

## Original Research

### Prosthodontists Choice on Selection of Anterior and Posterior Crowns for Prosthetic Rehabilitation: A Cross Sectional Study

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#### ABSTRACT:

**Aim** To identify recent choice of materials for anterior as well as posterior crowns for prosthetic rehabilitation in case of fixed dental prosthesis. **Materials and Methods** An anonymous questionnaire was given to 27 prosthodontists related to materials used for anterior and posterior crowns for fixed dental prosthesis based on strength, stability, esthetics and technique sensitivity. Their responses were analyzed statistically by SPSS software. Frequency analysis was carried out to determine the materials of choice for the restoration. **Results** The top three material choices for anterior teeth were lithium disilicate (54%), layered zirconia (17%), and leucite reinforced glass ceramic (13%). The top three material choices for posterior crowns were all-zirconia (32%), PFM (31%), and full metal crowns (21%). The analysis of material selection by dentist and practice characteristics. **Conclusion** Visual requirements and technical options have to be balanced in each clinical situation. The materials which fulfilled all the factors as well as reasonable cost of fabrication becomes the choice of restorative material.

**Key words:** Esthetics, stability, rehabilitation, prosthesis, longevity.

Received: 2 December, 2019

Accepted: 28 January, 2020

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**This article may be cited as:** UR Rahman MS, Dubbaka P, Sahani S, Thippaluru S, Kazi S, Gujarathi N. Prosthodontists Choice on Selection of Anterior and Posterior Crowns for Prosthetic Rehabilitation: A Cross Sectional Study. J Adv Med Dent Scie Res 2020;8(3):50-52.

#### INTRODUCTION

Dental treatment should have purpose of providing a functional and aesthetic restoration with least complications and longevity.<sup>1</sup> Prosthodontics is a challenging discipline with many clinical and laboratory procedures where a positive result depends upon close cooperation between dentists and dental technicians.<sup>2</sup> The success of a prosthodontic treatment, predominantly when a single tooth has to be restored, is based on the "precise" choice of the restoration material. However, the material selection is inclined by subjective factors, such as the patient's desire for metal-free restorations, the dentist's outlooks for maximal stability, and the dental technician's

experience with a preferred material. These subjective factors may be harmful, and lead to an "incorrect" material selection.<sup>3</sup> Consequently, the choice of the material for a single tooth restoration is mostly based on four visual factors:

- the translucency of the neighboring teeth
- the brightness value of the neighboring teeth
- the accessible space for replacement
- the degree of discoloration of the abutment tooth.<sup>4</sup>

Currently, the choices for reconstructive treatment have amplified with the introduction of advanced technologies (eg, CAD/CAM), the further development of prevailing materials, and the enhancement of adhesive cementation. Thus,

numerous all-ceramic materials may be a valuable treatment alternate to the existing gold standard of metal-ceramic restorations.<sup>3</sup> The five-year endurance rates for metal-ceramic crowns were 95.6%, for reinforced glass-ceramic crowns (eg, Empress; Ivoclar Vivadent) 95.4%, and for glass-infiltrated alumina crowns (eg, In-Ceram; VITA) 94.5%. There were no statistically noteworthy differences between groups. Therefore, both full-ceramic as well as metal-ceramic crowns may be specified for single tooth restorations. In contrast, metal-ceramic FDPs displayed a survival rate of 94.4% after 5 years, while FDPs with ceramic frameworks had a significantly lesser survival rate of 89.6%.<sup>5</sup> All-zirconia crowns have expanded popularity due to their increased strength<sup>6</sup> and toughness<sup>7</sup>, wear compatibility with natural dentition<sup>8</sup> and less cost. Though, some dentists may choose to be against this material due to its relative opaqueness and fear of long-term strength degradation from low temperature damage. Lithium disilicate is alternative popular material choice for single-unit crowns. It is extra translucent than zirconia<sup>9</sup>, and can be used in the anterior region without adding a layer of veneering porcelain, which decreases the risk of porcelain chipping. Metal crowns are amongst the strongest choices, although their major drawback is esthetics. Porcelain-fused-to-metal (PFM) has been used for several years and studied widely. Studies have established a 94% success rate over a 10-year period<sup>10</sup> and good long-term clinical reliability<sup>11</sup>. Even though chipping of veneering porcelain is a possible obstacle, fracture of the metal framework is unusual<sup>12</sup>. PFM restorations need adequate tooth reduction to permit space for at least 0.3 mm of metal coping and 0.7 mm of veneering porcelain, and a minimum facial reduction of 1.2 mm according to Hobo and Shillingburg<sup>13</sup>

#### AIM

To identify current choice of materials for anterior as well as posterior crowns for prosthetic rehabilitation in case of fixed dental prosthesis based on characteristics like strength, durability, longevity, as well as esthetics or natural tooth like resemblance. The responses were also assessed on the amount of technique sensitivity in relation to the materials used for rehabilitation.

#### MATERIALS AND METHODS

An anonymous questionnaire was given to 27 prosthodontists related to materials used for anterior

and posterior crowns for fixed dental prosthesis based on strength, stability, esthetics as well as technique sensitivity. Various other categories for selection were also considered like-translucency as well as brightness of neighboring teeth, degree of discoloration of the abutment teeth, and space available for replacement. Dentists enrolled in the network were included in the study if they met all of these criteria: (1) finished an Enrollment Questionnaire; (2) were currently practicing and treating patients; (3) stated in the Enrollment Questionnaire that they currently do at least some restorative dentistry in their practices.

#### Statistical Analysis

The questionnaire data was noted on excel sheet and was analyzed by SPSS software 20.0. the accuracy of input data was tested by entering data twice and comparing the two datasets. No inconsistencies were found in the data. Percentage analysis was carried to get the frequency analysis of the responses. The responses to these questions were tested to determine whether they were significantly ( $p < 0.05$ ) associated with material selection. (Table 1)

#### RESULTS

The top three material choices for anterior teeth were lithium disilicate (54%), layered zirconia (17%), and leucite reinforced glass ceramic (13%). Almost 25% of dentists who were too busy to treat all their patients chose PFM, compared to less than 10% for dentists in the other categories. Over 50% of dentists in private practice chose lithium disilicate, compared to 36% or less of dentists in public health practice. The analysis of material selection according to dentist and practice characteristics, statistically significant differences were found with dentist gender ( $p = 0.022$ ), years since graduation ( $p = 0.022$ ), practice type ( $p < .0001$ ), region ( $p = 0.0006$ ). The top three material choices for posterior crowns were all-zirconia (32%), PFM (31%), and full metal crowns (21%). The analysis of material selection by dentist and practice characteristics, statistically significant differences were found with dentist gender ( $p = 0.001$ ), practice type ( $p < .0001$ ), region ( $p < 0.0001$ ), years since graduation ( $p = .2380$ ). Dentists in rural practices were more likely to prescribe all-zirconia restorations than any other location type. 55% of dentists chose a full metal crown than more esthetic PFM crowns which were used in high end dental practices.

Position of tooth	Full metal	PFM	All-zirconia	Layered zirconia	Lithium di-silicate	Leucite reinforced glass	Other
Anterior tooth	nil	10%	4%	17%	54%	13%	2%
Posterior tooth	21%	31%	32%	nil	16 %	nil	nil

**Table 1- Frequency distribution of material selection, by tooth**

## DISCUSSION

Choice of the material of single tooth restorations mainly depends on esthetic factors, while the indications for all-ceramic FDPs are more complex and are influenced by mechanical aspects such as the stability and the span of the edentulous gap.<sup>3</sup> With FDPs involved in the spectrum, the length of the edentulous space is the most pivotal factor for the choice of the reconstruction material. Concerning the treatment with FDPs, short (three to four units) and long (five and more units) prostheses need to be distinguished. The longer the edentulous span, steadier the framework required. For this reason, at present zirconia is the solitary all-ceramic alternative to metal frameworks.<sup>14</sup> The results of this study show a higher occurrence of advising of ceramic crowns compared to metal-based crowns. The change in material choice from metal porcelain is possibly due to noteworthy improvements in dental ceramics, patient demands for esthetic ceramics, and the increased cost of fabrication of metal-based crowns.<sup>15</sup> The study results also validate that material choice for single-unit crowns is related with factors other than the clinical presentation of a patient. Usually, these associations are related to practice type, years since graduation, insurance, and practice workload. Variations in materials choice by practice type may be associated with the financial responsibility of the dentist or employer to pay the laboratory costs. For most dental laboratories, all-zirconia or all-lithium disilicate restorations can be accessible at a lesser cost than layered restorations due to the easier fabrication process.<sup>15</sup> A 2015 systematic review of survival rates of single crowns stated that PFM, lithium disilicate, leucite reinforced, and zirconia restorations had statistically comparable 5-year survival rates. The authors suggested that layered zirconia and PFM restorations showed a higher incidence of chipping, however leucite and lithium disilicate materials showed a higher incidence of framework fracture.<sup>16</sup> A decent 5-year clinical success rate of all of these restorative materials suggests that dentists need to decide efficiently so as to match the esthetic and mechanical properties of their restorative materials with the clinical presentation of their patient. This study does have certain limits as the study depended on questionnaire information rather than direct visualization of procedures; consequently, the implications made are based on replies from this questionnaire.

## CONCLUSION

Visual requirements and technical options have to be balanced in each clinical situation. Finally, the material fulfilling most of the factors is chosen as the material of choice. Thus, the material selection can be compared with an area of tension in which the alteration of one parameter may affect all other parameters.<sup>3</sup>

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