

## Evaluating the Basic Knowledge and Techniques of Dentists about Restoring Endodontically Treated Teeth in Saudi Arabia

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### Abstract

**Purpose:** To evaluate the basic knowledge and awareness of dental practitioners in Saudi Arabia in restoring endodontically treated teeth.

**Methods:** A cross-sectional study was performed by sending form of questionnaires through e-mail to all practitioners in private and government hospitals in Saudi Arabia during the period from November 2014 to April 2015. The questionnaire distributed to participants was written in English, and translated to Arabic and reviewed by some prosthodontics.

**Results:** From 293 questionnaires sent to dentists registered in the Saudi dental society, 229 completed the survey (response rate 79%). Respondents from private to governmental sectors were about 46% to 64% respectively. Ninety-Four male and 74 female dentists restore more than 30 endodontically treated teeth (ETT) per year. Dentists who were 50 years of age or older were less likely to restore more than 30 ETT per year. (P-value=0.006).

**Conclusion:** Dental practitioners differed in the levels of knowledge related to materials and techniques practiced by practitioners in restoring ETT. Since restoring ETT is still controversial, knowledge of the related new philosophies and techniques should be updated.

**Keywords:** Dental practitioners, Restoring, Endodontically Treated Teeth

### Introduction

The chances of retaining badly damaged teeth increase with endodontic treatment. Restoring such teeth is still complex and controversial [1]. The most common method for treating such compromised teeth after endodontic treatment is to apply post and core [2]. Restorative dentists must follow certain protocols to enhance the overall survival rate of ETT.

Currently, restorative dentists of various nationalities with different educational background are working in Saudi Arabia either in private or in government hospitals. Therefore, evaluating the different philosophies and techniques applied by dentists in restoring ETT is crucial for reducing failure rates and ensuring a high standard of care for patients. Subsequently, establishing a plan to raise the awareness and understanding of dental practitioners is necessary for providing an acceptable quality of dental treatment that benefits society.

Previous studies had evaluated the practice followed in restoring ETT in the United States and United Kingdom Morgano, et al. (1994) and Hussey (1995) respectively. In Saudi Arabia, Al Fouzan (2010) found that general dental practitioners rather than specialists perform most ETT. It is expected that numerous dental practitioners apply post-and-core systems to ETT based on the belief that inserting posts will reinforce these teeth [3,4]. Other studies were performed in different areas of Saudi Arabia, but no studies targeting both general practitioners and Prosthodontics have been conducted in the eastern province or elsewhere in the nation. Therefore, this study focuses on the practices and approaches of both general practitioners and prosthodontics in Saudi Arabia.

Advancing the knowledge of dentists in Saudi Arabia is crucial, particularly regarding the factors involved in selecting the best type, length, size, and techniques of post-and-core systems. Achieving the aim of this study may maximize the functioning

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levels of endodontic treatment in Saudi Arabia by updating the knowledge found in relevant literature and addressing long-term objectives to reduce the failure post-and-core cases

## Material and Methods

The research was based on a cross-sectional study in the form of questionnaires distributed by e-mail to all practitioners in private and government hospitals in Saudi Arabia during the period from November 2014 to April 2015. Participants included in the study were general practitioners and specialists restoring ETT in private and government hospitals in Saudi Arabia. The Saudi Dental Society provided the list of these dentists.

Ethical approval was obtained from the scientific research committee at College of Dentistry-University of Dammam. Detailed information about the study, as well as its purpose and techniques, was also included. No participants were excluded based on gender or other socio-demographic criteria; however, each dentist must currently be restoring at least 30 ETT annually.

Dentists were asked about their opinion regarding three philosophies: 1) Do you believe that every ETT must receive a post? 2) Do you believe that a post will reinforce an ETT and reduce the chance of fracture? 3) Do you believe in the placement of counter bevel of cast post and core it (ferrule design) to increase fracture resistance of an ETT? Dentists who restored 30 or fewer ETT were asked to stop the survey and return it with the first six questions replied to ensure validity of the response and the experience of the dentist as used previously in the literature.

The questionnaire used in this study was self-structured with items selected from that used by Morgano, et al. (1994), Hussey, and Killough (1995). The survey was written in English, and translation to Arabic was performed using the Microsoft Word document translator and reviewed by a prosthodontics and a dentist who had studied dentistry in Arabic. The questionnaires were then collected and analyzed by the statistical package for social sciences (SPSS v22 Inc.). Descriptive statistics (Mean, SD) presented in tables and Chi-square test was used to determine the significant relationship among the participants' knowledge.

## Results

From 293 questionnaires sent to dentists registered in the Saudi dental society, 229 completed the survey (response rate 79%). Respondents from private to governmental sectors were about 46% to 64% respectively. Most of repliers were non-faculty members just about (74%) while nearly (19%) were full-time faculty members and only 7% part-time members. Male to female respondents were 57% to 43% respectively. Some of the dentists leaved questions unanswered those were considered as unusable. Only single specific replies were included. English language was used by 80% of the volunteers to fill the survey. There were 94 male and 74 female dentists who restore more than 30 (ETT) per year. Dentists who were 50 years of age or older were less likely than dentists younger than 50 years of age to restore more than 30 ETT per year. (P-value= 0.006). Table 1 summarizes the association between age factor and techniques used by the respondents who restore 30 ETT per year.

The techniques used by the respondents varied when related to respondents' academic affiliation in regards to the type of prefabricated post with insignificant difference in relation to

	No. (%) of Respondents			
	<40 yr	41-49 yr	>50 yr	p+
Post Type				
Prefabricated	37(40)	11(34)	4(31)	-0.579
Cast post and core	10(11)	6(19)	2(15)	
Both	44(47)	15(47)	7(54)	
None	1(2)	0(0)	0(0)	
Prefab Post Type				
PS	28 (44)	9(31)	2(20)	-0.148
TS	21(33)	9(31)	2(20)	
SP	13(20)	11(38)	6(60)	
SF	2(3)	0(0)	0(0)	
Core Material				
Amalgam	8(12)	3(11)	0(0)	-0.74
CR	54(82)	21(75)	6(67)	
GI	2(3)	1(4)	0(0)	
MGI	2(3)	3(11)	3(33)	

\*Chi-Square test

PS, Parallel- sided serrated; TS, tapered smooth; SP, screw post; SF, split flexible CR, Composite resin; GI, glass ionomer; MGI, modified glass ionomer.

**Table 1:** Techniques by age for those who did more than 30 ETT per Year

the type of post used frequently. However, there is a significant difference when it is related to the type of prefabricated post where 59% of the respondents who were full time faculty members of a dental school used parallel-sided post, 29% of them used screw post, 12% used tapered smooth, but none of them used split flexible. Tapered smooth post was used by part time in 62%, and parallel sided in 25%, split flexible posts were used by 13% while none of them used screw post. Non-faculty members used the three types; parallel sided, tapered smooth and screw post nearly equally 32%, 32%, 34% respectively, and only 1% used split flexible. When it is related to core material and alloy used there was insignificant relation.

The differences in post selection for single-rooted crown and when multi rooted tooth used as abutment is not statistically related. However, it is statistically significant when multi-rooted tooth used as single crown (Table 2).

Responses from questions of techniques were compared between private and government sectors. Post type was statistically insignificant. However, the type of prefabricated post differs significantly, 53% of respondents working in governmental sectors used parallel-sided post. Screw post was used more by private sectors than governmental sectors by 47%, 18% respectively. Core material used is statistically significant related to the place of work, composite resin is used most common by both private and governmental sectors 75% and 81% respectively.

Type of alloy used, has no statistical significance between private and government sectors. Method of cast technique is different significantly; indirect method is used by 68% of private sectors, and 34% of governmental sectors. However, 50% of governmental sectors use both techniques compared to 14% of private sectors Table 3. When it was compared to the time of preparing the canal for a post, 48% of private working respondents prepare the canal for post one week later and the same percent was in the government sector. The results were significant regarding the way of placing the cement into the canal.

	No. (%) of Respondents			
	Part Time	Full Time	NO	P+
Post Type				
Prefabricated	5(45)	7(32)	40(38)	-0.414
Cast post and core	3(27)	1(5)	14(13)	
Both	3(27)	14(64)	49(47)	
None	0(0)	0(0)	1(1)	
Prefab Post Type				
PS	2(25)	10(59)	25(32)	0.018*
TS	5(62)	2(12)	25(32)	
SP	0(0)	5(29)	26(34)	
SF	1(13)	0(0)	1(1)	
Core Material				
Amalgam	1(14)	1(6)	9(11)	-0.61
CR	5(71)	14(88)	61(77)	
GI	0(0)	1(6)	2(3)	
MGI	1(14)	0(0)	7(9)	
Alloy				
Gold	3(38)	3(20)	10(13)	-0.225
SP	2(25)	2(13)	7(9)	
BM	1(13)	8(53)	44(56)	
DN	2(25)	2(13)	18(23)	
Cast Technique				
Direct Plan	3(38)	1(6)	14(18)	0.048*
Indirect	3(38)	5(31)	41(54)	
Both	2(25)	10(63)	21(28)	
Single root, single Crown				
Cast	2(25)	1(7)	27(36)	-0.211
Prefab	6(75)	13(93)	49(64)	
Single root, abutment				
Cast	6(75)	7(54)	40(60)	-0.62
Prefab	2(25)	6(46)	27(40)	
Multi root, single Crown				
Cast	2(25)	1(7)	34(47)	0.007*
Prefab	6(75)	13(93)	39(53)	
Multi root, abutment				
Cast	4(50)	5(38)	36(49)	-0.763
Prefab	4(50)	8(62)	37(51)	
Cement				
ZP	2(25)	4(24)	7(8)	-0.259
PC	0(0)	0(0)	3(4)	
GI	2(25)	7(41)	47(57)	
Resin	4(50)	6(35)	26(31)	

\*Chi-Square test

PS, Parallel- sided serrated; SF split flexible; SP, screw post; TS, tapered smooth, CR, Composite resin; GI glass ionomer; MGI modified glass ionomer; SP, silver palladium;.MB, base metal; DN, don't know  
ZP, zinc phosphate; PC, polycarboxylate;

**Table 2:** Techniques by Faculty Status for those who restore more than 30 ETT per Year

The highest score was by using lentulo spiral in 71%, 64% of governmental and private sectors respectively. The technique of preparing the post-hole was statistically insignificant.

Finally, from the whole repliers, about 78% of respondents attended a postgraduate lecture/course on the restoration of ETT with insignificant relation

	No. (%) of Respondents		
	Private sector	Gov. Sector	P+
Post Type			
Prefabricated	23(40)	29(37)	NS (0.565)
Cast post and core	6(10)	12(15)	
Both	28(48)	38(48)	
None	1(2)	0(0)	
Prefab Post Type			
PS	7(16)	30(53)	0.001*
TS	16(36)	16(28)	
SP	21(47)	10(18)	
SF	1(2)	1(2)	
Core Material			
Amalgam	2(5)	9(16)	0.013*
CR	33(75)	47(81)	
GI	2(5)	1(2)	
MGI	7(16)	1(2)	
Alloy			
Gold	6(13)	10(18)	NS (0.445)
SP	3(7)	8(14)	
BM	25(54)	28(50)	
DN	12(26)	10(18)	
Cast Technique			
Direct Plan	8(18)	9(16)	0.00*
Indirect	30(68)	19(34)	
Both	6(14)	28(50)	
Single root, single Crown			
Cast	15(35)	14(25)	NS (0.354)
Prefab	28(65)	41(50)	
Single root, abutment			
Cast	24(60)	30(61)	NS (0.906)
Prefab	16(40)	19(39)	
Multi root, single Crown			
Cast	23(53)	14(27)	0.008*
Prefab	20(47)	38(73)	
Multi root, abutment			
Cast	22(51)	24(47)	NS (0.692)
Prefab	21(49)	27(53)	
Cement			
ZP	3(6)	11(18)	NS (0.252)
PC	2(4)	1(2)	
GI	27(56)	28(47)	
Resin	16(33)	20(33)	

\*Chi-Square test

PS, Parallel- sided serrated; SF split flexible; SP, screw post; TS, tapered smooth, CR, Composite resin; GI glass ionomer; MGI modified glass ionomer; SP, silver palladium;.MB, base metal; DN, don't know  
ZP, zinc phosphate; PC, polycarboxylate;

**Table 3:** Techniques by working place of Dentist for those who did more than 30 ETT per Year

## Discussion

The response rate (79%) of this study was satisfactory and can be considered as reliable method of evaluating the basic knowledge of dentists in Saudi Arabia in restoring ETT [5]. Dentists who restore more than 30ETT per year were less than 50 years old; this result was similar to Stevens M. Morgano's survey [1].

Dentists encounter various challenges in daily practice, such as the decision to save weakened ETT by using post-and-core system; this treatment is the most common method for restoring such teeth [2].

The study found that almost two thirds of dentists routinely provide a post for either anterior or posterior teeth. The high percent is may be related to that almost half of respondents believe in the strengthening effect of post in ETT. Especially, those working in the government section, this could be due to the level of education and the continuous learning. Also 85% of non-faculty respondents believe on the strengthening effect of post on ETT, While in Hussey survey more than half respondents did not provide post for either anterior or in posterior teeth [6]. Generally, if the loss of tooth structure is greater than 50%, then a post is needed to retain the core [7].

Placement of counter bevel of cast post and core is acceptable significantly in 80 % of respondents. A close percent (88%) was reported in a study done in Germany [8]. Margin extension is considered one of the features that should exist during preparation of the cast post design [9]. Ferrule design of 2 mm height will increase the fracture resistance of ETT than without its presence [10]. Particularly if the ferrule is circumferential [11]. One study found that crowned anterior teeth with ferrule design would not increase the resistance to fracture by adding a secondary ferrule to the cast post and core [12]. In the absence of ferrule, using post with high modulus of elasticity will increase its performance in restoring ETT [13]. Prefabricated post and core material was the most commonly used system in the study. While one survey indicated that 40% of dentists use prefabricated posts most of the time [14]. Prefabricated fiber posts have become increasingly popular in recent years when compared with other types of posts [15] and might be considered as an economical, practical, and tooth-saving alternative [16]. Various studies have mentioned that cast posts, which are made of metal, is indicated when there is significant loss of tooth structure and if the canal is oval for better fit with ideal connection to the core. However, other studies have reported that metal posts are aesthetically inferior when compared to nonmetal posts, in addition to the higher risk of root fracture caused by high stiffness [17].

More than half of the respondents used parallel-sided posts or tapered smooth posts in both full and partial time faculty members of dental schools. Naumann claimed that the type of loading and amount of remaining tooth structure are more relevant in selecting a post than whether the involved tooth is anterior or posterior [18].

The technique for fabrication of cast post varied significantly, in general more than half of respondent's relay on the indirect technique in both faculty and non-faculty members. Using this technique will save time in the clinic. The indirect method is more suitable for multiple canals. Whereas the direct technique is endorsed for single canals [9].

The survival rate differs if a tooth is used as an abutment for a fixed or removable prosthesis. This is similar to a study conducted in Germany [8]. In addition, the risk of failure increases when a tooth is used as an abutment for removable partial dentures [19]. This point should be elaborated to dentists in this study; as the respondents' results showed no significant relation between using ETT as single crown or as an abutment for either single or multi rooted teeth.

The highest percent of both private and government working respondents who prepare the canal for post one week later was 48%. This percent is close to the results of Hussey's survey (42%) [6]. One study found that postponing post insertion after endodontic treatment at least 24 hours would increase the retentive strength of post if compared with direct cementation [20]. Swartz claimed that the cause of losing ETT was due to improper restoration rather than ensuing endodontic failure. Hussey and Killough found that restoring post-retained crowns using short or tapered posts or without applying any root, fillings may cause failure [21].

Although it was statistically insignificant between respondents about the length of post, the recommendation was to leave between 3-5 mm from the Obturation material [22] factors to consider include the length and diameter of posts, post brand, and type of tooth (e.g., incisors, canines, and premolars), as well as the amount and angle of load applied to the tooth [23]. Respondents of governmental sectors use radiograph more routinely than private sectors. Using lentulo spiral to place the cement of the post was used by more than 60% of the respondents. One study declared that the most effective way is to place the cement into the posthole using a lentulo-spiral [24]. Composite resin was the main core material used in this survey, the same as in Morgano's one, but to a less extend as in Hussey's survey [1,6]. Taking a radiograph after post preparation or luting the post was noticed more in governmental respondents than who work in private section (78%, 33%) respectively.(P-value < 0.001) compared to only 6 or7% [6].

## Conclusion

Most of respondents use either prefabricated post or cast post in their dental practice. The most common prefabricated post used is either parallel-sided post or tapered smooth post. Respondents in private sectors used screw posts more common. Composite resin is the most widespread core material used by respondents. Moreover, resin cement may be used more frequently by practitioners since many ETT are compromised. Almost half respondents believed that post will reinforce a root. The need for more relevant presentations and workshops should be elucidated, in order to expand the knowledge of the new philosophies and techniques of restoring ETT to update recent researches, as the topic is still controversial.

## Conflict of Interest

The Authors Report no financial or personal conflict of interest in this research.

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