

## Assessment of The Preferred Restorative Material – Composite Resin or Ceramic – For Anterior Teeth Restoration

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### ABSTRACT

**Objective:** assess the preference of clinicians and undergraduate students regarding the choice of composite resin and ceramic and they ability of distinguish these materials in anterior teeth restorations. **Materials and methods:** 60 subjects participated in this cross-sectional, epidemiologic study, including clinicians (n=30) and undergraduate students (n=30). The study consisted of two parts; in the first part the subjects answered objectively regarding the frequency of use of ceramic and composite resin in anterior teeth and the failure in the performed restorations. In the second part, each subject analyzed 3 photographs of an anterior smile and registered, individually, the presence of sound tooth, fully or partially restored with composite resin and fully or totally restored with ceramic. **Results:** in both groups the use of composite resin is more frequent and the major factor leading to this choice was the cost. Both groups presented a failure rate higher than 50%, and this percentage was higher for undergraduate students. In the visual analyzes of the photograph, none of the participants identified correctly all the restorations. **Conclusion:** distinguish sound teeth from restored teeth has become increasingly difficult, despite the restorative material (composite resin or ceramic) used. **Key words:** composite resin. Ceramic. Anterior teeth.

### INTRODUCTION

Restorations in anterior teeth have been showing optimum esthetic results when proper accomplished, whether with composite resin or ceramic. The clinician's decision on the choice of the material is guided by its advantages and disadvantages.<sup>1,2</sup>

Composite resin allows quick and easy repairs, extending the restoration long-term survival. Shows lower clinical time and restorations might be made without a laboratory step. The cost/benefit relation is satisfactory, and this factor could be determinant when the patient's financial resources are low.<sup>3,4</sup> Some disadvantages of this material are the color stability, polymerization shrinkage, water sorption, which could decrease the wear resistance and post-operative hypersensitivity.<sup>4,5</sup>

The main advantage of ceramics is the translucency, chemical stability, marginal adaptation, superficial smoothness and wear resistance.<sup>6,7</sup> Some disadvantages are its the higher hardness compared to enamel, friability and low tensile strength.<sup>7,8</sup>

Current studies<sup>9</sup> show excellent esthetic results and survival rates, irrespective of the chosen material. Thus, the aim of this study was to assess the perception of clinicians and undergraduate students regarding the restorative material, showed in photographs, and also assess their experience with anterior teeth restorations with composite resin and ceramic.

### MATERIALS AND METHODS

This cross-sectional, epidemiologic study was approved by the Human Research Ethics Committee

of the Federal University of Santa Catarina (approval number: 950.253/2014). All the subjects signed a consent form.

Data were recorded from 60 subjects, randomly selected, including clinicians (n=30) of the city of Florianópolis, SC, Brazil and undergraduate students (n=30) of the final year of the School of Dentistry of the Federal University of Santa Catarina, Florianópolis, SC, Brazil. The study consisted of two steps, in the first a questionnaire was applied and in the second a visual analysis of photographs was carried out.

For the first step, the participant was oriented to objectively answer the questions. The questions were as follows: 1) How often do you use composite resin and ceramic? 2) Which criteria do you use when choosing the material? 3) Did you already have a failure in an anterior restoration? If yes, what was the reason? And 4) What is the success rate in 2 to 5 years?

For the second step, the participant was positioned from a

distance of 50 cm from the photograph and 2 minutes were allowed to pass. After this time, the participant must move on to the next photograph, and was not allowed to return to the previous one. Three photographs were selected (Figures 1 to 3) and analyzed regarding the harmony of the anterior smile (from canine to canine) and each tooth individually, recording the presence of sound tooth, partial or full restoration with composite resin and full restoration with ceramic. Data were statistically analyzed through descriptive statistic measures.

## RESULTS

Regarding the restorative material used, both clinicians and undergraduate students reported they use composite resin more often than ceramic, and the frequency among undergraduate students was higher (Tables 1 and 2).

Frequency	Composite resin		Ceramic	
	N	%	N	%
0%	0	0	19	63
10% a 30%	0	0	8	27
30% a 50%	1	3	2	7
50% a 70%	2	7	1	3
70% a 90%	12	40	0	0
100%	15	50	0	0
Total	30	100	30	100

Table 1. Mean frequency of use of ceramic and composite resin in anterior teeth restorations by clinicians and undergraduate students.

Note: results based on the number of participants.

Frequency	Composite resin		Ceramic	
	N	%	N	%
0%	0	0	2	7
10% a 30%	0	0	17	57
30% a 50%	4	13	8	27
50% a 70%	8	27	2	7
70% a 90%	16	53	1	3
100%	2	7	0	0
Total	30	100	30	100

Table 2. Mean frequency of use of ceramic and composite resin in anterior teeth restorations by specialists and post-graduate students.

Note: results based on the number of participants.

Within the reasons that lead the participants to chose the material they use the most, the factor cost was consentaneous for both clinicians and undergraduate students. Following cost, for the undergraduate students the prevailing factors were the technique execution and the esthetic result. For the clinicians, the age of the patient and the longevity were considered as major factors while for the undergraduate students these factors were less relevant.

With regard to the success rate in the restorations performed with composite resin, 33% of the undergraduate students reported 100% success. On the other hand, within the clinicians, only 13% reported a success rate of 100%. Concerning the use of ceramic, clinicians had a higher number of subjects who use this material, and for 73% of them the success rate ranged from 70% to 90% of the performed restorations, compared to 46% for the undergraduate students. Although the number of undergraduate students who used ceramic was lower than the clinicians, 45% reported a 100% success rate in performed restorations, compared to only 23% of the interviewed clinicians.

Regarding the failure of the treatment with composite resin, the undergraduate students showed a lower percentage than the clinicians (23% and 93%, respectively). Within the most common situations of failure, in percentage for undergraduate students and clinicians, respectively, are: teeth with color alterations (43% and 31%), anterior rehabilitation with composite resin (43% and 26%), class V (0% and 39%) and diastema closure (14% and 3%).

With respect to the visual analysis of the photographs, all of them were considered as similar to natural tooth, regarding the esthetic outcome. When questioned about each tooth individually, it was observed that none of the participants answered correctly all the three situations.

In the first photograph (Figure 1), the hit rate of the treatments was lower than 23% for the undergraduate students and lower than 40% for clinicians. The treatment performed in the right and left maxillary central incisors was a diastema closed with composite resin. In the right and left maxillary lateral incisors a ceramic veneer was positioned and in the maxillary canines no treatment was performed.



Figure 1. First photograph assessed by the participants.

In the second photograph (Figure 2), all teeth were rigid and the hit rate of the clinical situations on the

teeth in question ranged from 33% to 90% for the undergraduate students and from 30% to 90% for the clinicians.



Figure 2. Second photograph assessed by the participants.

In the third photograph (Figure 3), the hit rate for the clinical situation was lower than 23% for the undergraduate students and lower than 33% for the

clinicians. In this photograph the maxillary central and lateral incisors had a diastema closure restoration with composite resin.



Figure 3. Third photograph assessed by the participants.

## DISCUSSION

When the two groups are compared, the clinicians reported they use more ceramic than the undergraduate students, this could be due to a longer clinical time and better skills. This relation is not in accordance with Chimetão et al,<sup>10</sup> who assessed the trend of using composite resin and ceramic for metal-free restorations. Within de 173 restorations in anterior teeth, 166 were performed with ceramic and only 7 with composite resin, showing a higher frequency of the use of ceramic, compared to composite resin.

Regarding the success rate of the restorations, taking into account a period of 2 to 5 years, the undergraduate students reported higher success rates than the clinicians for the restorations with composite resin. However, this finding might be related with a lower follow-up of the cases by the undergraduate students. Opdam et al,<sup>11</sup> related a success rate of 87% in posterior composite resin restorations in a follow-up period of 5 years, similar to Kräner et

al<sup>12</sup> who also reported a good longevity of composite resin restorations after 4 years. Kim et al<sup>12</sup> conducted a study to assess the clinical performance of

amalgam restorations, glass ionomer cement and composite resin in a period to 5 to 10 years. Regarding composite resin, the authors observed that the longevity of the direct restorations ranged from 9.7 to 11 years, depending of the evaluated criteria.

Concerning the failures, as the longevity period was not considered, the clinical experience of the clinicians tend to be higher than the undergraduate students, besides the longer follow-up period of the accomplished cases. The major pointed failure by both groups was the color alteration, followed by chipping of the material and fracture of the incisal edge. Unlike, another study<sup>14</sup> where the major cause of failure was secondary caries, followed by the same failures reported in this study. Likewise, Opdam et al<sup>11</sup> observed that the main cause of failure was secondary caries, followed by restoration fracture. The color alteration might be due to composite resin water sorption, and the fractures often are related with the size and location of the restoration, oftentimes due to chewing tension and lateral and protrusion movements with inadequate occlusal adjustment.<sup>14</sup>

Ceramic was the material that showed higher success rates in the restorations, no matter the group. It should be noted that the use of ceramic was lower than composite resin, and

this might be related with the results. According to a literature review,<sup>15</sup> the success of ceramic restorations after 5 years range from 70% to 100%, and for laminate veneers this rate ranged from 83% to 100%, corroborating the results of the present study.

Regarding the perception of clinicians and undergraduate students of the treatment outcomes, through a visual analysis of the photographs, it was observed that there is a difficulty in differing ceramic from composite resin and natural teeth, as well to identify the type and location of the restoration. It should be highlighted that no similar methodology was found in the literature.

In a photograph that showed only higid teeth, both clinicians and undergraduate students pointed the presence of ceramic veneers and composite resin restorations. In one of the presented cases, there was the associated use of ceramic and composite resin. The maxillary lateral incisors had a ceramic veneer and the centrals, diastema closure composite resin restorations. 33% to 40% of the interviewed said that the maxillary central incisors had ceramic veneer and 30% to 50% said the maxillary lateral incisors were higid. This demonstrates that the use of these materials combined in the esthetic zone is suitable and if the restorations are well accomplished the perception of this different is very difficult. The difficult of both groups to identify whether it was a higid or restored tooth might be related with the improvements observed in the quality of the materials throughout its evolution, with optimum esthetic outcome with ceramic veneers as well with partial composite resin restorations, to the point of being identified as natural tooth.

## CONCLUSION

Composite resin and ceramic restorations are easily mistaken with natural tooth, proving the advances in the dental materials for restorations in the esthetic zone.

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Diagramação: Flávio Ricardo Manzi e Juliana de Assis Silva