EVALUATING NUMBER OF PREFABRICATED FIBER POSTS PLACED IN THE LOWER ANTERIORS WITH 2 OR MORE WALLS PRESENT

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ABSTRACT:

The endodontically treated teeth with extensive loss of tooth substance have numerous problems due to significant reduction in the capability to resist a myriad of functional forces Today, it is accepted clinical practice to use a post to retain the coronal restoration after a tooth has been endodontically treated when significant amounts of the coronal tooth structure is missing. The aim of the study is to assess the number of prefabricated fiber posts placed in the lower anterior with 2 or more walls present. After analysing 86,000 patient records , the sample size chosen for the study was 24 patient records. The data that was collected was tabulated in excel and then imported into SPSS software. Incomplete data were excluded from the study. Chi square test was the statistical test employed for statistical analysis and it was noted that the most prevalent prevalent gender to undergo this treatment were female (66.67%) , most prevalent teeth to be treated was 31, 32, 42 (21.21%) and most prevalent wall present was 2 walls (69.70%). Correlation between the patient age and the no of walls were seen to be statistically significant p = <0.05 (p=0.001). Within the limits of this study, the prevalence of prefabricated fiber post in lower anterior teeth was most commonly seen in females among the lower canines. Significant association was present between the number of walls present and age .No significant association was present between the number of walls present with gender and type of teeth. Fiber reinforced posts are the most preferred posts to be used in anterior teeth, due to its flexural strength being similar to that of dentin and also better distribution of stress among the remaining tooth structure.

KEYWORDS: Fiber post, Prefabricated post , Post Endodontic Restoration, Root canal

INTRODUCTION:

Dental caries and non carious lesions is the most common cause for the loss of enamel in a clinical situation (Rajendran *et al.*, 2019) (Hussainy *et al.*, 2018). Disease of the pulp can be infectious or inflammatory. In such conditions, the healthy pulp attempts to counteract the inflammatory response as a defense mechanism in order to restore the integrity of the pulp (Janani, Palanivelu and Sandhya, 2020). The pathophysiology of spread of infection in the root canal is quite complex, the degradation of matrix during dental caries or injury which if not treated early will lead to inflammatory pulpal destruction

(Teja, Ramesh and Priya, 2018). The teeth which are infected till the pulp are endodontically treated. Following endodontic treatment the final restoration is given, in cases where there is inadequate amount of tooth structure present then the use of post and core build up is done. The use of a post crown fabricated from gold or silver to restore a root-filled tooth was described more than 20 years ago by Fauchard (Fauchard, 1980) Today, it is accepted clinical practice to use a post to retain the coronal restoration after a tooth has been endodontically treated when significant amounts of the coronal tooth structure is missing (Rosenstiel, Land and Fujimoto, 2006). With the advent of new technology , numerous prefabricated post systems have been introduced and used successfully in clinical situations , they have reduced chair time and the cost to the patient (Choudhary *et al.*, 2014)

Classification of endodontic posts has been made into 2 groups - custom-made, laboratory-fabricated and prefabricated, direct-placement. Prefabricated posts have been made from metals, ceramics, and fiber-reinforced, resin-based substrates. Cements for prefabricated posts include zinc phosphate, polycarboxylate, glass ionomer, and resin (Peroz *et al.*, 2005). Metal posts had been considered gold standard many years, nonmetallic posts have been introduced to address the need for a more esthetic material in the anterior region. In the last several years there have been significant advances in the development of bondable, fiber-reinforced, esthetic posts to reinforce endodontically treated teeth (Qualtrough and Mannocci, 2003) (Mannocci, Ferrari and Watson, 2001) (Strassler *et al.*, 2000) (Pitel and Hicks, 2003) (Brown and Hicks, 2003). These fiber posts have an advantage over the other types of esthetic posts used in the past. There is a need for light in translucent composite resins and ceramics to mimic the natural tooth requiring the use of translucent posts in the esthetic zone. The placement of a metal post in the anterior region can cause shadowing of the soft tissues adjacent to the root surface, which might affect the esthetic results required for bonded resin and ceramic restorations in the anterior region (Godder *et al.*, 1994) (Takeda *et al.*, 1996).

Factors that determine the success of post and core treatment includes shape of the canal (Teja and Ramesh, 2019), chemicals that cause loss of tooth structure (Nasim and Nandakumar, 2018) type of irrigants used (Ramanathan and Solete, 2015; Siddique *et al.*, 2019)(Noor, S Syed Shihaab and Pradeep, 2016, irrigant activation used, reason for root canal treatment like trauma (Jose, P. and Subbaiyan, 2020), preoperative considerations of infected /traumatised teeth(R, Rajakeerthi and Ms, 2019)(Ramesh, Teja and Priya, 2018), calcified canal(Kumar and Delphine Priscilla Antony, 2018) (Ramamoorthi, Nivedhitha and Divyanand, 2015), materials used for sealing the root canals(Manohar and Sharma, 2018) .

The need for such a study is to bring awareness among the dental professionals about prefabricated fiber post, since most studies about prefabricated fiber post are in-vitro more studies have to be carried out in a clinical and retrospective manner. The aim of the current study is to assess the association present between the number of walls present and prefabricated fiber posts.

MATERIALS AND METHOD:

Study design and setting:

This study setting is mainly a type of the university based and a single centered study.A Retrospective study was conducted using the records of the patients. 86000 case sheets were reviewed which were dated between June 2019 to March 2020. The data was collected by the patient records.The study population included patients who underwent prefabricated fiber post treatment in the lower anterior tooth region. The main advantage of this type of study is that flexible data can be obtained immediately but the drawback of this study is that they have geographical limitations and involve the people of the isolated population.Repeated patient records, incomplete data without proper notes were excluded from the data.The data were recorded, tabulated .

Statistical analysis:

Data was recorded in Microsoft Excel (version 2007,office 365) and later exported to IBM SPSS (version 20.0 chicago USA) and subjected to Statistical analysis. Chi Square test was then employed with a level of significance set at $P<0.05$. Chi square test was done to compare the parameters.The outcome was represented in a form of tables and bar charts. Ethical clearance was obtained. Ethical approval number SDC/SIHEC/2020/DIASDATA/0619-0320).

RESULTS AND DISCUSSION.

It was noted that the most common age group to undergo treatment for prefabricated fiber crowns were patients in the age group of 40-50 years (39.39%)(figure 1) the most prevalent prevalent gender to undergo this treatment were female (66.67%) (figure 2) , most prevalent teeth to be treated was 31,32,42 (21.21%) (figure 3) and most prevalent wall present was 2 walls (69.70%) (figure 4). Correlation between the patient age and the no of walls- statistically significant (p=0.001) (figure 5) correlation between the wall and the tooth number –not statistically significant (p=0.187) (figure 6) correlation between the patient gender and the no of walls- not statistically significant (p=0.051) (figure 7) most prevalent gender was female, most prevalent tooth to be treated 31,32,42.

A budding interest in aesthetic dental restorations and adhesive dentistry has led to development of innovative post materials and techniques for restoration of endodontically treated teeth. The use of fiber-reinforced composite-resin posts (FRC posts) has become popular in the last few years (Perdigão, Gomes and Augusto, 2007) (Bitter *et al.*, 2006) .A post provides an anchor to the restorative material to the tooth. The post is inserted into the root canal of endodontically treated tooth, and thus enables the coronal prosthetic core to be built and retained (Bessone and Bodereau, 2010)

Many different types of posts have been mentioned in the literature (Fernandes, Shetty and Coutinho, 2003). At first, cast metal alloy posts and prefabricated posts made of stainless steel, titanium or precious alloys were used. This cast post core system was more time consuming and required an intermediate laboratory phase to elaborate the retaining system, making the procedure expensive. Prefabricated posts did not require the laboratory phase and, therefore, allow the whole restoration to be performed in one visit, resulting in an easier and less expensive technique (Barjau-Escribano *et al.*, 2006).

These newer systems, fibre post have focused on physical properties, such as modulus of elasticity, that are closely matched to dentin to decrease stress concentration within the root canal and reduce the incidence of fracture (Takeda *et al.*, 1996), The indication for post placement depends on ascertaining the amount of destruction exhibited and whether the remaining tooth structure will support the selected restoration.The main factors that determine the prognosis of restored pulpless teeth have been the preservation of healthy dentin, the ferruling of crown margins on sound tooth structure, and the type of intermaxillary relation. Since in most cases there is no sound tooth structure it is generally not indicated to use veneers for anterior teeth replacement. A veneer is a thin sheet of material placed on the front surface of the tooth, used for aesthetic purposes and protection. It is usually a thin layer of restorative material replacing the enamel (Ravinthar and Others, 2018).Fiber-reinforced composite posts are indicated when restoring endodontically treated teeth to provide retention of the core and for root reinforcement (Bonchev, Radeva and Tsvetanova, 2017) .

The results from our study shows that the most common age group to undergo treatment for prefabricated fiber crowns were patients in the age group of 40-50 years, the reason for this could be that patients in this age group required a more aesthetic outcome without loss of tooth structure. the most prevalent prevalent gender to undergo this treatment were female (66.67%) the reason could be that females are more concerned about their aesthetic compared to males , most prevalent teeth to be treated was 31,32,42 (21.21%) the reason being that there are most commonly associated with the patients aesthetics and most prevalent wall present was 2 walls (69.70%) the reason for this could be the fact that lower anterior teeth

are comparatively smaller than other tooth and hence might lose a lot of tooth structure during root canal treatment. . Correlation between the patient age and the remaining number of walls present was statistically significant (p=0.001) , correlation between the remaining number of wall and the tooth number was not statistically significant (p=0.187) correlation between the patient gender and the remaining number of walls was not statistically significant (p=0.051) most prevalent gender was female, most prevalent tooth to be treated 31,32,42. The reason for obtaining non statistical results could be the reduced sample size of the study population.

The limitation of this study was the Limited population covered , reduced sample size, Limited number of studies conducted , the future scope of this study will include Other parts of population should be covered,Increased number of population- better results, More retrospective studies to be conducted.

CONCLUSION:

Within the limitations of the study, it can be concluded the remaining coronal walls influence the type of post selected for the restoring endodontically treated teeth. the prevalence of prefabricated fiber post in lower anterior teeth was most commonly seen in females than males among the lower canines. Significant association was present between the number of walls present and with age. Fiber reinforced post are the most preferred post in anterior teeth, due to its flexural strength matching the dentin and its better distribution of stress among the remaining tooth structure.

AUTHOR CONTRIBUTION:

Gayathri Karthikeyan carried out the retrospective study, participated in the sequence alignment, statistical analysis and drafted the manuscript. Surendar Sugumaran and Jaiganesh Ramamurthy conceived the study, participated in its design and coordinated and provided guidance to draft the manuscript. All the authors had equally contributed in developing the manuscript.

CONFLICT OF INTEREST:

The author would like to declare there was no conflict of interest

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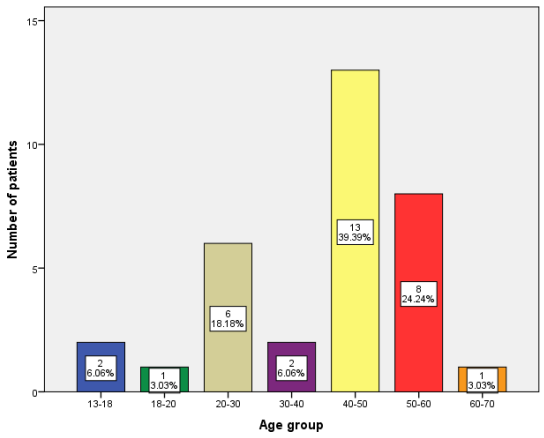

Figure 1 : Bar charts shows the distribution of patients who underwent prefabricated fiber post treatment based on age (x- axis represents age group , y-axis represents number of patients) where blue indicates age group 13-17 years (n=2) , green indicates 18-20 years (n=1), gray indicates 20-30 years (n=6), purple indicates 30-40 years (n=2), yellow indicates 40-50 years (n=13), red indicates 50-60 years (n=8) and orange indicates 60-70 years (n=1).The most common age group to undergo treatment for prefabricated fiber crowns were patients belonging the age group of 40-50 years.

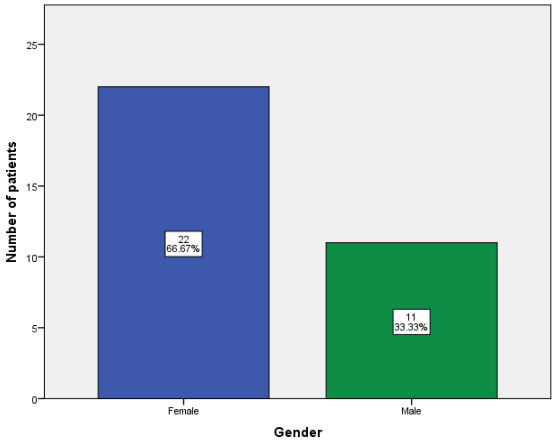

Figure 2 : Bar chart indicated the distribution of patients who underwent prefabricated fiber post treatment based on gender (X-axis represents gender , Y axis represents number of patients) where blue indicated females (n=22) and green indicates males (n=11) . the gender which more commonly underwent prefabricated fiber post treatment were males compared to females.

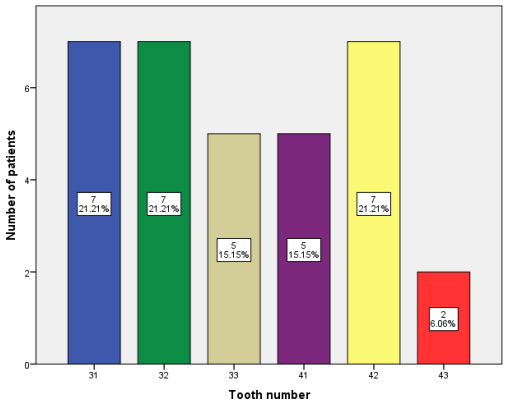

Figure 3 : Bar graph shows distribution of patients who underwent prefabricated fiber post treatment based on teeth number (x- axis represents tooth number, y-axis represents number of patients) where blue indicates tooth number 31 , green tooth number 32, gray indicates tooth number 33, purple indicates tooth number 41, yellow indicates tooth number 42, red indicates tooth number 43. The most common teeth to undergo prefabricated fiber post treatment were the right mandibular centrals and laterals and left mandibular laterals

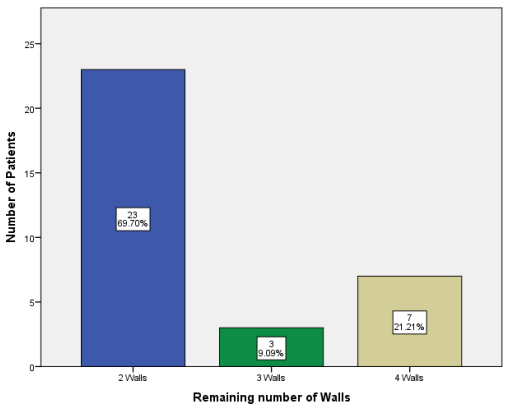

Figure 4 : Bar graph shows the distribution of patients who underwent prefabricated fiber post treatment based on the number of walls (x- axis represents remaining number of walls t, y-axis represents number of patients where blue indicates 2 walls, green indicates 3 walls and gray indicates 4 walls. The most common wall remaining to undergo prefabricated fiber post treatment were 2 walled canals.

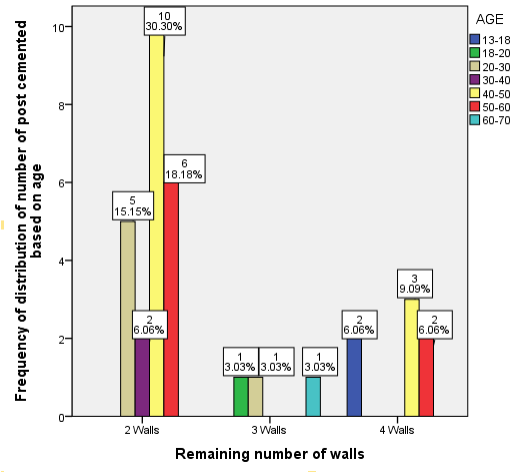

Figure 5: Bar chart shows the association between the number of walls present and age of the patients treated (X- axis represents the remaining number of walls , Y axis- frequency of distribution of posts cemented based on age) Among the 2 walled canals 40-50 years patients were more common, Chi-square test was done and the association was found to be statistically significant . Pearson's value : 32.224, DF: 12, P-value:0.001(<0.05), proving that there is an association present in the remaining number of walls present in the canal and age of the patients who underwent treatment.

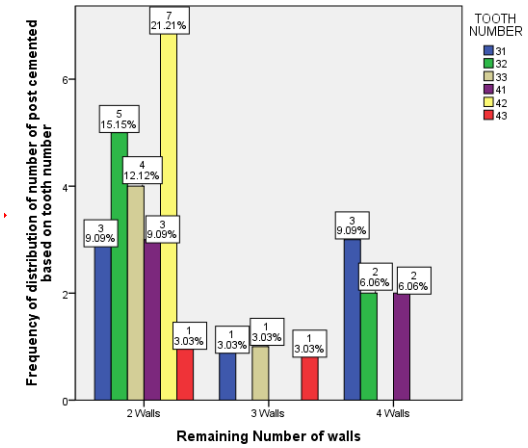

Figure 6 : Bar chart shows the association between the remaining number of walls present and tooth number ,where X- axis represents the remaining number of walls , Y axis represents the frequency of distribution of number of posts cemented based on tooth number). Pearsons's Chi-square value : 13.702, DF: 10, P-value: 0.187(>0.05), hence statistically not significant, proving that there is no association between the remaining number of walls present in the canal and tooth number.

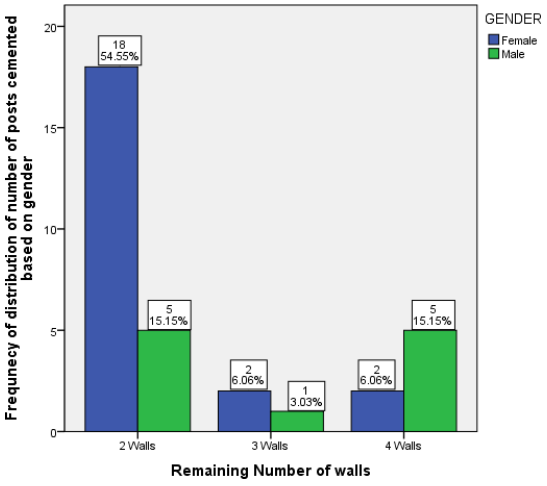

Figure 7: Bar chart shows the association between the number of walls present and gender of patients treated (X- axis represents remaining number of walls, Y axis represents the frequency of distribution of number of posts cemented based on gender). Among the 2 walled canales the most common gender to undergo treatment were females (n=18), among the 3 walled canales the most common gender to undergo treatment were females(n=2) and among the 4 walled canales the most common gender to undergo treatment were males(n=5). Chi-square test was done and the association was found to be not statistically significant . Pearsons's Chi-square value : 5.963, DF: 2, P-value: 0.051(>0.05), hence statistically not significant, proving that there is no association present between the remaining number of walls present in the canal and gender of the patients who underwent treatment.