



Association Between Type of Tooth and Number of Walls Present in Teeth Undergoing FRC Post - An Institution Based Retrospective Study

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ABSTRACT

Bondable fibre reinforced composite posts have gained popularity over the years for reinforcement of endodontically treated teeth. Success rate of these posts has been attributed to their low elastic modulus, resistance to high fatigue, excellent light conductivity etc. This study aimed to evaluate the Fibre-reinforced composite posts among different teeth and to know its association with the number of walls remaining. Data of 233 patients for whom FRC posts were placed at the Department of Conservative Dentistry and Endodontics was obtained from the Dental archives of Saveetha Dental College, Chennai. The type of tooth and number of walls present among age groups and gender were studied retrospectively. The results of the study showed that the use of FRC posts had a male predilection (53.65%) and 31-40 years was the most common age group among patients. A most common tooth was 21 (22.3%), followed by 11 (20.6%) and the least preferred teeth for FRC posts were 52 and 53 (0.4% each). It was observed that tooth type and the number of walls present had no association ($p=0.261$). Most prevalent number of coronal walls remaining in the tooth that underwent FRC were 2 walls (51.5%). The study draws attention to the fact that use of FRC posts has gained popularity over the years and there is a significant evolution for newer post systems to reduce the failure rate of post endodontic treatment with post and core systems. Since fibre-reinforced systems are incorporated into clinical practice more frequently, there is a need for various clinical studies evaluating the success rate despite the high number of laboratory studies pertaining to the characteristics of fibre posts.



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INTRODUCTION

Good prognosis of teeth which are endodontically treated also depends on the type of reconstruction preferred by the dentists and not completely on just the success rate of the endodontic treatments. Therefore, any decision of whether or not to use posts and which type of post to be given is a critical decision (Peroz *et al.*, 1985; Jose *et al.*, 2020). Diagnosis and careful evaluation of the clinical situation and following the criteria universally accepted is very crucial for the success of any treatment (Ramanathan and Solete, 2015; Janani *et al.*,

2020). Proper evaluation of the canal preparation needs to be done prior to the use of posts (Kumar and Antony, 2018; Siddique, 2019). Proper cleaning and shaping, choice of good intracanal medications in case of multiple visit endodontics is necessary (Manohar and Sharma, 2018; Teja and Ramesh, 2019). Irrigation during endodontic treatment is of utmost importance (Noor and Pradeep, 2016; Rajendran et al., 2019). Care should be taken to ensure that there are no signs of inflammation before placing posts (Ramesh et al., 2018).

When the remaining coronal structure is inadequate and can't provide adequate retention of the restoration (de Moraes et al., 2013), Intraradicular posts are required. In certain cases, reimplantation after avulsion followed by post have been useful (Rajakeerthi and Nivedhitha, 2019). For many years metal posts were standard then when esthetics played a major role in decision making, non-metallic posts were preferred (Trushkowsky, 2008). Shadowing of the soft tissues closer or near to the root surface by metal posts affected the aesthetics and had to be followed by resin bonded or ceramic restorations, especially for the anterior region (Amižić and Baraba, 2016).

Fibre-reinforced composite (FRC) posts were introduced later following the use of Prefabricated fibre posts which were popularly known for their benefits (Segal, 2001). A higher quantity of FRC materials are allowed to the root canal opening coronally than doing excessive preparation needed for the deeper parts of the canal. Stress at the apical parts of the post were minimized since this method provided the strongest support and saved dentin with its greater diameter cores (Manhart, 2009). Fiber in the organic matrix was evenly distributed and densely packed and showed a high degree of polymerization which led to its supreme quality (Vallittu, 1996). FRC posts have a modulus of elasticity of 16 to 40 GPa that provides ample resistance to shock and also augments fatigue resistance (Bonchev et al., 2017).

Factors like post length, remaining dentin and post diameter plays a role in governing the rule for the use of FRC post. Studies prove that the retentive capacity increases as the length of the post increases, but this increases chances of root perforation. The recommended post diameter should be less than one-third of the diameter of the root at the CEJ. Post removal, internal resorption and flaring at the coronal region to attain access to the apical portion are the ways known to reduce dentin thickness at the coronal part (Inaba et al., 2013).

Apart from the advantages of FRC posts, failures of

fibre posts can also be there, which is mainly due to adhesion loss or it's a fracture. However, it is less likely to experience a fracture in the tooth root, in contrast to posts made of rigid metal (Ravinthar and Jayalakshmi, 2018). On the contrary to zirconium oxide materials which are tooth coloured, posts made from fibre reinforced composite can be retrieved from the root canal using an excavation instrument. The varied advantages and disadvantages of forementioned fibre posts have been widely discussed and verified by multiple laboratory tests. But there exists a dearth in the literature about the preference of use clinically in different situations. There is a need to know the prevalence of use of FRC posts based on the type of tooth and number of walls remaining for building up a guide in order to assist the future dentists based on changing trends. This will pave the way for extensive research to gain a better understanding about the use and indications of posts.

The purpose of this study was to evaluate the use of Fibre-reinforced composite posts among different teeth and to know its association with the number of walls remaining.

MATERIALS AND METHODS

A retrospective hospital-based study of 233 patients who underwent FRC post after endodontic therapy was carried out by accessing the data from Department of Conservative dentistry and Endodontics of Saveetha Dental College and Hospital, Chennai, South India using the colleges' patient management software from June 2019 to March 2020. Institutional ethical committee clearance was obtained for data retrieval and usage as needed for the study (SDC/SIHEC/2020/DIASDATA/0619-0320). Inpatients who underwent FRC post were identified using the aforementioned digital records. Patients with incomplete records and double entries were excluded from the study. For each patient, details on the type of tooth, number of walls remaining, age and gender were collected and tabulated. Distribution percentages and associations were derived using Chi-Square tests. SPSS for Windows, ver. 19.0; SPSS Science, Chicago, IL, USA was used for performing all the analyses.

RESULTS AND DISCUSSION

Two hundred and thirty-three (233) patients were identified to have undergone FRC post placement in the Department of Conservative Dentistry and Endodontics.

Age distribution of the patients who had undergone

Table 1: Age distribution of the patients who underwent FRC post-placement

Age groups	Frequency	Percentage
Less than 30	93	39.9
31-40	53	22.7
41-50	35	15.0
51-60	36	15.5
61-70	16	6.9
Total	233	100.0

The highest prevalence was observed within the range of 31-40 years (22.7%)

Table 2: Distribution of the number of walls present while undergoing FRC post

Walls present	Frequency	Percentage
1	36	15.5
2	120	51.5
3	52	22.3
4	25	10.7
Total	233	100.0

The highest percentage was observed in teeth with 2 walls (51.5%)

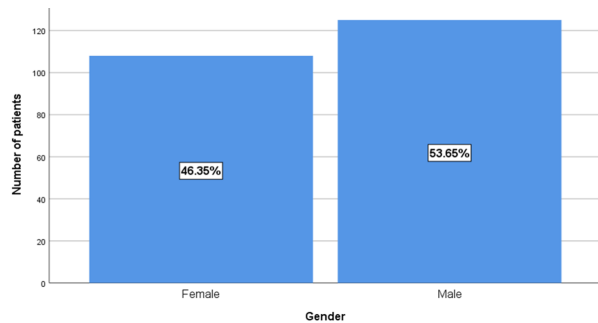


Figure 1: Graph representing gender distribution (N=233)

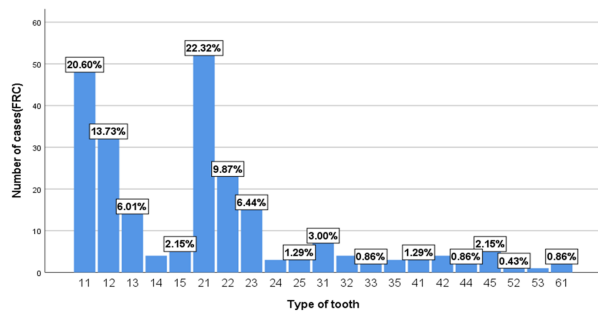


Figure 2: Distribution of type of tooth associated with FRC post

FRC post-placement shows that there was a higher prevalence observed within the range of 31-40 years (22.7%). [Table 1] Out of the 233 patients, 22.3% of the FRC posts were placed in 21 (left maxillary central incisor), followed by 20.6 % in 11 (right maxillary central incisor) and this can be cumulatively taken as Maxillary central incisors underwent post

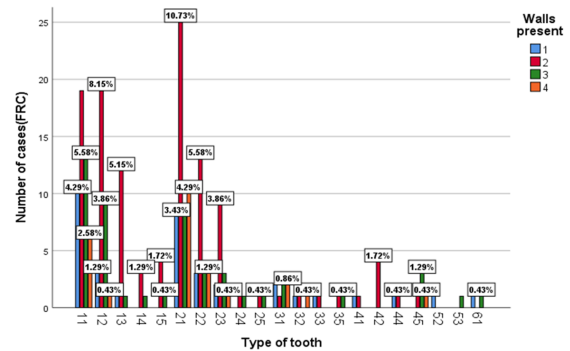


Figure 3: Bar graph depicting the association between type of tooth and the number of walls remaining

placements predominantly.

Only 0.4% were observed in primary teeth (52,53) in the study population. [Figure 2]. The X-axis represents tooth number and the Y-axis represents the number of cases (FRC). 22.3% placed in 21 and 20.6 % in 11 (cumulatively taken as Maxillary central incisors). Only 0.4% were observed in primary teeth (52,53).

Gender distribution among patients who underwent FRC revealed a male predominance (53.65%). [Figure 1] FRC post-placement was commonly observed in teeth with 2 walls remaining (51.5%). The X-axis represents gender, and Y-axis represents the number of patients. Male predominance (53.65%) was observed.

[Table 2] Walls present and type of tooth showed

no significant association ($p=0.261$). [Figure 3] Two walls were commonly present in the Maxillary central incisors that predominantly underwent FRC. No statistically significant difference between the tooth number and the walls remaining (Pearson Chi-Square test, p -value- 0.261, $p>0.05$)

In the present study, FRC posts were frequently used among patients within the age group of 31-40 years [Table 1]. This can be related to the fact that patients in their fourth decade of life have higher incidences of decay, which is extensive, and this was previously observed in the rural areas in a study conducted by (Kahar, 2016). The main reason for the loss of coronal tooth structure was poor oral hygiene maintenance, which was in turn related to caries (Kahar, 2016).

In the present study, Males (53.65%) frequently underwent FRC post following their endodontic treatment than females [Figure 1]. This is in acceptance with the study by (Mattoo et al., 2018) that suggests that the male population are more prone to caries and have adverse habits leading to loss of adequate crown structure that led to more number of posts placement (Mattoo et al., 2018). (Jain and Bansal, 2020) in his study also stated that more number of root canal treatments were done in the male population than female population because women tend to have a perception of waiting for the pain to subside (Jain and Bansal, 2020), whereas a man attends to the pain by getting it endodontically treated at a faster pace which throws light on the reason why males are invariably undergoing more FRC posts placement.

In the present study, Maxillary central incisors have predominantly undergone FRC post [Figure 2]. This result has been appreciated by similar studies by Magne et al., which concludes that more flexural stresses have to be supported by the Maxillary anteriors, and therefore one of the most important characteristics becomes rigidity (Magne and Douglas, 2000). In another study by C.Youngson, fibre posts were used to increase rigidity in anterior teeth for functional than adhesive reasons, which can also explain the reason for more use of fibre posts in anteriors (Youngson, 2005).

Fibre posts provide some translucency and their optical properties are similar to that of the natural teeth that have the ability to conduct light, which in turn facilitates the aim of acquiring high quality and aesthetic restorations (Mjör, 2001). Since aesthetic is the main concern in the restoration of anterior teeth (Hussainy, 2018), it is evident that FRC posts were used for all of the above reasons in anteriors more than posteriors in this study.

According to Figure 2, primary teeth, specifically, incisors have been treated rarely with fibre posts (only 0.4%). But this is a changing concept, as a study conducted by Ajay Kumar Kapoor et al., proves that rehabilitation of primary incisors with fibre-reinforced posts with flowable composite and bonding agent offers a firm restoration unit (Kapoor, 2017).

More FRCs were placed in teeth presenting with 2 walls (Table 2 -51.5%). This was contradictory to a study done by (Crysanticagidiaco et al., 2008). In the aforementioned study, teeth with 3 walls were treated in higher percentages. However, in the same study, it was also found that any compromise in the ferrule effect leads to a statistically significant failure of the post despite more number of walls present. Hence, proved that walls present did not affect the success rate but the ferrule structure had a direct influence.

Type of tooth and walls present were not strongly associated (Figure 3). This can be due to reasons like the difference in tooth structure being affected by caries will differ from person to person. Contradictory literature regarding this association was also not found, prompting the need for further research with a greater sample size population.

There is no such post and cores that are ideal for all clinical scenarios. Having the same shape as the endodontically prepared tooth, non-corrosiveness, adjustability, and ease of removal without difficulty are the properties of an ideal post. Radiopacity, lesser removal of tooth structure, and a modulus of elasticity equal to that of the dentin are some other requisites of a good post. The mechanical requirements required to restore the tooth should be provided by the post. The correlation between the type of tooth and remaining structure like dentin and walls present has to be evaluated and proper guidelines for the use of fibre-reinforced post in different clinical situations must be created to ease the work of future dentists in providing more success rates. Most importantly despite advancements in the field of endodontics, a dentist must emphasize on caries prevention and no postoperative pain during or after treatment (Ramamoorthi et al., 2015; Nasim and Nandakumar, 2018).

CONCLUSION

Within the limitations of the present study, it can be concluded that the use of FRC posts had a male predilection and most of the patients were from the age group of 31 to 40 years. Most commonly reinforced teeth were Maxillary central incisors. It was observed that tooth type and the number of walls

remaining had no association ($p=0.261$). Two walls were frequently present in teeth that underwent FRC.

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Conflict of Interest

The authors declare that they have no conflict of interest for this study.

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