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KNOWLEDGE, AWARENESS, AND INFLUENCING FACTORS IN THE USE OF ENDOCROWN AND CONVENTIONAL CROWN FOR ENDODONTICALLY TREATED TEETH

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Abstract

Introduction: Endodontically Treated Teeth (ETT) may experience a decrease in mechanical strength, leading to increased fragility and susceptibility to fractures primarily caused by the loss of tooth structure integrity when restoring ETT. It's important to consider the (remaining tooth structures, tooth position, occlusal forces, and aesthetics) which typically requires the use of a traditional post and core foundation along with a crown or endocrown system. The purposes of this study to determine prevalence and preference for use of endocrown and conventional crown in endodontically treated teeth and to assess knowledge, including comparisons of endocrown and conventional crown, in endodontically treated teeth among Saudi Arabia dentists.

Methodology: This study is of a cross-sectional design, conducted in Saudi Arabia from July to November 2024. Through social media platforms like Twitter, WhatsApp, Telegram, Instagram and Snapchat, this study attempts to recruit participants. Included were dental practitioners from all provinces of the Kingdom of Saudi Arabia, who performed endocrown and conventional crowns in their practice, and dentists willing to participate in the study and filled a detailed questionnaire. Dentists who have had neither experience with endocrown nor conventional crowns were excluded as criteria.

Results: The finding of significant insights in the knowledge and awareness of endocrown vs conventional crowns in endodontically treated teeth are highlighted in this cross-sectional study of 517 dentists in Saudi Arabia. We found that 89.2% of participants were aware of endocrown; however, 75% of participants showed low knowledge levels of endocrown application. Endocrown were considered less conservative by 79.7% of respondents, who however expressed concern about technique sensitivity

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http://magellanes.com/

and possible complications. While 60.5 percent of participants confident in doing endocrown.

Conclusion: Though, this study demonstrates a high awareness of the use of endocrown among Saudi dentists, they also indicated the lack of knowledge regarding their applications. Endocrown are being adopted while it is still preferred to have the conventional crown, but little change from traditional practices is occurring due to familiarity and fear of complications. Enhanced educational initiatives are essential to bridge this knowledge gap, ultimately improving clinical practices in endodontics across Saudi Arabia.

Keywords: Endodontically treated teeth, Restoration, Endocrown, Conventional crown.

Introduction:

Endodontically Treated Teeth (ETT) may experience a decrease in mechanical strength, leading to increased fragility and susceptibility to fractures primarily caused by the loss of tooth structure integrity when restoring ETT [1]. It's important to consider the (remaining tooth structures, tooth position, occlusal forces, and aesthetics) which typically requires the use of a traditional post and core foundation along with a crown or endocrown system [2].

The endocrown is a minimally invasive restorative option that substitute the need for a separate post and core build-up, because it's described as single-piece restorations with an internal extension into the pulp chamber, their priority lies in the fact that they necessitate less removal of root dentin for placement of the retainer, it preserves more of the tooth's integrity and ultimately decreasing the chances of root weakening and perforation that help in reducing the risk of fracture by using the natural tooth structure for support, and detraction bacterial infiltration in comparison to posts which is making this option of treatment more efficient and cost-effective [1,3].

The endocrown technique was invented by Pissis, who referred to it as the "mono-block porcelain technique." 1999 [4]. The term "endocrown" was originally described for the first time by Bindle and Mörmann to refer to adhesive endodontic crowns, which are whole porcelain crowns that are fixed on posterior teeth that have undergone endodontic treatment [5]. The pulpal walls would give micromechanical retention for these crowns, which would be anchored to the inner of the pulp chamber and on the cavity borders. Adhesive cementation would be used to achieve micromechanical retention. This approach is especially useful when there is significant crown tissue loss, there is little interproximal space, and traditional post-and-crown rehabilitation is not achievable due to insufficient ceramic thickness [6].

When compared to conventional crowns, endocrowns are easy to apply and require a short clinical time, low cost, short preparation time, ease of application, less chair time and aesthetic properties are the advantages of endocrowns [7]. Furthermore, in teeth with short or atresia clinical crowns and calcified, curved, or short root canals that prevent post application, endocrowns offer an alternative [8]. Teeth restored with endocrowns may be more resilient to failure than teeth replaced with fiber-reinforced posts, according to a study using 3D Finite Element Analysis of molars treated with endocrowns and

ISSN:1624-1940
http://magellanes.com/

posts during masticatory simulation [9].

In 2022, research has been published on endodontically teeth restoration assessment and decision making, nearly 60.2% of the study subjects consented to place a post following each endodontic treatment. A little over 61.9% lack confidence in performing endocrowns, and 69% did not go to any workshops on the subject [10]. Another study showed out of the 180 dentists in the sample, 148 dentists completed the survey (response rate: 82%). Generally, Posts were reported to be used for indirect restorations more frequently (51%) than for direct restorations (21%). The majority of dentists preferred fiber posts over metal posts and combined post [11]. Similar result in 2018 research appears majority of participants in this study did not believe that ETT should place a post, but should be crowned, and All-ceramic crowns were the best option, according to most of them [12]. The available data on the preferences of Saudi Arabian dentists regarding endocrowns versus conventional crowns is limited. Additionally, the existing studies have small sample sizes.

Objectives:

This study aims to assess knowledge, awareness regarding comparing endocrown and conventional crown in endodontically treated teeth among dentists in Saudi Arabia and to establish prevalence and preference of using endocrown and conventional crown in endodontically treated teeth among dentists in Saudi Arabia.

Methodology:

Study design and Setting:

This is a cross-sectional study, conducted in Saudi Arabia from July – November 2024 to compare between endocrown and conventional crown in knowledge, awareness, prevalence, and preference in EET among dentist in Saudi Arabia. To recruit participants from across Saudi Arabia, a sampling strategy was employed using social media platforms (e.g., Twitter, WhatsApp, Telegram, Instagram, and Snapchat).

Sample size:

Data collection started in July 2024. A target sample size of at least 384 participants was used for data collection (confidence level: 95%; margin of error: 5%).

The sample size was predicted using the formula:

$n = P(1-P) * Z\alpha\ 2 / d\ 2$ with a 95% confidence level.

n: Calculated sample size.

Z: The z-value for the selected level of confidence (1- a) = 1.96.

P: An estimated prevalence of knowledge.

Q: (1 – 0.50) = 50%, i.e., 0.50.

D: The maximum acceptable error = 0.05.

Therefore, the calculated minimum sample size was: n = (1.96)2 X 0.50 X 0.50/(0.05) 2 = 384.

ISSN:1624-1940
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Inclusion and Exclusion criteria:

The inclusion criteria were dental practitioners from all provinces of the Kingdom of Saudi Arabia, who performed both endocrown and conventional crowns in their practice, and dentists who consent to participate in the study and complete a detailed questionnaire. Exclusion criteria were dentists who have not performed both endocrown and conventional crowns.

Method for data collection, instrument and score system:

The study tool was a structured questionnaire based on studies conducted in Saudi Arabia [2,13]. The data were collected via a questionnaire administered to practitioners to determine their knowledge, awareness, and preferences regarding endocrown versus conventional crowns in endodontically treated teeth. The questionnaire was disseminated in five parts in English. In addition to providing a concise overview of the study's objectives, the questionnaire included a series of 35 questions.

The first part of the questionnaire covered demographic features such as gender, experience, and workplace. The second part contained questions about the participants' knowledge of endocrown and conventional crowns. The third part addressed awareness regarding the comparison of endocrown with conventional crowns in endodontically treated teeth. The fourth part asked participants about their preferences between endocrown and conventional crowns in endodontically treated teeth. The fifth and final part of the survey included questions about the prevalence of using endocrowns and conventional crowns in endodontically treated teeth.

Scoring system:

In all, 35 statements served to assess the participants' degree of knowledge, awareness, preference, and prevalence: 6 statements for demographics, 13 questions for knowledge, 5 questions for awareness, 5 questions for preference, and 6 questions for prevalence. One point was given for correct answers, and zero points were given for incorrect answers or "I don't know". For scoring, we utilized Likert scales (Dichotomous, Three Point, and Quality Scales). The maximum score was 18 (for knowledge and awareness questions) and divided as follows: The original Bloom's cut-off points, 80.0%-100.0%, 60.0%-79%, and 59.0%. The participants were divided into three groups based on their scores.

Knowledge question scores varied from 0 to 13 points and were classified into three levels as follows: those with a score of 8 or below (≤ 8) were classified as having a **low level of knowledge**, those with scores between 9 and 10 as having a **moderate level of knowledge**, and those with scores of 11 or above (≥ 11) as having a **high level of knowledge**.

Awareness question scores varied from 0 to 5 points and were classified into three levels as follows: those with a score of 2 or below (≤ 2) were classified as having a **low level of awareness**, those with a score of 3 (= 3) as having a **moderate level of awareness**, and those with scores of 4 or above (≥ 4) as having a **high level of awareness**.

ISSN:1624-1940
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Pilot test:

The questionnaire was distributed on 20 participants and asked to fill it. This was done in order to assess the study's feasibility and the ease of use of the questionnaire. Data from the pilot study were not included in the study's final data and analysis.

Analyzes and entry method:

The Microsoft Excel (2023) Windows program was used to enter the collected data on the computer. The statistical package for social science software, version 25, was then used to receive the data to undergo statistical analysis.

Results:

Table (1) displays various demographic parameters of the participants with a total number of (517). It is noteworthy that the distribution to the practice areas is very concentrated in the South (28.4%) and the West (31.7%), possibly reflecting practice area dynamics or population density among the population that practices. Perhaps tapping into a broader tendency towards female professionals in the dental field, a majority of the 57.3% belong to the gender category of females. Furthermore, most of respondents (56.3%) work in government organizations which suggests that public dental health endeavours may be impacted by the majority of respondents. Dental practitioners are shown to be primarily general dentists at 51.3% and are a substantial proportion of students and interns (36.6%), clearly indicating a strong educational pipeline. The data also suggests that a majority has less than 5 years of experience (77.4%) which might indicate a young dental profession with regard to practice styles and approaches to treatment and how dental professionals develop their work.

Table (1): Sociodemographic characteristics of participants (n=517)

Parameter		***No.***	***Percent (%)***
Practice area	North	26	5.0
	South	147	28.4
	Central	93	18.0
	East	87	16.8
	West	164	31.7
Gender	Female	296	57.3
	Male	221	42.7
Main workplace	Government	291	56.3
	Private	226	43.7
Dental practitioner type	Student \ Intern	189	36.6
	General dentist	265	51.3
	Specialist \ Consultant	63	12.2
Years of experience	<5 years	400	77.4
	5-8 years	74	14.3
	>8 years	43	8.3

ISSN:1624-1940
http://magellanes.com/

As shown in figure 1, A total of 517 patients were used to present the data providing insight into the trends of indications for Endocrown usage in restorative dentistry. A notable number of 51.5% (262 individuals) had moderate tooth structure loss implying that endocrown are indicated most for a case requiring a high degree of restoration of dental tissue. Furthermore, extending this concept, 34.2% (177 patients) had extensive loss of tooth structure, corroborating the value of endocrowns in treating highly traumatic structural deficits. In contrast, only 15.1% (78 individuals) had minimum loss of tooth structure, and endocrowns can, albeit to a lesser extent, be used in milder cases, but their primary use is in cases with greater need for restoration.

Figure (1): Illustrates indication of using Endo crown among participants.

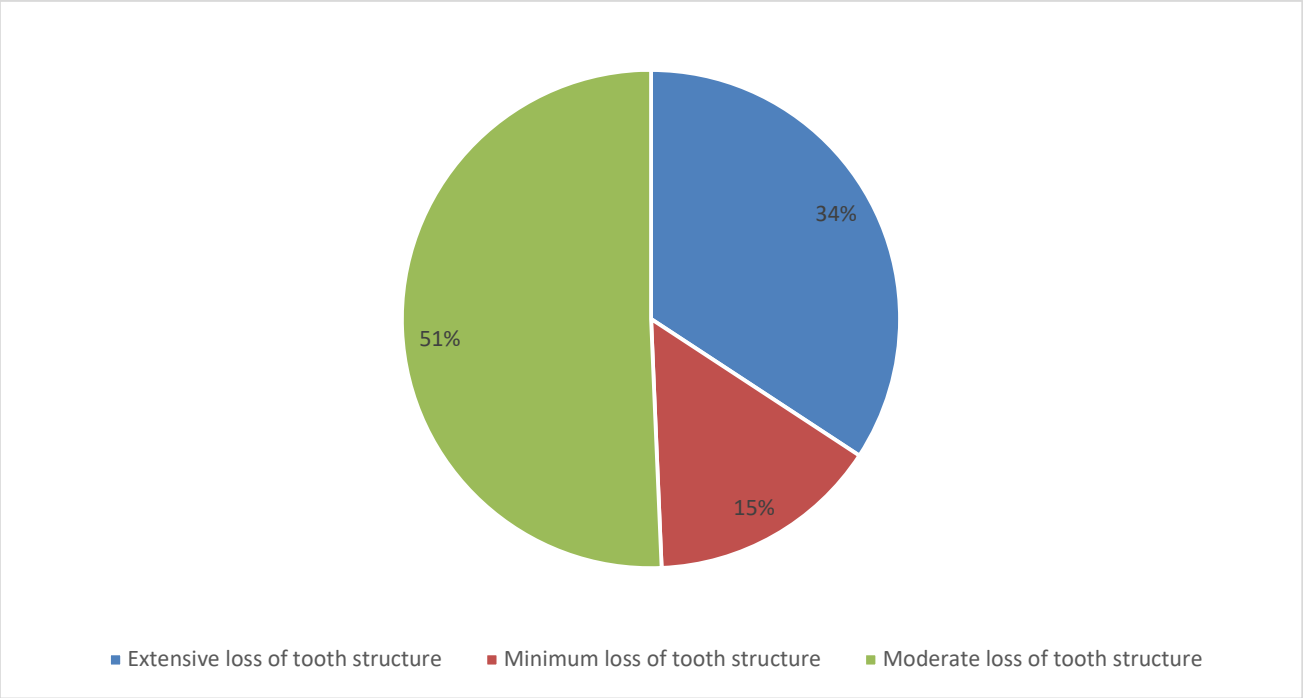

Table 2 provides interesting observations on how endocrowns compare with conventional crowns for endodontically treated teeth. There is an extensive majority of 89.2 percent that is aware of the endocrown concept. 50.7 per cent of respondents indicated that use of endocrown was primarily indicated for cases with moderate loss of tooth structure and the use was indicated for conserving tooth structure. Interestingly, 84.7% of the participants said that molars are the most common application for endocrowns despite the fact that 39.1% of the participants were concerned with secondary caries and 42.6% were concerned with vertical fractures. In addition, 63.6% concurred that minimal preparation undermines bonding as well as retention, which highlights the clinical significance of preparation techniques. In general, 79.7% felt endocrowns were a more conservative approach, and that this perceived increased conservatism may be caused by an increasing awareness of the potential benefits of endocrowns in clinical practice but coupled with concerns regarding technique sensitivity.

Table (2): Parameters related to knowledge of the use of Endo crown vs. conventional crown for endodontically treated teeth (n=517).

Parameter	***No.***	***Percent (%)***

ISSN:1624-1940
http://magellanes.com/

Are you knowledgeable about the concept of endocrown?	No	56	10.8
	Yes	461	89.2
What is the indication of using endocrown?	Extensive loss of tooth structure	177	34.2
	Minimum loss of tooth structure	78	15.1
	Moderate loss of tooth structure	262	50.7
The Endo crown is used for?	Anterior teeth	50	9.7
	Premolars	29	5.6
	Molars	438	84.7
The main problem of Endo crown is secondary caries?	Yes	202	39.1
	No	166	32.1
	I do not know	149	28.8
Often the Endo crown cause vertical fracture for the root?	Yes	220	42.6
	No	138	26.7
	I do not know	159	30.8
Endo crowns allow longer life span for a RCT tooth rather than conventional crown because it's more conservative?	Yes	304	58.8
	No	101	19.5
	I do not know	112	21.7
Does the minimal preparation effect of bonding and retention?	Yes	329	63.6
	No	107	20.7
	I do not know	81	15.7
Endo crown de bonding is one of the main causes of restoration failures?	Yes	342	66.2
	No	56	10.8
	I do not know	119	23.0
Endo crown preparation is difficult in comparison to conventional crown preparations?	Yes	145	28.0
	No	292	56.5
	I do not know	80	15.5
Endo crown preparations and impressions making are more time consuming in comparison to conventional crown preparations?	Yes	151	29.2
	No	273	52.8
	I do not know	93	18.0
Can endocrown be an alternative to conventional crown?	Yes	309	59.8
	No	117	22.6
	I do not know	91	17.6
More conservative option?	Endocrown	412	79.7
	Conventional crown	105	20.3
Which is more technique sensitive and more difficult?	Endocrown	273	52.8
	Conventional crown	244	47.2

As shown in figure (2), Several important advantages of endocrowns over conventional crowns are illuminated in the data from the 517 surveyed participants. Their completion of procedure was noted by a significant minority, 78 people or about 15% of the sample, as requiring minimal amount of time to complete the procedure. Another 112, or just under 22 percent, acknowledged that implementing endocrowns was not overly time consuming. Cost efficiency was also noted, with 24 participants (or

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about 5% of the cohort) stating that this treatment option was more cost efficient. Interestingly, and significantly, a whopping 303 (or approximately 59%) people found all these benefits clearly outweigh the advantages of traditional crowns and hence endorse the superiority of endocrowns.

Figure (2): Illustrates the advantage of endocrown over conventional crown among participants.

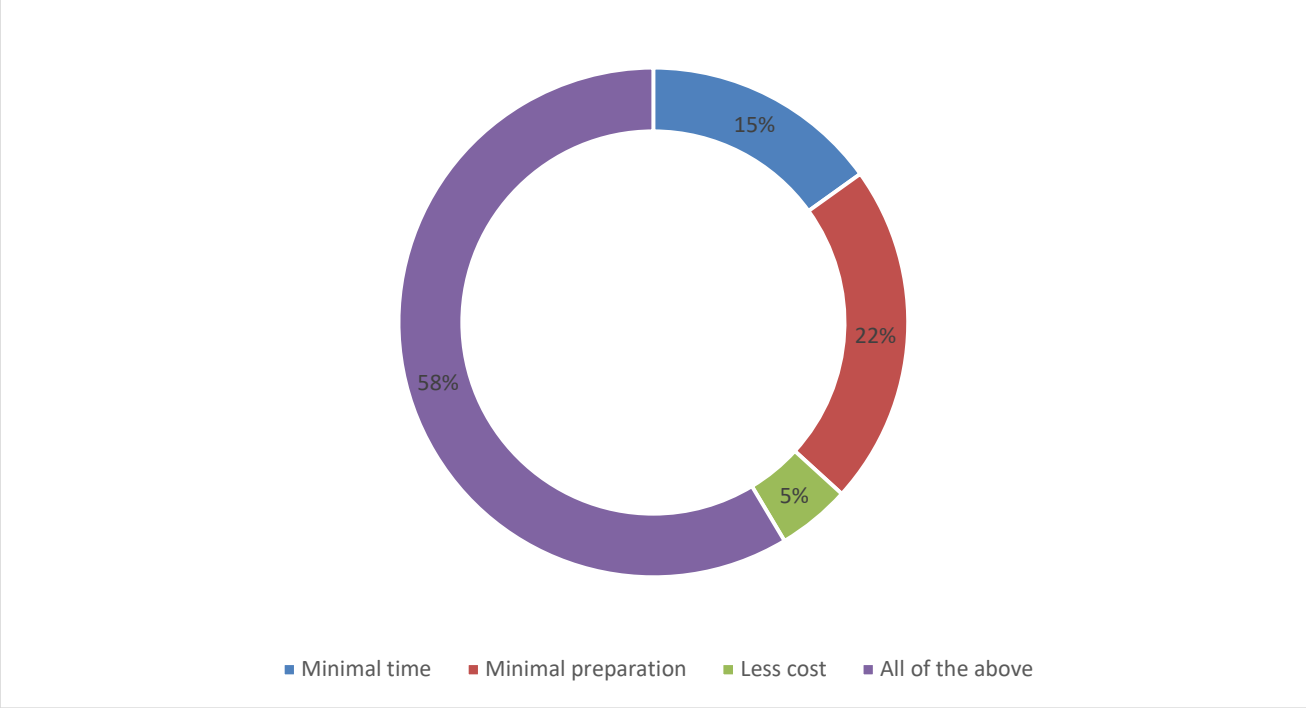

Table 3 presents the data that provides interesting thoughts about the use of endocrowns versus conventional crowns on endodontically treated teeth, in terms of awareness and preferences by the patients. Significant majority of respondents (45.3%) assert that endocrowns are cheaper than conventional crowns since they are getting more aware of cost advantage of endocrowns in clinic practice. This familiarity is the result of an undergraduate education (63.8%) illustrating the significance of early education on shaping practitioners' perceptions. Further reinforcing the preference especially for endocrowns is the overwhelming acknowledgement (58.6 percent) of their advantages, chiefly with minimal preparation requirements. Further indications of caution amongst practitioners are expressed around possible disadvantages particularly de-bonding (33.5%) and root fractures (11%). Finally, the data bears out a significant disparity in practical application, as 60 percent of participants prefer classical crowns for posterior restorations. However, a large confident majority (60.5%) is willing to perform the endocrown procedures, indicating a trend toward their increased use within the clinical setting.

Table (3): participants' awareness and preference of the use of Endo crown vs. conventional crown for endodontically treated teeth (n=517).

Parameter	*No.*	*Percent (%)*

ISSN:1624-1940
http://magellanes.com/

Endocrown cost less than conventional crown?	No	123	23.8
	Yes	234	45.3
	I do not know	160	30.9
How did you get familiar with endocrown? *	Undergraduate studies	330	63.8
	Postgraduate studies	128	24.8
	Daily Practice	170	32.9
	Social media	202	39.1
	Articles	152	29.4
Advantage of endocrown over conventional crown?	Minimal time	78	15.1
	Minimal preparation	112	21.7
	Less cost	24	4.6
	All of the above	303	58.6
Disadvantage of endocrown?	De-bonding	173	33.5
	Root fracture	57	11.0
	Both A & B	287	55.5
In which clinical scenario is the utilization of endocrown favored above the standard approach of conventional crowns?	Enough inter-arch space	219	42.4
	Limited inter-arch space	298	57.6
Usually how do you restore posterior endodontically treated tooth?	Conventional crown	310	60.0
	Endocrown	147	28.4
	Others	60	11.6
In your opinion, which is more costly?	Endocrown	202	39.1
	Conventional crown	315	60.9
Confidence in doing endocrown?	No	204	39.5
	Yes	313	60.5
Previous workshop on endocrown?	No	290	56.1
	Yes	227	43.9
Do you follow specific guidelines or protocols when deciding between endocrown and conventional crown?	No	124	24.0
	Yes	393	76.0

Results may overlap

Table 4 presents valuable data for dental professionals on the preferences and practices of the restoration of endodontically treated teeth with endocrowns versus conventional crowns. Notably, on the order of 6 times (61.7%) of participants reported performing fewer than 6 endodontic treatments each month, suggesting that a significant proportion of the sample may involve practitioners with reasonably small cases. Additionally, there is prevalence of the traditional crown preferred, as 26.1% reported using them 76–100% of their restored teeth endodontically treated, to only 12.4% of respondents who are using endocrowns in the same fashion. The remaining tooth structure (70.9%) and anatomical (63.4%)

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considerations are primarily factors influencing restoration choices, indicating that clinical judgment matters based on patient circumstance. The results further show that when endocrowns are being adopted, especially among these treating fewer cases, there is still significant incidence (47.6%) of practitioners that sometimes encounter contraindications to their use demonstrating that endocrowns are being used with caution.

Table (4): participants' prevalence of the use of Endo crown vs. conventional crown for endodontically treated teeth (n=517).

Parameter		***No.***	***Percent (%)***
How frequently do you perform endodontic treatments monthly?	0-5	319	61.7
	6-10	41	7.9
	11-15	64	12.4
	16-20	14	2.7
	More than 20	79	15.3
What percentage of your endodontically treated teeth do you restore with endocrowns?	0%	177	34.2
	1-25%	167	32.3
	26-50%	69	13.3
	51-75%	40	7.7
	76-100%	64	12.4
What percentage of your endodontically treated teeth do you restore with conventional crowns?	0%	72	13.9
	1-25%	118	22.8
	26-50%	91	17.6
	51-75%	101	19.5
	76-100%	135	26.1
What factors influence your choice between endocrowns and conventional crowns for endodontically treated teeth? (Select all that apply) *	Tooth location (anterior vs. posterior)	328	63.4
	Amount of remaining tooth structure	367	70.9
	Patient's aesthetic concerns	151	29.2
	Cost considerations	212	41.0
	Clinical evidence and literature	233	45.1
	Personal experience and outcomes	212	41.0
	Other (please specify)	63	12.2
How many patients approximately did you treat by placing endocrowns in your clinic?	0-5	322	62.3
	6-10	35	6.8
	11-15	63	12.2
	16-20	19	3.7
	More than 20	78	15.1
How often do you encounter cases where endocrowns are contraindicated and you option	Never	83	16.1
	Rarely	104	20.1

ISSN:1624-1940
http://magellanes.com/

for conventional crowns instead?	Sometimes	246	47.6
	Often	61	11.8
	Always	23	4.4

****Results may overlap***

Table 5 gives justification to the knowledge levels regarding the use of endocrowns versus conventional crowns on endodontically treated teeth by dentists. Significantly, a total of 75.0% of respondents were at a low knowledge level, indicating a large knowledge and applicability gap for advanced restorative techniques. In contrast, only 10.4% had high knowledge and 14.5% moderate knowledge.

Table (5): Shows knowledge of the use of endocrown vs. conventional crown for endodontically treated teeth among dentists score results.

	Frequency	**Percent**
High knowledge Level	54	10.4
Moderate knowledge	75	14.5
Low knowledge level	388	75.0
Total	517	100.0

Table (6) depicts the differences in the level of awareness as perceived by dentists regarding the use of endocrowns over conventional crowns for endodontically treated teeth. In contrast, a very large part, 40.2%, showed low awareness levels. More so, only 35.2% of the surveyed dentists had a very high level of awareness. This indicates a major 'black hole' in knowledge about potentially the clinical decision and patient outcomes. The awareness of dentists was moderate for 24.6% of dentists.

Table (6): Shows awareness of the Use of endocrown vs. conventional crown for endodontically treated teeth among dentists score results.

	Frequency	**Percent**
High awareness level	182	35.2
Moderate awareness	127	24.6
Low awareness level	208	40.2
Total	517	100.0

Table (7) shows that knowledge of the use of endocrown has statistically significant relation to practice area (P value=0.001), main workplace (P value=0.011), dental practitioner type (P value=0.0001), and years of experience (P value=0.005). It also shows statistically insignificant relation to gender.

Table (7): Relation between knowledge of the use of endocrown and sociodemographic characteristics.

Parameters		***Knowledge level***		***Total (N=517)***	***P value****
		High or moderate knowledge level	**Low knowledge level**		
Gender	Female	81	215	296	0.142

ISSN:1624-1940
http://magellanes.com/

		62.8%	55.4%	57.3%	
	Male	48	173	221	
		37.2%	44.6%	42.7%	
Practice area	North	4	22	26	0.001
		3.1%	5.7%	5.0%	
	South	56	91	147	
		43.4%	23.5%	28.4%	
	Central	21	72	93	
		16.3%	18.6%	18.0%	
	East	18	69	87	
		14.0%	17.8%	16.8%	
	West	30	134	164	
		23.3%	34.5%	31.7%	
Main workplace	Government	85	206	291	0.011
		65.9%	53.1%	56.3%	
	Private	44	182	226	
		34.1%	46.9%	43.7%	
Dental practitioner type	Student \ Intern	75	114	189	0.0001
		58.1%	29.4%	36.6%	
	General dentist	50	215	265	
		38.8%	55.4%	51.3%	
	Specialist \ Consultant	4	59	63	
		3.1%	15.2%	12.2%	
Years of experience	<5 years	109	291	400	0.005
		84.5%	75.0%	77.4%	
	5-8 years	18	56	74	
		14.0%	14.4%	14.3%	
	>8 years	2	41	43	
		1.6%	10.6%	8.3%	

****P value was considered significant if ≤ 0.05.***

Table (8) shows that aawareness of the use of endocrown has statistically significant relation to practice area (P value=0.0001), dental practitioner type (P value=0.0001), and years of experience (P value=0.0001). It also shows statistically insignificant relation to gender and main workplace.

Table (8): Awareness of the use of endocrown in association with sociodemographic characteristics.

Parameters		***Awareness level***		***Total (N=517)***	***P value****
		High or moderate awareness	**Low awareness level**		
Gender	Female	167	129	296	0.072
		54.0%	62.0%	57.3%	
	Male	142	79	221	
		46.0%	38.0%	42.7%	

ISSN:1624-1940
http://magellanes.com/

Practice area	North	13	13	26	0.0001
		4.2%	6.3%	5.0%	
	South	83	64	147	
		26.9%	30.8%	28.4%	
	Central	64	29	93	
		20.7%	13.9%	18.0%	
	East	37	50	87	
		12.0%	24.0%	16.8%	
	West	112	52	164	
		36.2%	25.0%	31.7%	
Main workplace	Government	172	119	291	0.728
		55.7%	57.2%	56.3%	
	Private	137	89	226	
		44.3%	42.8%	43.7%	
Dental practitioner type	Student \ Intern	90	99	189	0.0001
		29.1%	47.6%	36.6%	
	General dentist	165	100	265	
		53.4%	48.1%	51.3%	
	Specialist \ Consultant	54	9	63	
		17.5%	4.3%	12.2%	
Years of experience	<5 years	213	187	400	0.0001
		68.9%	89.9%	77.4%	
	5-8 years	57	17	74	
		18.4%	8.2%	14.3%	
	>8 years	39	4	43	
		12.6%	1.9%	8.3%	

P value was considered significant if ≤ 0.05.

Discussion:

The objective of this discussion was to describe the findings concerning dentists' knowledge, awareness, and preferences regarding endocrowns vs. conventional crowns for endodontically treated teeth. The primary aim of this study was to survey these variables among dental practitioners in Saudi Arabia, in order to gain a better idea of the restorative practices still realized in terminotherapy. With the increase in adoption of endocrowns as a viable alternative to traditionally placed crown restorations, it is imperative to evaluate the findings in terms of what literature exists.

The results from the present study show high awareness of the concept of endocrowns among surveyed dentists with 89.2% of respondents were aware of it. This finding is congruent with previous research indicating increasing acceptance for the use of endocrowns as a conservative treatment option for endodontically treated teeth. For example, Chen et al. found that endocrowns possess success rates comparable to conventional crowns and as a result have accepted their use in clinical practice [14]. In addition, Bozkurt et al. highlighted the mechanical superiority of endocrowns over their post and core counterparts, and the growing understanding and acceptance of the restorative approach [15].

Functional crowns, although well known, exhibited low knowledge levels with 75% being low knowledge. However, if dentists are aware of endocrowns, the current understanding of indications, technique and possible benefits is still limited. This finding is in line with what Thapa and Shubham

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observed — that many practitioners lack confidence in the performance of endocrown procedures because of insufficient training and exposure [16]. According to the literature, regarding the education is important because educational initiatives can improve knowledge and skills about endocrowns, regarding clinical outcomes and use of this restorative technique [17]. The study also reported that 60% of participants would choose conventional crowns in posterior restorations and would be willing (60.5%) to perform endocrown procedures. This is a trend towards clinical practice, because it may lead dentists to start using endocrowns in their dental practice, especially as practice with endocrowns improves with gaining experience and confidence in the use of them. Similar to these studies, a growing acceptance of endocrowns by practitioners has been previously reported with many agreeing with their use to preserve tooth structure and shorten treatment times [18, 19]. Nevertheless, participants in this study anticipated secondary caries and vertical fractures with endocrowns, and this may explain their reluctance to use endocrowns instead of conventional crowns.

Results of factors influencing restoration choices (such as remaining tooth structure and anatomical considerations) confirm importance of clinical judgment when determining the restorative option. The findings of this align with that of Seddik and Derelioğlu, who contend that restorative dentistry decisions are subject to the clinical situation and the practitioner's experience [20]. Additionally, the study's demographic analysis reported a majority of early career dentists, who may routinely influence their treatment preference and treatment approach. As Alhelal [21] notes, restorative dentistry evolves, and requires that education and mentorship continue to maintain a pipeline for younger practitioners to receive the skills and knowledge to make them better informed about endodontic restorations.

With its limitations in mind, the study offers some valuable information on dentists' knowledge and preferences on regards to endocrowns. The cross-sectional design may not allow the causal relationships between knowledge, awareness and restoration preferences to be established. They may also rely on self-reported data, which introduces a bias as people may over estimate their knowledge or awareness levels. Besides, most of the study's sample included dentists belonging to certain areas of Saudi Arabia, whose numbers might not reflect the entire representation of the country's dental community. Future research should seek to include a larger sample, and use longitudinal designs, to better understand the factors that influence the use of endocrowns for clinical practice.

Conclusion:

Finally, this study concludes that there is a need for targeted educational efforts improving dentists' understanding and self-confidence regarding endocrowns as a restorative treatment for endodontically treated teeth. Awareness for endocrowns is high, but many questions remain to be answered to enable their wider uptake. Regardless of the evolution within the dental community, it is important to establish a learning and collaborating environment for improvement of clinical outcomes for the patients who need endodontic restorations.

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Ethical approval

An informed consent was obtained from each participant after explaining the study in full and clarifying that participation is voluntary. Data collected were securely saved and used for research purposes only.

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Conflict of interests

The authors declare no conflict of interest.

Informed consent:

Written informed consent was acquired from each individual study participant.

Data and materials availability

All data associated with this study are present in the paper.

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