Maximum	Mean	Std. Deviation
Age	30	18	44	26.47	7.171
Tooth Form	30	0	2	1.43	.568
Outline	30	0	2	1.10	.759
Colour	30	0	2	1.83	.461
Surfacetexture	30	0	2	1.37	.556
Translucency	30	0	2	1.57	.568
Total	30	2	10	7.30	1.803
Valid N (Listwise)	30				

Table 2: Mean and Standard Deviation in Patients Undergoing Indirect Veneering

	N	Minimum	Maximum	Mean	Std. Deviation
Age	30	19	43	29.97	6.724
Tooth Form	30	0	2	1.30	.702
Outline	30	0	2	.90	.662
Colour	30	1	2	1.93	.254
Surfacetexture	30	1	2	1.87	.346
Translucency	30	0	2	1.40	.814
Total	30	5	10	7.43	1.431
Valid N (listwise)	30				

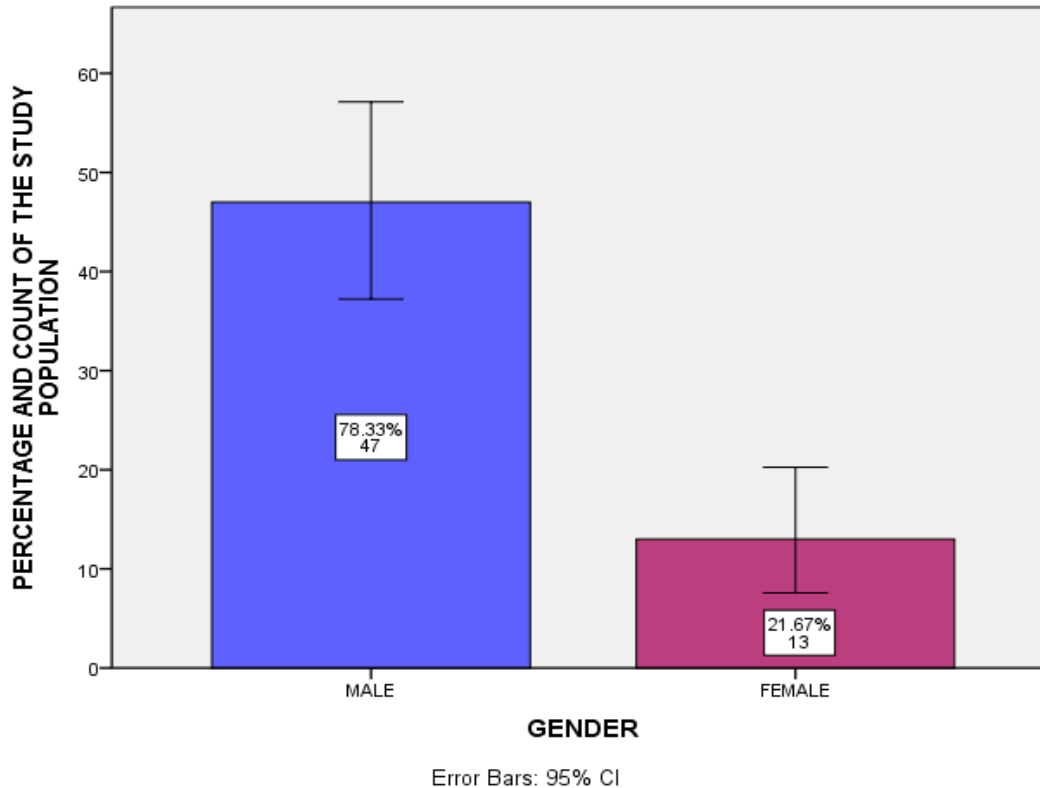
Figure 1: Gender Wise Distribution of the Study Population

Figure 1: bar graph showing the gender wise distribution of the study population. X axis represents the gender of the study population and the y axis represents the percentage and count of the population. Blue colour represents the male population and purple colour represents the female population. 78.33% (47) of the patients were male and 21.67% (13) of the patients were female indicating a male predominance.

Table 3: Pearson Chi Square Test for Association between the Type of Restoration and Total White Aesthetic Score

Chi-Square Tests			
	Value	df	Asymptotic Significance (2-sided)
Pearson Chi-Square	12.968 ^a	6	.044
Likelihood Ratio	16.198	6	.013
Linear-by-Linear Association	.102	1	.749
N of Valid Cases	60		
a. 8 cells (57.1%) have expected count less than 5. The minimum expected count is .50.			

Figure 2: Comparison of Mean Tooth Form between Direct and Indirect Veneering

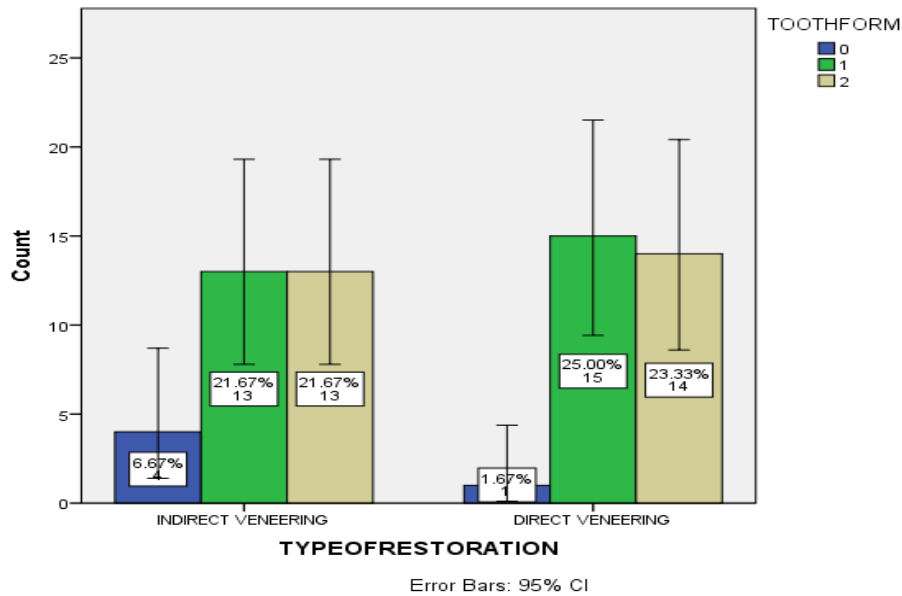


Figure 2: bar graph showing the association between the mean tooth form and the type of restoration. X axis represents the type of restoration and Y axis represents the percentage and count of the study population. The blue colour represents WES score 0 which indicates presence of major discrepancy, green colour represents WES score 1 which indicates presence of minor discrepancy and yellow colour represents WES score 2 which indicates there is no discrepancy present. It was observed that better mean tooth form was observed in direct veneering. Chi square statistical test was done and the p value was found to be 0.372 (p value \geq 0.05, statistically insignificant).

Figure 3: Comparison of Mean Outline between Direct and Indirect Veneering

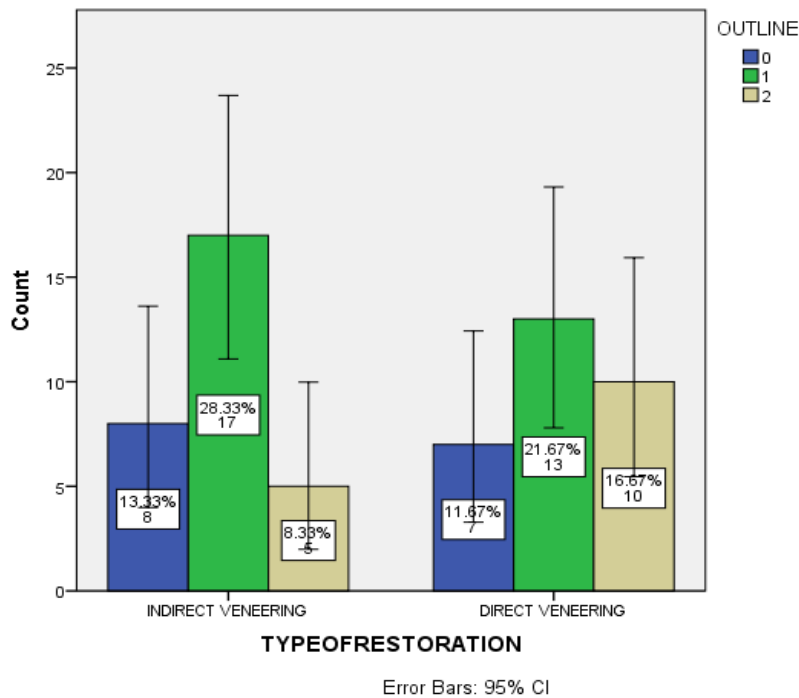


Figure 3: bar graph showing the association between the mean outline form and the type of restoration. X axis represents the type of restoration and Y axis represents the percentage and count of the study population. The blue colour represents WES score 0 which indicates presence of major discrepancy, green colour represents WES score 1 which indicates presence of minor discrepancy and yellow colour represents WES score 2 which indicates there is no discrepancy present. It was observed that better mean outline form was observed in direct veneering. Chi square statistical test was done and the p value was found to be 0.322 (p value ≥ 0.05 , statistically insignificant).

Figure 4: Comparison of Mean Colour between Direct and Indirect Veneering

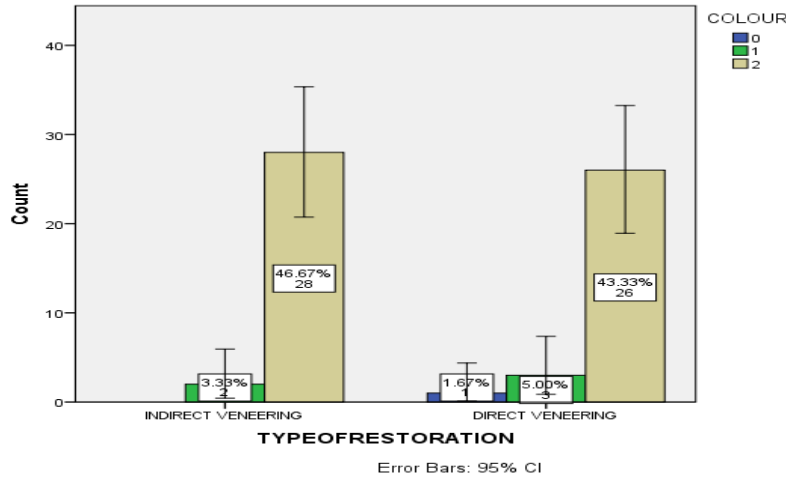


Figure 4: bar graph showing the association between the mean colour and the type of restoration. X axis represents the type of restoration and Y axis represents the percentage and count of the study population. The blue colour represents WES score 0 which indicates presence of major discrepancy, green colour represents WES score 1 which indicates presence of minor discrepancy and yellow colour represents WES score 2 which indicates there is no discrepancy present. It was observed that better mean colour was observed in indirect veneering. Chi square statistical test was done and the p value was found to be 0.436 (p value ≥ 0.05 , statistically insignificant).

Figure 5: Comparison of Mean Surface Texture between Direct and Indirect Veneering

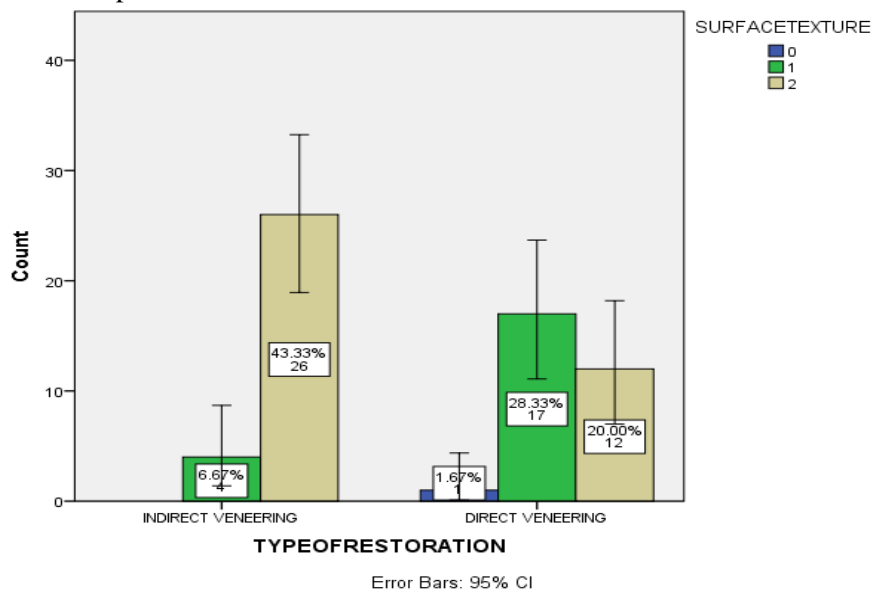


Figure 5: bar graph showing the association between the mean surface texture and the type of restoration. X axis represents the type of restoration and Y axis represents the percentage and count of the study population. The blue colour represents WES score 0 which indicates presence of major discrepancy, green colour represents WES score 1 which indicates presence of minor discrepancy and yellow colour represents WES score 2 which indicates there is no discrepancy present. It was observed that better mean surface texture was observed in indirect veneering. Chi square statistical test was done and the p value was found to be 0.000 (p value \leq 0.05, statistically significant).

Figure 6: Comparison of Mean Translucency between Direct and Indirect Veneering

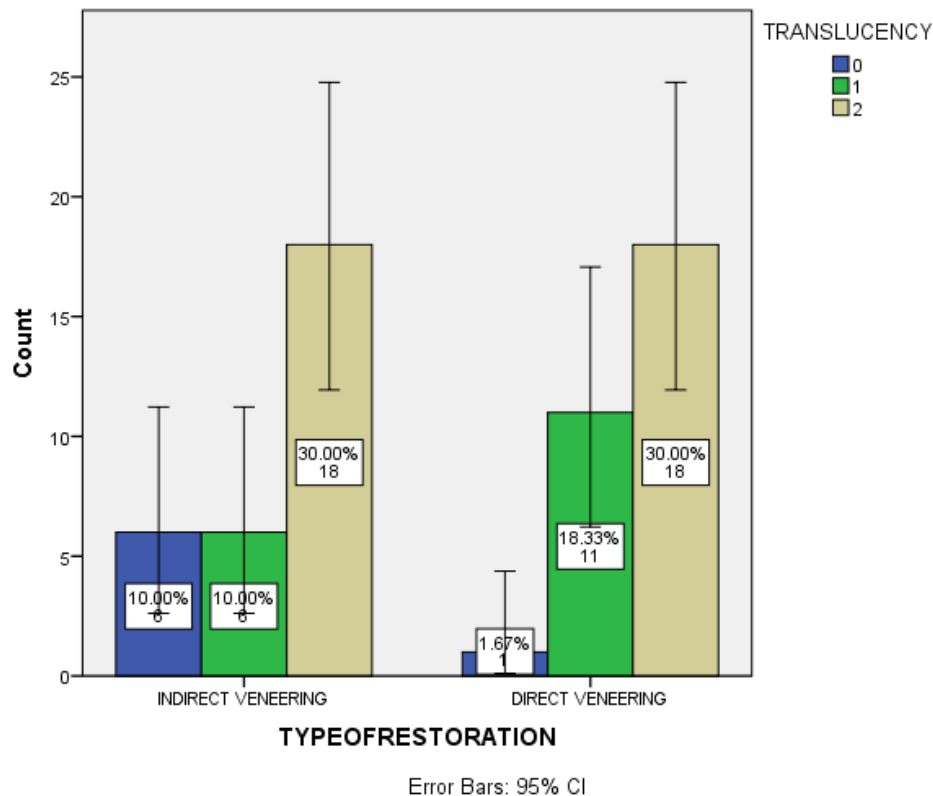


Figure 6: bar graph showing the association between the mean translucency and the type of restoration. X axis represents the type of restoration and Y axis represents the percentage and count of the study population. The blue colour represents WES score 0 which indicates presence of major discrepancy, green colour represents WES score 1 which indicates presence of minor discrepancy and yellow colour represents WES score 2 which indicates there is no discrepancy present. It was observed that better mean translucency was observed in direct veneering. Chi square statistical test was done and the p value was found to be 0.06 (p value \geq 0.05, statistically insignificant).

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