

Does Working in Public or Private Sector in United Arab Emirates Influence the Clinical Decision in Selection of Post System for Endodontically Treated Teeth?

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Abstract

Introduction: Selection of the posts for endodontically treated teeth is a complex multifactorial decision. Although well established in the literature, confusion may still exist among dentists regarding the indications and functions of posts.

Objective: This study aims to find out, if there is any difference in the selection of post system for endodontically treated teeth, between the dentists working in the private sector and the public sector in the United Arab Emirates.

Methods: A questionnaire in the English language was sent randomly to dentists working (public and private sector), in United Arab Emirates (Dubai, Sharjah, Ras AL Khaimah, Fujairah) through email/hardcopies/survey portal.

Results: Out of all reasons cited for the selection of posts, only the fewer number of visits (public sector) and cost (private sector) showed a statistical significance at p-value 0.023 and $p < 0.01$ respectively; Although fibre posts were generally the most commonly used posts by both sectors, the metal active prefabricated post was used mainly in the private sector (statistically significant at p-value 0.046). Metal cast posts were preferred in anterior teeth by the public sector (p-value 0.046), and metal active prefabricated was preferred in premolars and molars by the private sector (p-value 0.014 and 0.046 respectively). Other posts like zirconia and titanium were only used in the public sector (p-value 0.022 for premolars and p-value 0.041 for molars).

Conclusion: Within the limitations of this study, it can be concluded that although the basic concepts for using posts were the same for dentists in both the sectors, however, some differences were found in their clinical decisions of the selection of posts for root canal treated teeth.

Keywords: Fibre Post; Metal Cast Post; Metal Active Prefabricated Posts

Introduction

Initially, it was believed that endodontically treated teeth become weak and are prone to fracture due to changes in cross-linking in dentine and moisture content lost, however, the research has indicated that this is mainly due to the tooth becoming brittle from loss of structural integrity and coronal tooth structure, as a result of caries and access preparation [1-3]. In order to prevent the fracture of root canal treated teeth and increase its longevity, it is vital to restore the tooth with a restoration that will reinforce the remaining coronal structure. Given the plethora of restorative materials available, selecting the appropriate one can be challenging. The primary role of post and core build-up is to replace the coronal missing tooth structure and provide retention and resistance to the crown that will be restoring the function and aesthetics of the tooth [4].

Although recent advances in adhesive dentistry have reduced the necessity to use posts for endodontically treated teeth, however, posts are still considered a viable option to provide retention for the cores, in structurally compromised teeth [5-7]. According to Meyenber, if no unfavourable lateral forces are produced on dentinal walls by the active or screw posts, and there is no risk of perforations by the inaccurate techniques, posts may not be viewed as destructive [6].

One of the dilemmas faced by dentists is, choosing the post system from a wide range of systems available today. Although the selection of post system is multifactorial, there are certain features of the post system that should be borne in mind when making the decision. The posts that provide maximum retention and are most conservative of dentine should be preferred. The post should have physical properties similar to dentine, causing the minimal and equal distribution of stresses along the root surface. The post should be aesthetically compatible, have good core retention and resistance to displacement. It should be easy to use and retrieve and should be cost-effective [10]. A dentist should choose a post as per these recommendations, become familiar with it and use it as per the principles of that system [5].

There may not be a consensus on which one is the ideal material for the posts. The materials like metal and zirconia posts that can take up more load than dentine can be considered to have a mechanical advantage; however, these can induce more stress in the apical region causing catastrophic failure due to vertical root fracture. On the other hand, posts like fibre posts, with a similar modulus of elasticity to dentine causes less concentration of stresses in the apical region, but more stresses in the cervical region. The more rigid posts like metal, ceramic and zirconia can cause unsalvageable root fractures. In contrast, more flexible fibre posts can cause loss of retention and debonding of core material or post fractures, which may be repairable [3,6,8]. Due to this choice of posts made from more rigid metal has shifted to a more flexible material like fibre posts [12]. In conjunction with the mechanical properties of the posts, the aesthetic features of the post system also need consideration, especially in the aesthetic zone.

There are certain quintessential factors that determine the decisions when choosing one type of post system over others. In addition to the factors mentioned above, the environment and the workplace may also play a pivotal role in decision making by the dentists. There may be certain common components in both groups. For instance, aesthetics, ease of use and retrievability, remaining tooth structure may have an influence on dentists in both the sectors. However, there may be certain factors like cost, which may influence only the economically driven sector.

It has been shown by research that there are variations in the treatment decisions amongst the dentists. These discrepancies have been shown to be present in the dentist between and within the countries. The various dentist factors that can account for this variation include personal and practice aspects. The individual characteristics like age and years of experience, skills, educational backgrounds, and specializations are known to be influential in the decision making [15-17]. Other than the personal factors the dental health care systems and practice can also impact clinical decisions made by the dentists [18,19]. A survey was conducted in the United Arab Emirates (UAE) to explore if there was any difference in the selection of post system for endodontically treated teeth, between the dentists working in public and the private sector.

The null hypothesis proposed that there is no significant difference, in the selection of post system for endodontically treated teeth, between the dentists working in private and the public sector.

Materials and Methods

A cross-sectional study was conducted by a questionnaire-based survey.

Ethical approval: Relevant Ethical approval was obtained from the Ethical Committee of King’s College London, Medical Education and Research Department Dubai Health Authority and Ministry of Health and Prevention Research Ethics Committee, United Arab Emirates.

Questionnaire: The questionnaire was self-structured and non-incentivized, although other similar question-based surveys were also used as references.

The questionnaire consisted of two parts: Part 1 collected the social - demographic information. Part 2 consisted of 15 multiple choice type questions and statements.

Participants: The questionnaire was sent randomly to the dentists working in public and the private sector in UAE (Dubai, Sharjah, Ras Al-Khaimah, Umm Al Quwain), through emails/hardcopies/survey portal. The participants included general dentists and specialists who placed posts in endodontically treated teeth.

Results

Data collection: The survey portal was sent to 923 dentists through emails by Emirates Medical Association (EMA). Along with this, the survey was also sent to 111 dentists through emails, portal surveys and hard copies. The total response received was 128. Since the target was total 100 dentists (50 public and 50 private), so the incomplete responses, where vital information like demographic data or unanswered questions were not included in the study.

Demographic data (Table 1): There was a diversity in specialization of dentists that placed the posts in both the sectors, it was not limited to only prosthodontists or endodontists.

Demographic Information - Specialization	Private (50)		Public (50)	
	Count	Percent	Count	Percent
GP dentist	26	52%	8	16%
Prosthodontist	4	8%	21	42%
Endodontist	9	18%	12	24%
Periodontist	1	2%	2	4%
Public health	2	4%	3	6%
Orthodontics	0	0%	1	2%
Oral surgery	1	2%	1	2%
Pedodontist	2	4%	1	2%
Conservative, Restorative and aesthetic dentistry	5	10%	1	2%
Total number of dentists with post-graduation qualification	24	48%	42	84%

Table 1: Distribution of GP and specialist dentist.

Most commonly used post systems and reasons for the selection (Table 2 and 3): Fibre posts were the most common post systems used by dentists in both sectors. Metal active prefabricated posts were used more by private sector dentists than the public sector which was statistically significant ($p < 0.046$). Metal passive prefabricated posts and metal cast posts were used more by dentists in the public sector. Ceramic posts were also favoured more by private sector dentists. Other posts like titanium, ever stick, zirconia, and carbon were only used by dentists in the private sector ($p < 0.22$). Dentists in both the sectors mentioned aesthetics as the most common reason for their selection of posts. Ease of use was the second most common reason in both sectors. The availability of the material was cited by more dentists in the public sector than in the private sector. Less number of visits was a reason given by more dentist in the public sector in contrast with the dentist in the private sector which was statistically significant ($p < 0.023$). Whereas cost was a more common reason given by dentists in the private sector, as compared to those in the public sector, which was also statistically significant ($p < 0.01$). Ease of removal was mentioned by the same number of dentists in both sectors.

Post systems	Private (50)		Public (50)		χ^2	P
	Count	Percent	Count	Percent		
Fibre posts	44	88%	43	86%	0.09	0.766
Metal posts (active-prefabricated posts)	8	16%	2	4%	4*	0.046
Metal posts (passive-prefabricated posts)	7	14%	11	22%	1.08	0.298
Metal Cast post and cores	12	24%	17	34%	1.21	0.271
Ceramic posts	4	8%	2	4%	0.71	0.400
Others	5	10%	0	0%	5.26*	0.022

Table 2: Most commonly used post system.

*: Significant at 0.05 level.

** : The total number exceeds the total number of dentist due to more than one option selected.

Main reasons for selection	Private (50)		Public (50)		χ^2	P
	Count	Percent	Count	Percent		
Aesthetics	34	68%	27	54%	2.06	0.151
Availability of the material	14	28%	20	40%	1.6	0.205
Ease of use	28	56%	28	56%	0	1.000
Less number of visits	8	16%	18	36%	5.2*	0.023
Cost	16	32%	3	6%	10.98	$p < 0.01$
Ease of removal	8	16%	8	16%	0	1.000
Others	8	16%	9	18%	0.07	0.790

Table 3: Reasons for selection of different post systems.

*: Significant at 0.05 level.

** : The total number exceeds the total number of dentist due to more than one option selected.

Placement and preference of post for anterior teeth (Table 4 and 5): The number of dentists in public and private sector who mentioned placing posts when only one wall remained in the anterior teeth was nearly same. The choice to place the post when two walls remained was replied by around the same number of dental practitioners in both the sectors. For the other two clinical situations, there was not much difference within the decision of the dentists in both the sectors. Fiber posts were most preferred for anterior teeth by dentists in both the public and private sector. Whereas metal cast posts were more popular with dentists in the public sector, however, it was not so common with dentists in the private sector; this was statistically significant ($p < 0.046$). The ceramic post was chosen by almost the same number of dentists in the private sector and the public sector. Other posts like zirconia post, carbon post, and glass post were only used by private sector dentists.

When do you place the post	Private	Public		
	Percent	Percent	c ²	p
All 4 four walls remaining with only access cavity	12%	16%	0.33	0.564
Loss of one cavity wall	6%	4%	0.21	0.646
MOD cavity with two remaining walls	60%	68%	0.69	0.405
One cavity wall	78%	78%	0.22	0.640

Table 4: Placement of post for anterior teeth.

		Anterior		
Preferred post	Private	Public	c ²	p
Fibre post	92%	86%	0.92	0.338
Metal cast	4%	16%	4*	0.046
Ceramics	8%	6%	0.15	0.695
Others	6%	0%	3.09	0.079

Table 5: Preference of post for anterior teeth.

*: Significant at 0.05 level.

** : The total number exceeds the total number of dentist due to more than one option selected.

Placement and preference of post for premolar and molar teeth (Table 6 and 7): For premolar teeth, there was not much difference within the clinical decision making of dentists in both sectors with regards to the placement of post according to the remaining tooth structure. The most common scenario cited by both sectors was one cavity wall remaining, followed by two remaining walls, only access cavity with all four remaining walls and with loss of one cavity wall. Fiber posts were the most commonly used by dentists in both the groups. The metal active prefabricated post was more common amongst private sector dentists than the public sector; this was statistically significant ($p < 0.014$). Metal passive prefabricated and metal cast posts were more popular with dentists in the public sector than the private sector. Ceramic posts and other posts like titanium, zirconia, and ever stick were also only placed by private sector dentists, which was statistically significant ($p < 0.022$).

When do you place the post	Premolar				Molar			
	Private (50)	Public (50)	c ²	p	Private (50)	Public (50)	c ²	p
	Percent	Percent			Percent	Percent		
All 4 four walls remaining with only access cavity	12%	6%	1.1	0.295	12%	8%	0.44	0.505
Loss of one cavity wall	6%	4%	0.21	0.646	10%	2%	2.84	0.092
MOD cavity with two remaining walls	70%	76%	0.46	0.499	66%	68%	0.05	0.832
One cavity wall remaining	76%	86%	1.62	0.202	82%	88%	0.71	0.401

Table 6: Placement of post for premolars and molars.

*: The total number exceeds the total number of dentist due to more than one option selected.

Post preference	Premolar				Molar			
	Private (50)	Public (50)	c ²	p	Private (50)	Public (50)	c ²	p
	Percent	Percent			Percent	Percent		
Fibre post	68%	60%	0.69	0.405	52%	50%	0.04	0.841
Metal active prefabricated	16%	2%	5.98*	0.014	16%	4%	4*	0.046
Metal passive prefabricated	8%	14%	0.92	0.338	20%	30%	1.33	0.248
Metal cast	16%	28%	2.1	0.148	24%	30%	0.46	0.499
Ceramics	4%	0%	2.04	0.153	4%	0%	2.04	0.153
Others	10%	0%	5.26*	0.022	8%	0%	4.17*	0.041

Table 7: Preference of post for premolar and molar teeth.

*: Significant at 0.05 level.

** The total number exceeds the total number of dentist due to more than one option selected.

Dentists in both sectors preferred to place posts with only one and two remaining walls in the molars. Very few dentists placed post for molars with only access cavity. As with other teeth, fiber posts were the most preferred post for molars by the dentist in both the sectors. Dentists in the private sector preferred metal active prefabricated posts more than the public sector, which is statistically significant ($p < 0.046$). Metal passive prefabricated and metal cast was preferred more by public sector dentists than private-sector dentists. Ceramics and other posts like titanium, digital zirconia and ever stick were preferred by only private sector dentists ($p < 0.041$).

Discussion

Regarding the position of the tooth in the arch; dentists in the private sector placed maximum posts in premolars, followed by molars and anterior teeth. While, dentists in the public sector had an equal predilection for placement of posts in both molars and premolars with less placement of posts in anterior teeth. It can be said that dentists in the private sector placed more posts in premolars than the public sector. More posts were placed in anterior teeth and molars by dentists in the public sector. Posterior mandibular and maxillary regions

were more common sites of placement of posts by dentists in the public sector. In contrast, the anterior maxillary region was the more common site for dentists in the private sector.

It has been recommended that posts should be placed if anterior teeth require full coverage, as after tooth preparation there may be a minimal tooth structure remaining to retain the core; and since anterior teeth are subjected to shearing forces, the crown may fracture [3,26]. In endodontically treated premolars, the lateral forces may cause fracture of the cusps, particularly maxillary first and second premolars and mandibular second premolar; hence these teeth require full coverage. Since they have small pulp chambers for retention of cores, these teeth with minimal tooth structure may require posts [3,24,26]. Endodontically treated molars, though require cuspal coverage, but due to large pulp chambers can have increased surface area for retention of the core for adhesive restorations. It can be inferred that dentists in both sectors chose to place posts in teeth as per tooth structure loss and functional demands of the tooth, which has been recommended as important factors deciding the clinical decision for placement of the posts.

In both sectors, fibre posts were the most commonly used post. These findings are consistent with other surveys conducted where fibre posts were the most preferred posts [12,13,20]. Over the years' fibre posts have gained popularity due to their aesthetic acceptance, similar modulus of elasticity to dentine causing less catastrophic failures, ease of use and easy retrievability. They are being considered as an economical and tooth conservative alternative to other posts [9,12,20,25]. This is also evident in this study, as it was the most preferred post in both groups.

Metal cast posts were the second most popular post. But it was used more by dentists in the public sector than the private sector. This result compares with the study conducted by Nawsrah, *et al.* [9] who reported more use of cast post and core by dentists in the government sector than the private sector. This disparity could be due to additional laboratory costs and technical skills that these posts require. Since there is no laboratory fee and there were more skilled prosthodontists in the government sector, hence these posts were used more by public sector dentists. Although these posts are not aesthetic and require removal of dentine for post space preparation, have a higher modulus of elasticity than dentine, involve additional cost and visits; despite all these disadvantages, they have been known to have higher clinical success due to increased resistance to fracture. However, when vertical root fracture happens, it is catastrophic, causing potential loss of a tooth [22,24,25]. These posts are recommended for non-circular root canals for a better fit and adaptability, and when there is extensive loss of tooth structure [9]. They are also indicated for misaligned teeth, when it is essential to angle the core to the post, to align the restored tooth to other teeth in the arch [3].

Metal passive prefabricated posts are cemented with luting cement, and these were used more by public sector dentists as compared to the private sector. This was in accordance with a study conducted by Naswasrah, *et al.* where passive posts were used by more dentists in the government sector [9]. Despite having poor aesthetics, these posts have the advantage that they can be cemented chairside in a single visit, thus eliminating the laboratory costs and have a good clinical success rate. Conversely, these posts do not precisely fit and adapt to the canal; and the space between the post and canal is filled with the cement [4,27,28]. Due to different modulus of elasticity between the metal and dentine, stress concentration can occur between the luting cement and posts, which can lead to micro gaps and microleakage, causing failure of root canals [8]. The stress on roots can also cause unfavourable root fractures.

Metal active prefabricated posts are threaded and screwed to engage the dentine and these were used mainly by dentists in the private sector than the public sector which showed a statistically significant of p-value 0.046. Although active posts are not recommended due to high failure rates, they are still being used by dentists as found in other studies [13,20,22,23,29]. However, the overall reduction in the use of metal active prefabricated posts is attributed to the fact that these posts cause more stresses in the roots and hence causing root fractures and are not aesthetically acceptable [12,23,30]. Nevertheless, prefabricated metal screw posts have an advantage that they can be placed in a single visit and are cost-effective than cast posts. They can be used in short, curved and divergent roots for increased retention [3,26,33].

Ceramic posts were less popular among the dentists in both groups. Some other posts like titanium, ever stick, zirconia, and carbon were also mentioned only by dentists in the private sector, and this was also statistically significant (p-value 0.022). Ceramic and zirconia posts are aesthetic and biocompatible but have low fracture strength. Under stress, they tend to fracture rather than bend or distort like metal post [29]. These posts are difficult to retrieve when broken and hence can lead to loss of the tooth. Since they are brittle, it is necessary to prepare adequate post space for the bulk of the post and thus are not very conservative of tooth structure [1,3,14,34]. Due to the higher modulus of elasticity than dentine, they can also cause root fractures [10,35]. Their use has been recommended in areas of aesthetic concern where there is minimal occlusal load [27]. Titanium posts also have less fracture strength and cannot be used in thin roots and are difficult to retrieve. Due to stresses; micro gaps can develop at cement-dentine or cement-titanium interface leading to microleakage, and root canal failure. Hence titanium posts should be used with caution [14,31].

When asked about the reasons for the selection of posts, the most common reason mentioned was aesthetics. The second reason was the ease of use. It has been cited by few authors that dentists can choose a post system that they find easy to use and can be managed by the operator as per their skills and experience, and if clinical data exists that proves the success of that post [5,10]. Since fibre posts are easy to use and are aesthetically acceptable, so this could be the reason that these posts were most commonly used in both groups. Availability of the material influencing the choice of the post was mentioned by 28% of dentists in the private sector and 40% of dentists in the public sector. Ease of removal was mentioned by the same number of dentists in both groups. Retrievalability is one of the factors that is essential for the selection of posts, as this can be important when re-treatments are required in case of endodontic failures [10]. Less number of visits, as one of the deciding factors for selection of post, was mentioned by 36% of dentists in the public sector and only 16% of dentists in the private sector, which was also statistically significant (p-value 0.023); the reason could be to reduce the waiting time for appointments due to increased number of patients visiting the public sector. Cost was mentioned as a factor by 32% of dentists in the private sector, and only 6% of dentists in the public sector, which was also statistically significant (p-value 0.01). As can be expected, the cost was a factor mainly mentioned by the private sector, as the dentists in the public sector do not deal with the financial issues of treatment.

When asked about the placement of post in anterior teeth, premolars and molars, according to the remaining tooth structure; most of the dentists in both groups answered that they placed posts when only one or two walls remained. Only a few dentists in both sectors answered that they placed posts when only one wall was missing and when only the endodontic access cavity was present. The fibre post was the most preferred post for the anterior teeth, premolars and molars, by dentists in both groups. Aesthetics was the most common reason mentioned for this preference for anterior teeth. There have been tremendous improvements in the properties, aesthetics and bonding protocol of fibre posts since their introduction [21]. Since their elasticity is similar to dentine, the unfavourable root fractures do not occur, the most common failures are debonding, or fractures at the crown level, which is repairable, and the post is easily retrievable. Simplified placement of posts without any need for laboratory fees and conservative, makes these posts a popular choice among dentist [13,20]. Studies conducted have also found that these posts to have good clinical success [24,25,32]. Due to these advantages' fibre posts were the most prevalent choice amongst dentists for all type of teeth in both the groups.

Even though the metal cast post was used by a smaller number of dentists for anterior teeth, premolars and molars, it's use was, however, more prevalent in the public sector than the private sector. For anterior teeth, it carried a statistical significance (p-value 0.046). Laboratory manufactured cast post systems can add additional cost, which may not be a favourable factor for the private sector, where cost is one of the major decisive factors for selection of the post [11]. This could be the reason for it being less popular with dentists in the private sector. Although metal cast posts are not aesthetically acceptable for anterior teeth, some studies have indicated that they can be used when the tooth structure is substantially lost and in oval canals as they have a better fit and adaptation to the canal [9,34,36]. Since the cast post is customised to fit and adapt to the root canal, hence they can resist the rotation forces on the full coverage crowns on teeth with minimal tooth structure in single-rooted teeth [34,36]. The metal cast post has shown good clinical success, as mentioned in the literature [14,27].

Metal passive (cemented posts) and active prefabricated (screw posts) posts were only used for premolars and molars by both the groups. They were not used for anterior teeth, probably because of aesthetic reasons. For premolars and molars, the passive metal post was used more by dentists in the public sector than the private sector.

Metal active posts, for premolars and molars, were preferred by more dentists in the private sector than the public sector, and this was statistically significant (p-value 0.014 for premolars and 0.046 for molars). It has also been found in other studies that metal screw post is preferred for the posterior teeth [12,22]. Although active posts cause more stresses on roots, they are more retentive, and hence they can be used for teeth with short roots, where maximum retention is desirable. Since maxillary premolars have short roots, they can be considered for these teeth [14,27]. Their use for molars is attributed due to their increased retention in short and curved roots and being more conservative of tooth structure.

Ceramic posts were preferred by very few dentists in both sectors for anterior teeth, and only by dentists in the private sector for premolars and molars. Other posts like zirconia, carbon and glass post were used only by dentists in the private sector, which could be due to the availability of these posts. The use of other posts was statistically significant for premolars and molars (p-value 0.022 for premolars and 0.041 for molars). Although these posts were used by dentists only in the private sector, however overall, the number of dentists using them was very less.

Most of the dentists in both the groups had a similar overall approach in selecting the posts, for the endodontically treated teeth, which was in agreement with the literature. However, certain differences were observed between the two sectors. It can be conjectured from the above discussion, that the fibre post was the most commonly preferred post in both the groups, while metal cast posts were more commonly used by dentists in the public sector and the metal active prefabricated post was more used by the private sector dentist. Some posts like zirconia and titanium were used by very few dentists in the private sector. Cost was one of the deciding factors for decision making by dentists in the private sector.

Even though certain differences were found in the selection of post, between both the groups, however, this difference was ascertained among a smaller number of dentists. Majority of the dentist in both the sectors had similar conceptual understanding and decision making in regard to the selection of post system for endodontically treated teeth. There were a few common factors observed in both the groups, along with some factors that were predominant in one type of group.

Although the dentists in both the sectors, may have had educational training at different international curriculums, nevertheless their treatment decisions did not vary much from each other. This could be due to the reason that they have adapted their practice to regional dental practice. Since the quality of care in the private sector is also regulated and monitored by the government health authorities, due to this, there is no compromise on any aspect in providing the best dental care for the patients in public and the private sector. This is also evident from the present study as the clinical decisions made by dentists in both the sectors, to restore the root canal treated teeth with different post system was within the norms of the published literature.

This study has given us some insight and understanding around the decision-making process between the dentists from two workgroups, i.e. the private and the public sector, regarding the selection of post system for root canal treated teeth.

Within the limitations of this study, the null hypothesis that there might not be any difference, in the selection of post systems for endodontically treated teeth, between the dentists working in private and the public sector system for root canal treated teeth, was rejected.

Conclusion

It can be concluded that dentists in both the sectors had knowledge regarding the placement of the posts in endodontically treated teeth, and the clinical decisions made were in accordance with published literature. There were, however, few differences apparent be-

tween the preferences of the dentists in the private and the public sectors. Nevertheless, due to the low response rate, the result of this study needs to be cautiously applied to the generalised population of the dentists, in the private and public sector.

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