
Assessment of Use of Different Types Of Posts According To The Different Regions Of The Jaw – A Retrospective Study.

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Abstract: With a variety of options, in terms of materials available for the restoration of the destroyed root structure of endodontically treated teeth, for clinical decision of which to use constitutes a challenge to dentist practitioners. The most commonly used posts are prefabricated metal post, prefabricated fibre post and custom made post [cast post]. The purpose of this retrospective study is to check the prevalence of different types of posts and their correlation with age, gender and type of teeth. The correlation is done by the Chi square test. It was found that prefabricated metal posts mostly had the maximum prevalence, followed by prefabricated fibre posts and custom made posts had the least prevalence. Prefabricated posts were more commonly used in female patients, whereas custom made posts were more commonly used in male patients. It was also observed that the maximum number of post treatments were done in young people and the frequency decreased with age. Prefabricated fibre posts and custom made posts were more commonly done in anterior teeth, especially in males, whereas, prefabricated metal posts were more commonly seen in the posterior teeth. More number of studies need to be done to verify the conclusion.

Keywords: Custom made post, Prefabricated fibre post, Prefabricated Metal post

INTRODUCTION

Endodontically treated teeth have become problematic for the clinics due to its tendency to fracture. Root canal therapy is indicated when there is extensive loss of tooth structure or irreversible pulpitis. It is performed to remove the source of infection (Vijayalakshmi and Ganapathy, 2016). Endodontically treated teeth may exhibit pronounced coronal destruction and the remaining coronal dentine is indication of any additional theory. If sufficient coverage is available in the remaining dentine the tooth can be saved. Depending on the amount of remaining tooth structure, a post may be indicated for extra retention of the crown to prevent fracture of the restoration (Ganapathy, Kannan and Venugopalan, 2017). A post promotes a way to securely anchor the filling material to the tooth (Kannan and Venugopalan, 2018). Several techniques and materials are available to restore an endodontically treated tooth with medium to severe loss of the coronal tooth structure (Morgano and Brackett, 1999).

For many years, the most commonly used material was prefabricated and custom made metal posts. Prefabricated cast posts were mostly used in the posterior regions in cases of severe loss of tooth structure, followed by a core build up and metal ceramic crowns (Ajay *et al.*, 2017). A custom made post was used in the anterior region, mostly when there was extensive loss of tooth structure, and when the angle of the tooth had to be changed (Ganapathy, 2016). But since the advent of esthetic dentistry, the patients were concerned about their smile as the metal post was seen through the ceramic. This prompted use of non-metallic posts (Grandini *et al.*, 2005; Ganapathy, 2016). Several new types of posts with higher aesthetic quantity, quality and glass fibre posts, combined with direct resin composites provide an aesthetic foundation for an all ceramic crown (Grandini *et al.*, 2005; Ganapathy, 2016; Selvan and Ganapathy, 2016). Due to the advent of new aesthetic posts, it is possible to overcome the limitation of metallic posts in its anterior region (Subasree, Murthykumar and Dhanraj, 2016). Choosing the type of post has always been a controversial question for the clinician. Each post type has its own advantages and disadvantages. The advantage of a custom made post is that it can adapt to any canal or any slope to provide the adequate retention with equal dissipation of force in the root (Ashok *et al.*, 2014). In contrast to this, the prefabricated post is time saving, cheap and less technique sensitive (Ariga *et al.*, 2018). Their disadvantage is that they do not take the slope or the angle of the root into consideration. Hence, their

adaptation is not comparable to custom made posts. They rely on cements for retention, especially in non-circular root canals (Ariga *et al.*, 2018). One key advantage of prefabricated fibre post is that the elastic modulus of the fibre post is similar to dentine. Hence, the chances of its fracture is less (Basha, Ganapathy and Venugopalan, 2018). Several in vitro studies have shown that because of the high elastic modulus, metal posts will exert more force on the radicular portion of the roots which lead to its fracture (Zhou and Wang, 2013). In contrast, a recent study with finite element analysis reported that fibre post delivered more stress to the roots than the metal post (Santos *et al.*, 2010). However, the same study showed that roots which had fibre posts were less prone to fracture since the chances of fracture of the post or core is more than the roots. Hence, more studies are required to arrive at a conclusion.

The choice of the most suitable material for the restoration of endodontically treated teeth is dependent upon certain factors like the amount of retention capacity of the remaining tooth structure, the position of the teeth, the amount of occlusal forces on the teeth, the esthetic requirement of the teeth etc (Ashok and Suvitha, 2016). Hence, the clinician should take all the factors into consideration before the treatment, since it will affect the outcome of the treatment. Our team has rich experience in research and we have collaborated with numerous authors over various topics in the past decade (Deogade, Gupta and Ariga, 2018; Ezhilarasan, 2018; Ezhilarasan, Sokal and Najimi, 2018; Jeevanandan and Govindaraju, 2018; J *et al.*, 2018; Menon *et al.*, 2018; Prabakar *et al.*, 2018; Rajeshkumar *et al.*, 2018, 2019; Vishnu Prasad *et al.*, 2018; Wahab *et al.*, 2018; Dua *et al.*, 2019; Duraisamy, Krishnan, Ramasubramanian, Sampathkumar, Mariappan and Navarasampatti Sivaprakasam, 2019; Ezhilarasan, Apoorva and Ashok Vardhan, 2019; Gheena and Ezhilarasan, 2019; Malli Sureshbabu *et al.*, 2019; Mehta *et al.*, 2019; Panchal, Jeevanandan and Subramanian, 2019; Rajendran *et al.*, 2019; Ramakrishnan, Dhanalakshmi and Subramanian, 2019; Sharma *et al.*, 2019; Varghese, Ramesh and Veeraiyan, 2019; Gomathi *et al.*, 2020; Samuel, Acharya and Rao, 2020)

The objective of this study was to compare the prevalence of different posts and check its correlation with different parameters.

MATERIALS AND METHODS

Study Design: This retrospective cross sectional study was carried out in the Department of Prosthodontics, Saveetha Dental College, Chennai, India. The present study was approved by the Ethics Committee of Saveetha Dental College, Chennai, India. The data was obtained from the Dental Information Archiving Software [DIAS] which contains all the information regarding general information, diagnosis, treatment plan and treatment completed along with the photographs.

Sample Selection: From June 2019 to May 2020, the subject selection of this study was done in Saveetha Dental College, Chennai, India based on the inclusion and exclusion criteria.

Inclusion Criteria

1. At least 18 years old patient
2. Healthy subjects with no history of systemic diseases
3. Both genders were included
4. Endodontically treated teeth
5. Post indicated teeth
6. Patient willing for the treatment
7. Signed informed consent

Exclusion Criteria

1. Patients with systemic diseases
2. Alcoholic patients
3. Patients where post is not indicated
4. Patients not willing for the treatment

After the inclusion and exclusion criteria was followed, by sample size of 912 was agreed upon

Groups

Group 1 – Prefabricated fibre post

Group 2 – Prefabricated metal post

Group 3 – Custom made post

Statistical Analysis

All analyses were conducted using SPSS 20 [SPSS Inc, Chicago, IL]. Description statistics such as frequency was carried out for each model. A chi square test was done to determine the correlation between the treatment options and age, gender and tooth.

Statistical Variables

The independent variables in this study are the study groups.

The dependent variables in this study are the various posts.

RESULTS AND DISCUSSION

In this retrospective study, when the prevalence of different posts was checked, it was observed that the prefabricated metal post had the highest prevalence [49.9%], followed by prefabricated fibre post [39.8%] and the custom made post had the least prevalence [10.3%] [Table 1] [Figure 1]. The reason can be that metal posts have a long history of usage and it can be used in cases with severe loss of tooth structure (Jyothi *et al.*, 2017).

Prefabricated fibre posts were more commonly seen in the age group of 20-40 years [23.8%]. Prefabricated metal posts were more commonly seen in the age group of 20-40 years [30.2%]. Custom made posts were more commonly seen in the age groups of 20-40 years [6.2%] [Table 2] [Figure 2]. This result is in contrast to some studies which reported that the middle aged group population has the highest prevalence of post treatment, since at this age, it is more prone to caries as it gets weakened (Duraishamy, Krishnan, Ramasubramanian, Sampathkumar, Mariappan and Sivaprakasam, 2019). The least prevalence of posts was found in the geriatric patients. This can be due to the loss of most of the teeth at this age due to weakened periodontium. The association between the type of post and age was not statistically significant. Chi square value- 0.748, p value- 0.945 [>0.05].

Prefabricated fibre posts were more commonly seen in the female patients [20.6%] than the male patients [19.2%]. Prefabricated metal posts were more commonly seen in the female patients [26.2%] than the male patients [23.7%]. Custom made posts were more commonly seen in the male patients [6.9%] than the female patients [3.4%] [Table 2] [Figure 3]. The reason can be that there is more extensive damage in male patients, hence requiring metal post. This finding is similar to a study which states that caries incidence for both the genders is equal (Venugopalan *et al.*, 2014). The association between the type of post and age was statistically significant. Chi square value- 12.505, p value- 0.002 [<0.05].

Prefabricated fibre posts were more commonly seen in the anterior teeth [35.4%]. Prefabricated metal posts were more commonly seen in the molars [49.9%]. Custom made posts [Red] were more commonly seen in the anterior teeth [8.7%] [Table 2] [Figure 4]. It was observed that prefabricated fibre posts and custom made posts are more common in the posterior teeth. The reason for prefabricated fibre posts to be used in the anterior teeth can be aesthetics. A cast post and core can be made using several materials like gold alloy, silver palladium alloy, or a box metal alloy, etc (Venugopalan *et al.*, 2014). Prefabricated posts are made from a variety of materials ranging from metallic [stainless steel and titanium alloys] to non-metallic [zirconia fibre reinforced composite resin] (Jain, Ranganathan and Ganapathy, 2017). Metal posts are not placed in the anterior teeth as it hampers the translucency and affects the aesthetics. Cast posts are mostly placed in the anterior teeth, since the angle of the crown might have to be changed from the angle of the root to have an aesthetic smile (Ruparel, 2013), (Baba and Goodacre, 2014). It was believed that metal posts should be used in the posterior teeth, as it will act as a strong support to the crown portion and prevent it from fracture. The association between the type of post and teeth was statistically significant. Chi square value- 732.3, p value- 0.001 [<0.05].

Based on a finite element analysis of various posts, Coelho *et al.* (Coelho *et al.*, 2009) reported that fibre posts had modulus of elasticity similar to dentine, where it had a more homogenous stress distribution due to which the risk of fracture was decreased. In a systematic review, Nicole Martins *et al.* reported that there is a significant difference in the survival rates depending on the type of posts. The mean survival time for fibre post was 12 years, 11.8 years for custom made post and 10.2 years for prefabricated metal post. These results did not coincide with a study done by Sarkins *et al.* (Coelho *et al.*, 2009; Sarkis-Onofre *et al.*, 2014), which stated that the survival rates were independent of the types of post. More failures of the posts are seen in the anterior teeth than the posterior teeth. The rationale behind the higher failure rates is the angulation of the anterior teeth, which makes it more susceptible to shear force. Even with all the disadvantages of prefabricated fibre posts in comparison to custom made posts, the former is preferred in the younger population as they demand a more aesthetic smile. In another systematic review by Figueiredo Eros *et al.* (Website, no date), he reported that the incidence rate of root fractures for prefabricated metal posts was twice that of custom made metal posts and glass fibre posts. He also reported that the survival rate of metal based posts is 90% and of fibre posts is 83.9%. There are many different studies which have contradictory statements to other studies regarding various parameters. The limitation of the study is that it is a retro respect study, only its prevalence was seen since since the operators for the posts treatment was different. Our institution is passionate about high quality evidence based research and has excelled in various fields ((Pc, Marimuthu and Devadoss, 2018; Ramesh *et al.*, 2018; Ezhilarasan, Apoorva and Ashok Vardhan, 2019; Ramadurai *et al.*, 2019; Sridharan *et al.*, 2019; Vijayashree Priyadharsini, 2019; Mathew *et al.*, 2020)

TABLES AND GRAPHS

Table 1: Table showing prevalence for different types of posts

Groups	Frequency	Percentage
Prefabricated Fibre Post	363	39.8%
Prefabricated Metal Post	455	49.9%

Custom Made Post	94	10.3%
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Table 2: Table showing the correlation between different types of post and age, gender, and teeth.

Criteria			Prefabricated fibre post	Prefabricated Metal Post	Custom made post	Chi square value	P value
Age	20-40 years	Count % of total	217 [23.8%]	275 [30.2%]	57 [6.2%]	0.748	0.945
	41-60 years	Count % of total	113 [12.4%]	146 [16.0%]	29 [3.2%]		
	>60years	Count % of total	33 [3.6%]	34 [3.7%]	8 [0.9%]		
Gender	Male	Count % of total	175 [19.2%]	216 [23.7%]	63 [6.9%]	12.505	0.002*
	Female	Count % of total	188 [20.6%]	239 [26.2%]	31 [3.4%]		
Teeth	Anterior	Count % of total	323 [35.4%]	0 [0.0%]	79 [8.7%]	732.3	0.001*
	Premolar	Count % of total	40 [4.4%]	215 [23.6%]	11 [1.2%]		
	Molar	Count % of total	0 [0.0%]	240 [49.9%]	4 [0.4%]		

* shows statistical significance

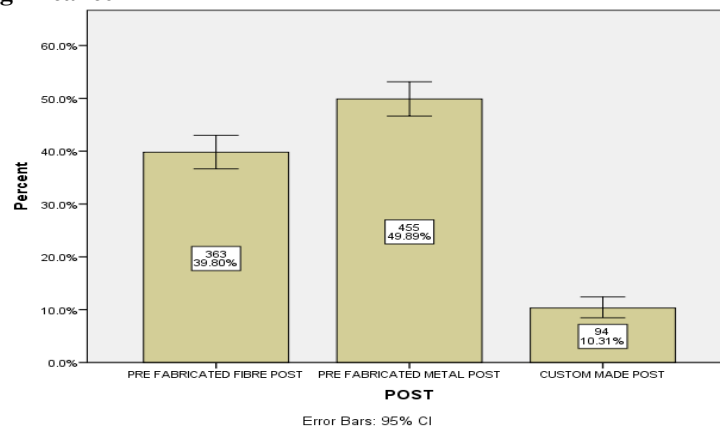


Fig.1: Bar graph depicting the prevalence of different types of posts. The X- axis represents the different types of posts used and Y-axis represents the percentage of cases. The most prevalent of the posts prefabricated metal post [49.9%], followed by prefabricated fibre post [39.8%] and the least prevalent was custom made post [10.3%].

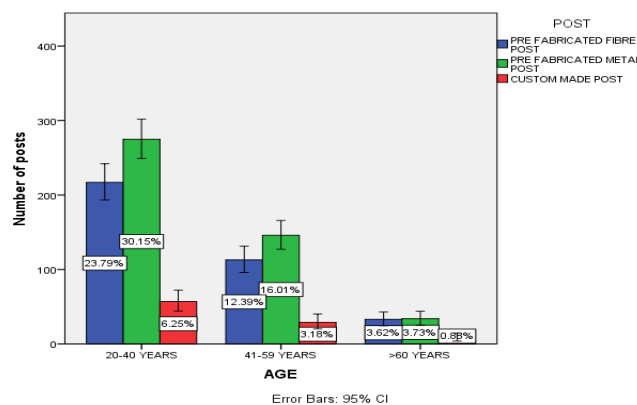


Fig.2: Bar graph representing the association between type of post and age. X-axis represents the age and Y-axis represents the number of posts where prefabricated fibre post [blue], prefabricated metal post [green], custom made post [red]. There is no statistical significant association between post and age [Chi square value- 0.748, p value- 0.945 [p>0.05], however, all the three groups of posts were most commonly used in between 20-40 years.

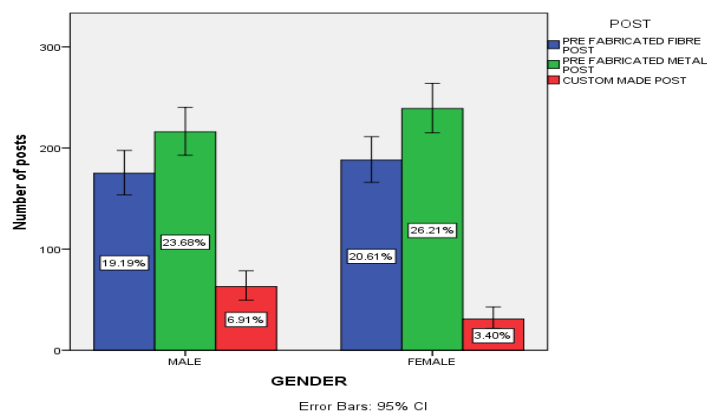


Fig.3: Bar graph representing the association between type of post and gender. X-axis represents the gender and Y-axis represents the number of posts where prefabricated fibre post [blue], prefabricated metal post [green], custom made post [red]. There is a statistical significant association between post and gender [Chi square value- 12.505, p value- 0.002 [p<0.05], however, prefabricated metal posts [Green] and prefabricated fibre posts [Blue] were most commonly used in female patients, whereas, custom made posts [Red] were most commonly used in male patients.

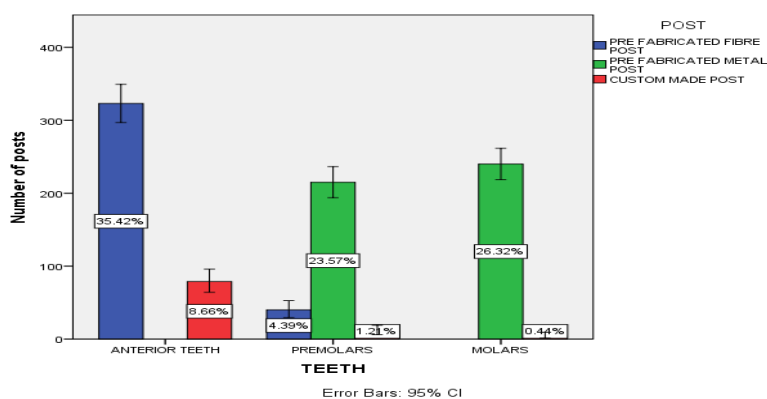


Fig.4: Bar graph representing the association between type of post and teeth. X-axis represents the teeth and Y-axis represents the number of posts where prefabricated fibre post [blue], prefabricated metal post [green], custom made post [red]. There is a statistical significant association between post and teeth [Chi square value- 732.3, p value- 0.001 [p<0.05], however, prefabricated fibre posts [Blue] and custom made posts [Red] were more commonly used in the anterior teeth, whereas, prefabricated metal posts [Green] were more commonly used in the posterior teeth.

CONCLUSION

Within the limitations of the current study it can be concluded that the prevalence of prefabricated metal posts was the maximum. More number of in vivo studies need to be done to verify the fracture resistance and survival rates of the posts under one operator to avoid bias. Long term follow up needs to be done to verify the outcome measures and longevity of the posts. Patients should be explained about posts, so that more patients will be motivated for the treatment. In this way, the overall outcome of the treatment can be improved, which in turn will have an impact on the quality of life.

AUTHOR CONTRIBUTIONS

The primary author contributed to establish the materials and methods and analysed the results followed by manuscript writing.

The co-author verified the results and manuscript before submission.

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Conflict of Interest

The author declares no conflict of interest.

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