

## Evaluation of Efficiency of Composite Veneers Vs Porcelain Veneers in Dental Aesthetics-An Original Study

Dr.Akanksha Kumari<sup>1</sup>, Dr. JaydipMarvaniya<sup>2</sup>,DrManojkumarYasangi<sup>3</sup>, Dr. AkritiMahajan<sup>4</sup>,Dr. HarjotKaur<sup>5</sup>, Dr. Moon Ramraika<sup>6</sup>, Dr. HeenaDixit Tiwari<sup>7</sup>.

<sup>1</sup>MDS, Department of Conservative and Endodontics, PHC, Barh, Patna, Bihar.[akanksha.aki06@gmail.com](mailto:akanksha.aki06@gmail.com);

<sup>2</sup>MDS, Assistant Professor, Department of Conservative Dentistry and Endodontics, TeerthankerMahaveer Dental College and Research Centre, Moradabad.[jaydipmarvaniya@gmail.com](mailto:jaydipmarvaniya@gmail.com);

<sup>3</sup>Reader, Department of Prosthodontics, MNR Dental College and Hospital, Telangana.[drmanoj5672@gmail.com](mailto:drmanoj5672@gmail.com);

<sup>4</sup>MDS, Oral medicine and radiology, Private consultant, Jammu and Kashmir.[akritim709@gmail.com](mailto:akritim709@gmail.com);

<sup>5</sup>B.D.S, Guru Nanak Dev Dental College &Research Institute, Sunam, Punjab, India.;

<sup>6</sup>MDS, Senior Lecturer, Department of Orthodontics and dentofacialorthopedics, Ram Krishna Dharmarth Foundation University, Bhopal, M.P. [drmoonramraika@gmail.com](mailto:drmoonramraika@gmail.com);

<sup>7</sup>BDS, PGDHHM, Final year Student, Master of Public Health,ParulUniveristy, Limda, Waghodia, Vadodara, Gujrat, India.[drheenatiwari@gmail.com](mailto:drheenatiwari@gmail.com)

### Corresponding author:

Dr.AkankshaKumari, MDS, Department of Conservative and Endodontics, PHC, Barh, Patna, Bihar.[akanksha.aki06@gmail.com](mailto:akanksha.aki06@gmail.com)

### ABSTRACT

*Introduction:* The clinical success of restorations depends on technical aspects, aesthetic result and performance in time. The aim of this study was to evaluation of efficiency of composite veneers vs porcelain veneers.

*Materials and Methods:* One hundred and eighty VRs of three different types (direct composite, indirect composite and porcelain) were placed on anterior teeth. Patients were asked to fill in questionnaires at baseline and at one- and two-year recalls.

*Results:* At baseline the overall satisfaction was 76%, after two years this was 78%. The variable 'type of VR' was the only factor measured that had a significant influence on the satisfaction of the patient. At the two-year evaluation patients with porcelain VRs were more satisfied than those with direct composite VRs (P<0.05).

*Conclusions:* From the results of this study it is concluded that differences in clinical procedures had no effect on satisfaction. Also the number of VRs had not influenced the level of satisfaction. After two years a significant difference was observed for the variable 'type of VR', with the best results for porcelain.

**KEY WORDS:** Veneer restoration, Clinical evaluation, Satisfaction.

### INTRODUCTION

About one third of the adult population in the USA is dissatisfied with the colour or shape of one or more of their natural or restored teeth . The same conclusion was found in the National Dental Survey which was preformed in 1986<sup>1-3</sup>. The growing importance placed

on aesthetics may result in an increased demand for cosmetic dental treatment. Cosmetic dentistry has the purpose to maintain or improve the aesthetic appearance of the teeth. A good option to restore unaesthetic anterior teeth is a veneer restoration (VR). Both direct and indirect bonding techniques can be used for this type of restoration. The technique of VR is not new, but the materials and preparation design have changed over time.

The clinical success of restorations depends on technical aspects, aesthetic result and performance in time. Most of the studies dealing with evaluations of VR have been performed by dentists<sup>4-7</sup>. These studies report the survival rate of VR with or without well described evaluation criteria. If evaluation criteria were used they often differ from standardized criteria, for example as in Quality Evaluation for Dental Care of the California Dental Association or United States Public Health Service Criteria (USPHS)<sup>8-10</sup>. The parameters employed were mostly surface characteristics, marginal integrity, anatomic form and the colour of the restoration. Except for the criterion 'colour' these are all objective parameters and the levels are relatively easy to quantify. The criterion 'colour' is difficult to describe without the use of colorimetric devices'. Also the criteria 'aesthetic result' and 'satisfaction' evaluated by dentists or patients are not objective but subjective criteria<sup>11-12</sup>. Nevertheless, the judgement of the patient regarding aesthetic outcome and their satisfaction is most important to the success of aesthetic restorations. The aesthetic requirements of dentists are not the same as those of patients<sup>2</sup>. They vary not only from person to person but are also dependent on professional interests. There is only one study performed to investigate the patients' satisfaction with bonded restorations<sup>1</sup>. This study showed a relative high level of satisfaction (96% satisfied). Nordba' reported that the acceptance of porcelain VRs were judged to be good. The aim of this study was to evaluation of efficiency of composite veneers vs porcelain veneers.

## MATERIALS AND METHODS

This analysis was part of a clinical trial which was originally designed to test the influence of a number of clinical variables on the survival of VRs. This trial involved 180 VRs of three different materials using two preparation designs, one with and the other without incisal reduction. The VRs were placed by seven dentists in the Dental School of Nijmegen on maxillary central and lateral incisors for aesthetic reasons (62% discoloration, 24% deviation of position and 14% deviation of shape).

The three types of VR were:

- (1) Direct resin composite (DC; Silux Plus, 3M Co., St. Paul, MN, USA)
- (2) Indirect resin composite (IC; Dentacolor, HereausKulzer GmbH, Wehrheim, Germany)
- (3) Porcelain (P; Flexo-ceram, Elephant Ceramics, Hoorn, The Netherlands).

A factorial design of the different treatment combinations is presented in *Table 1*. Details about the materials, operators, assigning of the experimental variables, preparation and clinical procedures for fabrication of the VR have been previously published<sup>4</sup>.

The patients' satisfaction with their VR was assessed using questionnaires with precoded categories. Patients were asked to fill in the questionnaires at baseline (one month after the placement of the VRs) and at recalls one and two years after placement of the VRs.

Table 1. Factorial design and sample sizes of the different treatment combinations

	Type DC	Type IC	Type P
Prep. 1	60	30	30
Prep. 2	—	30	30

DC, direct resin composite; IC, indirect resin composite; P, porcelain; Prep. 1, no reduction of the incisal edge; Prep. 2, reduction of the incisal edge.

A number of patient-dependent and experimental variables were tested if they influenced the patients' satisfaction. These factors, including levels and distributions, are presented in *Table II*.

Subjects for this study were 112 patients taking part in the clinical trial on VRs. These patients were treated with one or more restorations with a maximum of six. However, to avoid unwanted dependencies, a maximum of two VRs per patient were evaluated in the study. In cases where more than two VRs were made, two VRs made on the same tooth type were included in the trial (first preference) and/or two VRs were randomly selected (second preference). The other VRs were excluded for analyses.

In nine cases a protocol deviation occurred. In these cases the teeth were restored with another type of VR than assigned because during the treatment it appeared impossible to obtain a good colour match of the VRs. In all these cases the operator decided to make a direct composite VR instead of an IC- or P-VR. During the treatment phase one tooth fractured. A non-vital lateral incisor, which was intended to be restored with an indirect composite VR, fractured during the removal of the temporary restoration and was subsequently excluded for further evaluation.

At the one-year recall, 107 patients were evaluated. Three patients were lost to follow-up and one VR failed. At the two-year recall only 100 patients were seen. The VRs of five patients failed and six patients were lost to follow-up. One patient who was absent at the one-year recall was present at the two-year recall.

In this study the treatment demand was 100%. Since all treatments were carried out, the treatment need was also 100%. The type of disorder in aesthetic appearance might have an influence on the level of satisfaction of the patient. However, the dentist judgement (objective need) and the patient demand (subjective need) might vary and thus influence the results. Therefore the patient demands were compared with the dentists opinion.

*Table III* shows a comparison of the reason for treatment as judged by the dentists and patients.

Statistical tests for factors at the same time point were done by means of the Chi-square test. A paired t-test was done for each level of a factor to test differences between two time points. All statistical tests were performed at a significance level  $\alpha=0.05$ .

**Table 2: Factors tested for influence on the patients' satisfaction, including different levels and distributions**

<i>Factor</i>	<i>Type</i>	<i>Measurements points</i>	<i>Description of variable/points number of patients (and VRs)</i>
Type of VR	E	B, R1, R2	
DC			38 (60)
P			36 (61)
IC			37 (58)
Preparation design (P, IC)	E	B	
No incisal reduction			50 (75)
Incisal reduction			23 (44)
Operator	E	B	1-7 Operators
Number of VR	P	B, R1, R2	
1 VR			43 (43)
2 VRs			34 (68)
>2 VRs			34 (68)
Tooth type	P	B	
Central incisor			(108)
Lateral incisor			(71)
Reason of treatment	P	B	
Discoloration			74 (110)
Deviation of shape			15 (26)
Deviation of position			22 (43)
Time of existing	P	B	
0-10			34
>10 years			39
Congenital			38
Gender	P	B	
Male			31
Female			80
Mean age	P	B	30 years
Procedure problems	R	B	
Yes			50
No			61
Failures			
Totally	R	R2	7
Repairable			15

**Table III. Agreement between dentists' and patients' diagnoses of treated teeth (colour, shape or position) in per cent**

<i>Patient</i>			
<i>Dentist</i>	<i>No reason</i>	<i>Reason</i>	<i>Total</i>
<b>Colour</b>			
No reason	55	45	44
Reason	2	98	56
Total	25	75	100
<b>Shape</b>			
No reason	88	12	88
Reason	21	79	12
Total	79	21	100
<b>Position</b>			
No reason	90	10	69
Reason	49	51	31
Total	77	23	100

## RESULTS

The comparison of the reason for treatment as judged by the dentists and patients is given in *Table III*. Although, the indications (discoloration, deviation of shape or deviation of position) for treatment varied, in 71-84% of the cases there was an agreement between the dentist and patient. In further analyses the judgement of the dentists has been used.

*Table IV*. Percentages of satisfied persons according to the variables 'type of VR' and 'number of VRs' at different measurement points

	Baseline		Recall 1		Recall 2
Overall satisfaction	76	← *** →	93	← ** →	78
Satisfied with colour	92				87
Satisfied with shape	90				94
Type					
DC	74	← ** →	95	← ** →	67*
P	72	← ** →	97		93*
IC	79		89		82
Number					
1 VR	86	< * >	100	< ** >	81
2 VR	67	← ** →	93		73
>2 VR	70	← * →	88		81

A ← \* → B, indicate a level of significant differences between groups A and B.  
 \*, 0.05 > P > 0.01.  
 \*\*, 0.01 > P > 0.001.  
 \*\*\*, 0.001 > P.

## DISCUSSION

Every change in the dentition will require habituation. Especially when there is a change in position or shape it will take some time before the patient does not feel the restoration any more and will look at their dentition in total. Once the patients are getting used to the restoration, they will see that the aesthetics of the tooth is improved.<sup>13-15</sup> The result may be a more satisfied patients' population at the one-year recall. Then, after a certain adaptation period, the aesthetic judgement may change again as the patients may become aware of the aesthetics of the adjacent teeth as well. When the patient is no longer satisfied with the aesthetics of the dentition as a whole, the aesthetic satisfaction of the restored teeth will decrease as well. This period will vary from person to person and depends on the adaptation ability of the patient. At the two-year evaluation the restored tooth will be compared with the adjacent teeth. Our results support this theory since, with an increasing number of VRs the difference between the satisfaction at one and two years recall was not so pronounced as in the case of one tooth being restored.<sup>16-19</sup>

The significant decrease in the satisfaction with direct veneers between one and two years is difficult to explain. Several reports mentioned colour changes of light-cured composite resins influenced by time of light exposure and time after curing, while another study showed no significant difference between some composite resins after five years<sup>17-20</sup>. It is not very likely that a change in the colour of the restoration material will be noticeable after two years. Other problems with composite resin veneering which were described were roughening of the surfaces, chipping, fracture and staining<sup>20-23</sup>. However, in this population the occurrence of chipping or fracture had no influence on the satisfaction of the patient. Surface

roughening and staining was not investigated in this study.

Several studies report a discrepancy between treatment need of the dentist and treatment demand of the patient<sup>1,5,23</sup>. The agreement between dentist and patient in case of cosmetic dental treatment was 72% in the National Dental Survey. If there was a disagreement, the objective need of cosmetic treatment as judged by the dentist was higher (44%) than the treatment demand of the patient (14%)<sup>23</sup>. Several other articles have also reported a higher treatment need than treatment demand<sup>4,5</sup>. In this study, the reasons for treatment by the dentist and the patient were compared. The agreements varied from 84 to 71%. Comparison of the reasons for treatment revealed that the reason 'shape' and 'position' were more important for the dentist than for the patient, while the reason 'colour' was more important for the patient. The overall satisfaction can not be completely explained by the satisfaction of colour and shape. It seems that other factors play a role in this matter. Goldstein suggested that the conservative approach and relative low costs of these restorations are appreciated by the patients and this may influence the satisfaction.

The use of a questionnaire to evaluate the treatment with VR at baseline, one and two years after the completion of treatment, is a procedure that may introduce some kind of bias. For example, selection on a population level: the population of the trial with a higher or university education is 44% and the male and female ratio is also not representative for the population.

## CONCLUSIONS

From the results of this study it is concluded that differences in clinical procedures for VRs had no effect on satisfaction. Also the number of VRs had not influenced the level of satisfaction. After two years a significant difference was observed for the variable 'type of VR'. The best results were found for porcelain VRs. With longer follow-up it is expected that the influence of 'type of VR' will become more apparent when the property of the materials will influence the process of ageing, discoloration or strength.

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