

## Original Research Article

# Success Rate of Endocrowns Reported by Dental Practitioners in Riyadh City, Saudi Arabia.

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**Aim of study:** To investigate the success rate for endocrowns done by Saudi doctors. **Materials and Methods:** Survey study contained explanatory questions about the problems of endocrowns a dentist may face, collected from a sample of 100 Dental professionals. The data was subjected to statistical analysis using SPSS version 19. Descriptive as well as inferential statistics were done including frequencies, mean and Chi-square test with the value of significance kept under 0.05. **Results:** Our results showed that there is a statistically significant increase in success rate of endocrowns. **Conclusions:** Within the limits of this study it can be concluded that endocrowns are efficient types of restorations.

**Keywords:** Endocrowns, Restorations, Dental practitioners.

## INTRODUCTION

The Endodontic Crowns are considered as one of many choices to cover a tooth after root canal treatment that has lost a huge amount of tooth structure. These teeth lose their strength after removing the pulp and surrounding dentine. Therefore, it may need intraradicular post with or without a core to strengthen the restoration<sup>1,2</sup>.

To prevent destroying more of the sound tooth structure, the endocrown is considered as an alternative restoration. It combines the intraradicular post, core, and crown in monoblock restoration. It sets and fills the internal part of the pulp chamber and cavity margin depend on that, it can achieve both macro and micro-mechanical lock<sup>3,4,5</sup>. One of the advantages of this type of restorations is the removal of less amount of sound tooth structure and reduces chair time for the patient<sup>6,7</sup>.

## OBJECTIVE OF THE STUDY

The objective of the present study is to evaluate the problems that can affect the efficiency and inference of success rate of endocrowns.

## MATERIALS AND METHODS

This is a survey study.

**Study subject:** Dental senior, interns and doctors of Riyadh Elm University, King Saud University, Segal Private clinics, and

Al Habib Clinics. The target sample size was 100 male and female Doctors and students. The survey contained questions about: Gender, Academic degree, number of failed cases, reasons, fracture resistance compared to Full coverage crowns, bonding, and cost.

**Methods:** A closed-ended questionnaire constructed, Sent through Website links and printed papers used as the survey. The data was subjected to statistical analysis using SPSS version 19. Descriptive as well as inferential statistics were done including frequencies, mean and Chi-square test with the value of significance kept under 0.05.

## RESULTS

This study involved N=100 dental practitioners, which included 60% males and 40% females (figure 1). As far as the academic degree distribution was concerned, 35% were dental interns, 24% were dental seniors and 41% prosthodontists (figure 2).

Table 1 shows the comparisons of survey responses on the basis of gender. It can be noted from the findings that there was no significant difference between males and females when inquired about the number of patients treated by placing endocrown (p-value: 0.621).

Similar findings were reported when inquired about the main problem of endocrowns being secondary caries (p-value: 0.972), endocrowns causing vertical root fracture (p-value: 0.415), endocrowns having long life span (p-value: 0.134),

endocrowns allowing longer life span for RCT (p-value: 0.199), endocrowns costing less than all ceramic crowns (p-value: 0.078) and minimal preparation effecting the bonding (p-value: 0.426).

Slightly different results were observed when the findings compared on the basis of academic degree (table 2). There were significant comparisons observed when inquired the participants about endocrowns having long life span than all ceramic crowns (p-value: 0.044). 17% of the dental seniors strongly disagreed as compared to 0% dental interns and 2% prosthodontists. Additionally, another statistically significant difference was observed when inquired about the endocrowns being less costly than all ceramic crowns (p-value: 0.012). It can be noted from the table that 89% of dental interns disagreed as compared to 66% dental seniors and 90% prosthodontists.

The success rate of endocrown is 99% with a follow-up period for 6 to 18 months. The mean number of teeth is 345

posterior and anterior were included in the assessment done by 41 Prosthodontic Doctors, 24 Dental seniors and 35 Dental interns from (Riyadh Elm University, King Saud University, Segal Private clinics, and AlHabib Clinics and many of Dental clinics in Riyadh) (figure 3).

Failure due to de-bonding of the endocrowns occurred mostly in the 3rd molar for two cases and due to secondary caries for two cases. The analysis of endocrowns fracture strength in anterior and posterior teeth proved considerable differences from conventional methods including intraradicular posts with direct composite resin. Endocrowns provide their preferences than all coverage crowns because of the less destruction of sound tooth structure. The cost of endocrowns is mostly equal to full-coverage crown.

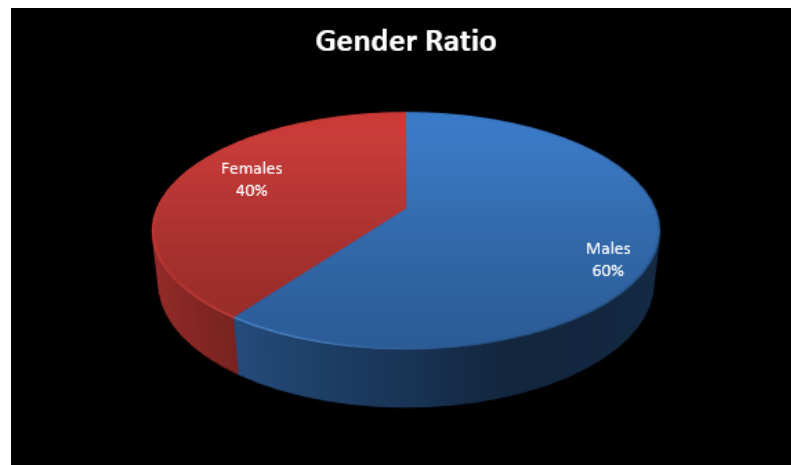


Figure 1: Male to female ratio in this study

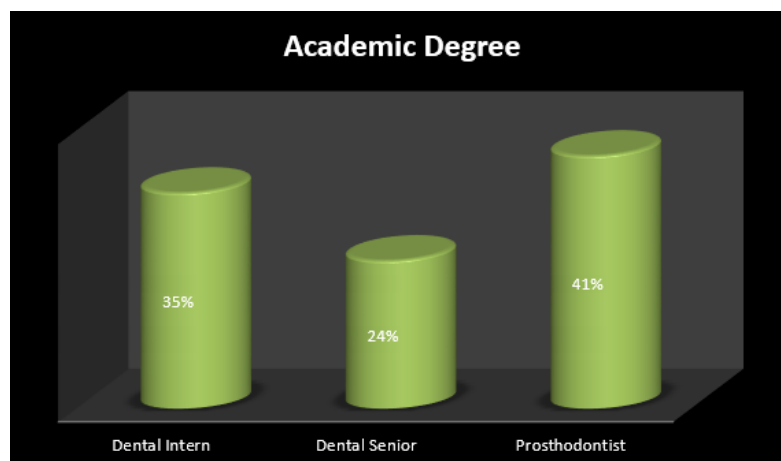


Figure 2: Academic degree of study participants

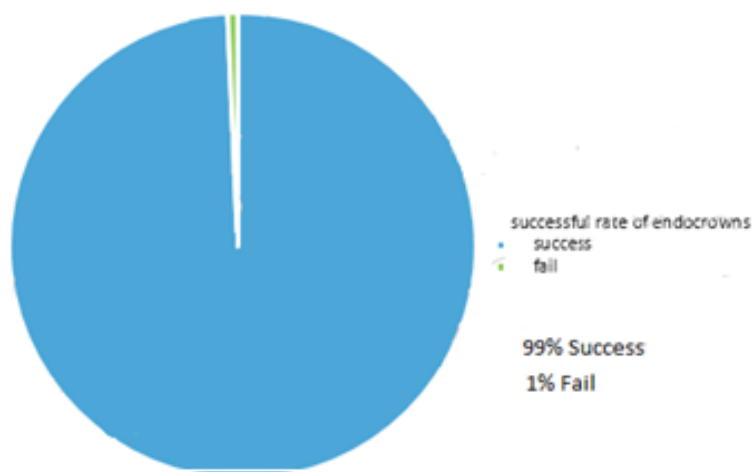


Figure 3: Success rate of endocrowns

Table 1: Survey questions' comparisons on the basis of gender

Survey Questions	Males	Females	P-value
How many patients did you treat by placing EndoCrown in your clinic?	0 – 5: 80% 5-10: 17% 10-15: 4% 15-20: 3%	0 – 5: 88% 5-10: 10% 10-15: 1% 15-20: 0%	0.621
The main problem of EndoCrowns is Secondary Caries.	Strongly disagree: 10% Disagree: 87% Agree: 3%	Strongly disagree: 10% Disagree: 98% Agree: 2%	0.972
Often the Endocrowns Cause Vertical Fracture for the root.	Strongly disagree: 8% Disagree: 92%	Strongly disagree: 5% Disagree: 95%	0.415
Endocrowns have Long Life Span than all Ceramic Crowns.	Strongly disagree: 8% Disagree: 87% Agree: 5%	Strongly disagree: 0% Disagree: 98% Agree: 2%	0.134
EndoCrowns allow longer life span for a RCT tooth rather than All ceramic crowns because it's more conservative.	Strongly disagree: 5% Disagree: 78% Agree: 13% Strongly agree: 4%	Strongly disagree: 0% Disagree: 94% Agree: 6% Strongly agree: 0%	0.199
Endocrowns cost less than All Ceramic Crowns.	Strongly disagree: 2% Disagree: 77% Agree: 12% Strongly agree: 10%	Strongly disagree: 0% Disagree: 96% Agree: 4% Strongly agree: 0%	0.078
Does the minimal preparation effect of bonding and retention?	Strongly disagree: 20% Disagree: 78% Agree: 2%	Strongly disagree: 13% Disagree: 87% Agree: 0%	0.426

**Table 2:** Survey questions' comparisons on the basis of academic degree

Survey Questions	Dental Intern	Dental Senior	Prosthodontist	P-value
How many patients did you treated by placing EndoCrown in your clinic?	0 – 5: 91% 5-10: 9% 10-15: 0% 15-20: 0%	0 – 5: 83% 5-10: 17% 10-15: 0% 15-20: 0%	0 – 5: 76% 5-10: 20% 10-15: 2% 15-20: 2%	0.542
The main problem of EndoCrowns is Secondary Caries.	Strongly disagree: 0% Disagree: 98% Agree: 2%	Strongly disagree: 17% Disagree: 79% Agree: 4%	Strongly disagree: 15% Disagree: 83% Agree: 2%	0.180
Often the Endocrowns Cause Vertical Fracture for the root.	Strongly disagree: 9% Disagree: 91%	Strongly disagree: 13% Disagree: 87%	Strongly disagree: 2% Disagree: 98%	0.278
Endocrowns have Long Life Span than all Ceramic Crowns.	Strongly disagree: 0% Disagree: 97% Agree: 3%	Strongly disagree: 17% Disagree: 79% Agree: 4%	Strongly disagree: 2% Disagree: 96% Agree: 2%	0.044
EndoCrowns allow longer life span for a RCT tooth rather than All ceramic crowns because it's more conservative.	Strongly disagree: 0% Disagree: 8% Agree: 92% Strongly agree: 0%	Strongly disagree: 8% Disagree: 66% Agree: 17% Strongly agree: 8%	Strongly disagree: 2% Disagree: 90% Agree: 8% Strongly agree: 0%	0.061
Endocrowns cost less than All Ceramic Crowns.	Strongly disagree: 0% Disagree: 89% Agree: 11% Strongly agree: 0%	Strongly disagree: 4% Disagree: 66% Agree: 8% Strongly agree: 22%	Strongly disagree: 0% Disagree: 90% Agree: 7% Strongly agree: 2%	0.012
Does the minimal preparation effect of bonding and retention?	Strongly disagree: 11% Disagree: 89% Agree: 0%	Strongly disagree: 25% Disagree: 75% Agree: 0%	Strongly disagree: 17% Disagree: 80% Agree: 3%	0.506

## DISCUSSION

The project of the restorative treatment of molars with a large coronal destruction, a clinical challenge, requires careful planning. That is why the dentist has to decide for the best treatment option to ensure an efficient treatment providing clinical longevity of molars<sup>8</sup>.

The endocrown is convenient for all molars, particularly those with clinically low crowns, calcified root canals, or narrow canals. However, it is not recommended if adhesion cannot be assured if the pulpal chamber is less than 3 mm deep, or if the cervical margin is less than 2mm wide for most of its circumference<sup>9</sup>.

This has been shown to be an advantageous technique as the procedure is easy; it facilitates the steps of impression taking and protects the periodontium. Also, the use of ceramic has the advantages of biocompatibility and biomimicry and its wear coefficient are close to that of the natural tooth. Furthermore, the single interface of a 1-piece restoration makes cohesion look better<sup>10,11</sup>.

The objective of the preparation is to get a wide and stable surface resisting the compressive stresses that are frequent in molars. The prepared surface is parallel to the occlusal plane to provide stress resistance along the major axis of the tooth. The stress levels in teeth with endocrowns were lower than in teeth with prosthetic crowns<sup>12</sup>.

Due to the development of adhesive cementation systems, the need for a retentive preparation for crowns has decreased. In 2018, Dartora et al. evaluated the biomechanical behavior of endodontically treated teeth restored using different extensions of endocrowns inside the pulp chamber; it has concluded that the greater extension of endocrowns provided better mechanical performance. A 5 mm extension presented lower intensity and a better stress distribution pattern than a 1 mm extension which presented a low fracture resistance and a high possibility of rotating the piece when in function<sup>13</sup>.

An *in vitro* study performed by Taha et al. was done to assess the effect of varying the margin designs on the fracture resistance of endodontically treated teeth restored with

polymer-infiltrated ceramic endocrown restorations. The results showed that endocrowns with axial reduction and a shoulder finish line had higher mean fracture resistance values than endocrowns with butt margin design<sup>14</sup>.

It has been also shown that butt joint designs provided a stable surface that resists the compressive stresses because it is prepared parallel to the occlusal plane.

In 2012, Biacchi and Basting compared the fracture strength of 2 types of full ceramic crowns: indirect conventional crowns retained by glass fiber posts and endocrowns. They came to the conclusion that endocrowns were more resistant to compressive forces than the first ones. More recently, finite element analysis highlighted the role of endocrowns in stress distribution<sup>15</sup>.

According to Schultheis et al., endocrown seems to be a more reliable alternative for posterior load bearing teeth, where as a bilayer configuration is more susceptible to reduce load fracture failure. As stated by Biacchi et al., endocrowns procure adequate function and esthetics and preserve the biomechanical integrity of nonvital posterior teeth. The restoration is reported to be less exposed to the adverse effects of degradation of the hybrid layer<sup>16</sup>.

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A research comparing equivalent stresses in molars restored with endocrowns as well as posts and cores during masticatory simulation using finite element analysis revealed that teeth restored by endocrowns are potentially more resistant to failure than those with FRC posts. This study also showed that under physiological loads, ceramic endocrowns ideally cemented in molars should not be damaged or debonded<sup>17</sup>.

## CONCLUSIONS

Endocrowns prove to be better than full crown coverage and better fracture resistance than composite restoration. It avoids the tooth a large destructive preparation as compared to full crown coverage. From the financial aspect, Endocrowns are almost equal full crown coverage in many of Riyadh city clinics. However, the study shows the importance of choosing the cases that are suitable for endocrowns, importance of the proper preparation and ensure good isolation during cementing to get the best results.

## CONFLICT OF INTEREST

There is no conflict of interest among the authors of this study.

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