

## ORIGINAL ARTICLE

# ASSESSMENT OF DENTAL STUDENTS' AND DENTISTS' KNOWLEDGE OF POST AND CORE TECHNIQUE USE IN ENDODONTICALLY TREATED TEETH

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**Abstract:** Restoring the morpho-functionality of a dental crown that shows extensive surface and depth lesions can be achieved by means of prosthetic therapy represented by different post and core techniques. Purpose The present study aims to assess dental students' and dentists' knowledge of post and core techniques using a questionnaire. *Material and methods.* For this survey-based study a questionnaire was designed consisting of 15 questions related to the category of participants, questions related to the sources of information and questions related to the topic discussed. *Results.* This study included 55 participants including 39 students in years IV, V and VI, and 16 dentists. Of the 55 participants, 44 were in the 20-29 age group, 10 in the 29-39 age group, and 1 participant was over 40 years old. In terms of gender, 43 were females and 12 males. 74.5% of the participants (n=41) thought that prefabricated fiberglass posts are most often used, followed by cast metal posts, mentioned by 58.2% (n=32) of the respondents. 81.8% (n=45) of the respondents specified intra-radicular aggregated metal-ceramic crowns as the most used substitution method. *Conclusion.* Based on the results of the study, it can be concluded the main types of prefabricated posts used in post and core techniques were: fiberglass posts and screwed metal posts.

**Keywords:** post and core technique, fiber post, cast post and core.

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## 1. Introduction

Restoring the morpho-functionality of a dental crown that shows extensive surface and depth lesions can be achieved by means of prosthetic therapy represented by different types of post and core restorations. Due to the extensive loss of tooth tissue and the increased fragility of endodontically treated teeth compared to vital teeth, they may fracture [1]. Any of the methods of post and core consist of replacing the natural crown of a tooth with an aggregate prosthetic restoration in the root of the tooth.

For teeth with significant crown damage, endodontic treatment is required as a first step. Therefore, these teeth have a reduced resistance, by preparing canals. After endodontic therapy, post and core procedures are necessary for reconstruction of tooth morphology [2], restoration of normal occlusion and tooth functions. Certain factors affect the restoration selection of endodontically treated teeth. The most important factors are the amount of remaining coronal tooth structure, the position of the tooth on the dental arch and whether it serves as an abutment tooth for fixed or removable dentures [3-5].

To restore endodontically treated teeth, dentists have to choose from a variety of materials and techniques, from conventional cast metal posts, prefabricated metal posts, fiber glass posts or computer-assisted milling posts. Clinical performance and longevity may vary depending on the material [6].

There were two methods for crown rehabilitation in severe crown loss:

- single prosthetic piece with cast post, core and crown, making a single prosthetic piece that provides both crown restoration and root aggregation;
- double prosthetic piece with cast post and core and separately a crown, the first piece is cast post and core, which is added to the root plus a capping crown. The two pieces are independent and are fixed to each other by cementation.

Crown substitution is a means of prosthetic therapy that fully restores the morpho-functional crown of a tooth with extensive surface and depth lesions. It consists of replacing the damaged dental crown with a prosthesis whose aggregation is achieved through a root post that penetrates into a special recess made by widening the root canal. The substitution crown is a means of prosthetic therapy that fully restores the morpho-functional crown of a tooth with extensive surface and depth lesions [7]. Nowadays it is used only as an endocrown.

Preparation of the root canal for a cast metal post results in an increase in canal space and a reduction in root wall thickness, with the risk that the post through wedge effect may result in root fracture.

Prefabricated metal posts can be used to preserve the root wall thickness of endodontically treated teeth, resulting in high fracture resistance, and reduced chair time [8]. However, the difference between the elastic modulus of the metal post compared to dentin can induce stress and also increase the risk of root fracture leading to failures [9].

Instead, fiberglass posts are considered a viable alternative by most professionals due to its aesthetic characteristics and dentin-like modulus of elasticity, which improves stress distribution and reduces the risk of root fractures [10]. They are used in direct technique, preserving chair time.

Considering these varieties of materials, it is essential that dental students as well as dentists have adequate knowledge of the materials and techniques available to be able to perform tooth crown rehabilitation by these methods.

The present study aims to assess dental students' and dentists' knowledge of post and core techniques using a questionnaire.

## 2. Materials and method

The study was conducted on a group of dental students of UMF Craiova and dental doctors also from Craiova. The participants were volunteers, anonymous, and agreed to be included in the study. The study was approved by the Ethics Committee of the University of Medicine and Pharmacy of Craiova (no. 57/29.01.2024).

The study method consisted of a questionnaire that included 15 questions related to the category of participants, questions related to the sources of information and questions related to the topic discussed. The questionnaire was distributed online using Google Forms on social media between late January and February 2024 among students and doctors from Craiova. The questions were the following: Specify your professional category; If you are a student, specify the year;

Gender; Specify the age group you belong to; If you are a doctor, specify your work experience; What are the sources of information you have approached?; Have you witnessed one of the post and core techniques being carried out?; Have you carried out one of the post and core techniques?; Which of the following dental diseases are treated by the post and core techniques?; What conditions do you think a dental root must meet in order to use the post and core techniques?; Which of the following post and core techniques do you consider to be the most commonly used?; Which of the following types of posts do you consider to be the most commonly used?; Which type of crown do you consider to be the most commonly used in post and core techniques for crown lesions?; Which of the following posts do you consider to have the highest mechanical strength?; Which of the following mistakes do you consider to be the most common when preparing the root canal for a post?.

The answers to the questionnaire questions were centralized and statistically processed by descriptive statistical analysis.

## 3. Results

Fifty-five participants responded to the questionnaire, including 39 students in years IV, V and VI, and 16 dentists. Of the 55 participants, 44 were in the 20-29 age group, 10 in the 29-39 age group, and 1 participant was over 40 years old. In terms of gender, 43 were female and 12 male (Fig.1a,b).

According to the number of years of experience, the 16 dentists were divided as

follows: 10 were included in the 0-5 years age group, 3 in the 5-10 years age group and 3 in the over 10 years age group (Fig 1d). It was observed that out of 55 participants, 39 were students and 16 dentists. Of the students, 3 were in 4th year, 5 were in 5th year and 31 were in 6th year (Fig 1c).

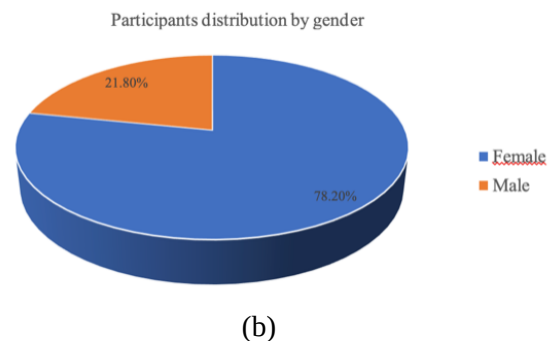
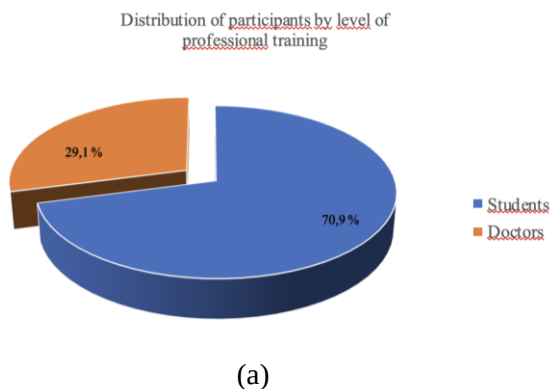
Regarding sources of information, 42 participants mentioned university courses, 37 specialist books, 36 national and international congresses, 31 media and scientific articles (Fig 1e,f).

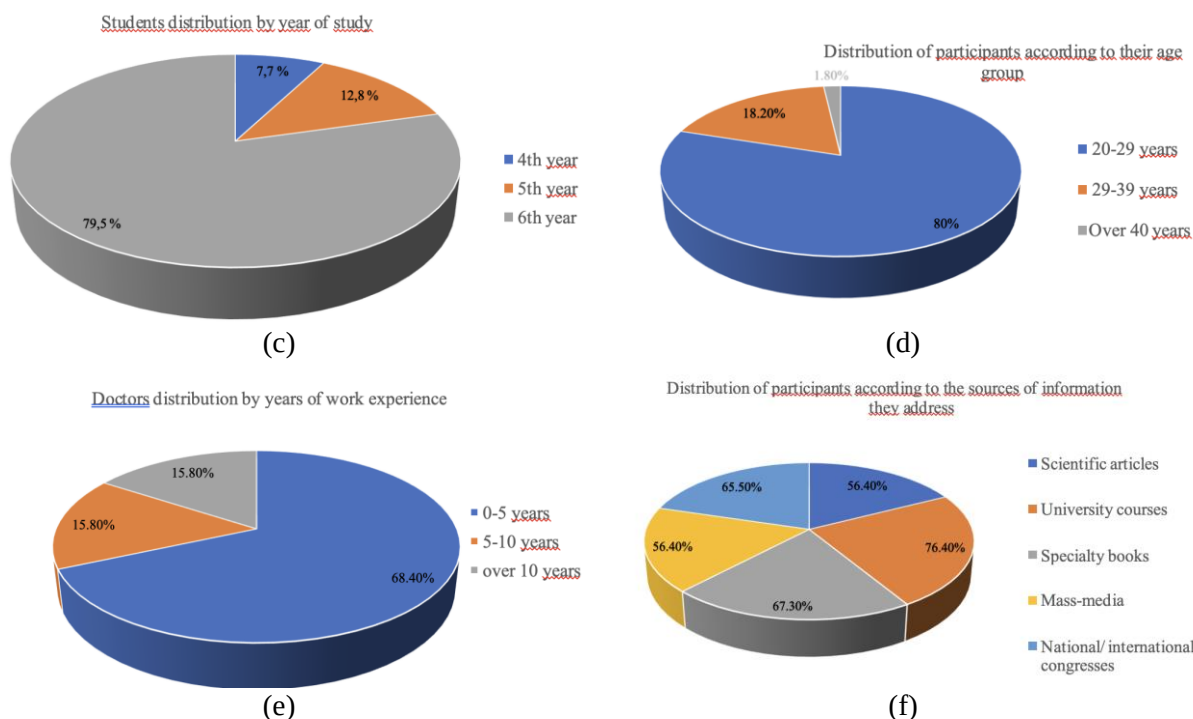
The distribution of participants according to their responses to the question "Which of the following lesions are treated by the post and core technique" was: 78.2% (n=43) indicated that superficial and deep carious lesions are treated by the post and core techniques, 69.1% (n=38) mentioned total or subtotal coronary fracture (Fig 2a).

Concerning "What conditions do you consider a dental root must fulfil in order to use the post and core techniques" 76.4% of the participants (n=42) considered that the roots must be anatomically intact and 74.5% (n=41) stated that there must be no periapical pathological processes (Fig 2b).

For the question "Which of the following post and core techniques do you consider to be most commonly used?", 70.4% of the participants (n=38) considered that intra-radicular aggregate composite restoration with prefabricated glass fiber post is one of the most commonly used (Fig 2c).

When asked "Which of the following types of posts do you think are most often used?", 74.5% of the participants (n=41) thought that prefabricated fiberglass posts are most often used, followed by cast metal posts, mentioned by 58.2% (n=32) of the respondents. (Fig. 2d).





**Figure 1.** Distribution of the study group. (a) Distribution of participants by level of professional training; (b) Students distribution by year of study; (c) Participants distribution by gender; (d) Distribution of participants according to their age group; (e) Doctors distribution by years of work experience; (f) Distribution of participants according to the sources of information they address.

An 81.8% (n=45) of the respondents specified intra-radicular aggregated metal-ceramic crowns as the most used crown substitution method (Fig. 2e).

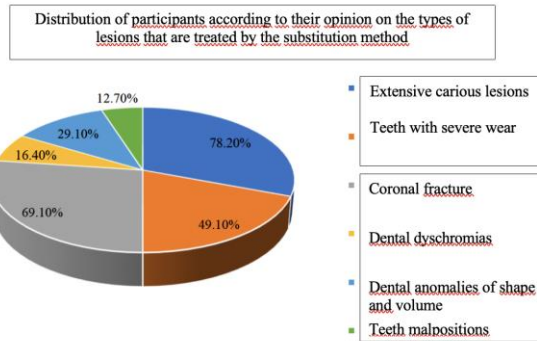
When asked "Have you witnessed one of the post and core techniques being performed?", 73.1% of participants (n=38) stated that they had witnessed intra-radicular aggregated composite restoration using prefabricated fiberglass post (Fig. 2f).

To the question "Have you carried out one of the post and core techniques?" 89.7% (n=26) mentioned that they had participated in the

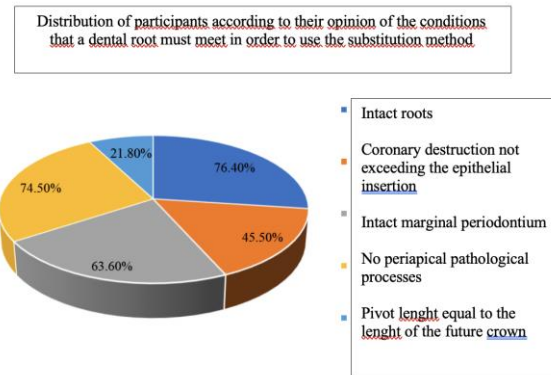
performance of intra-radicular aggregate composite restoration using prefabricated fiberglass post (Fig. 2g).

A percentage of 58.2% of respondents (n=32) considered metal cast posts have the highest mechanical strength (Fig. 2h).

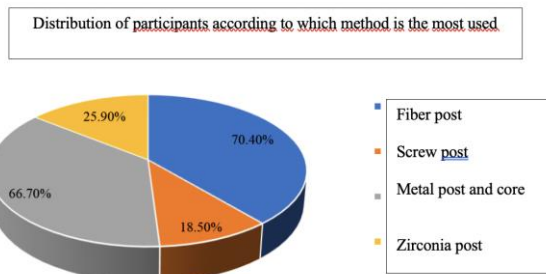
In the last question the participants of this survey were asked "Which of the following mistakes do you think are most commonly encountered when preparing the root canal for a post?", 75.5% (n=40) of them considered excessive widening of the root canal (Fig 2i).



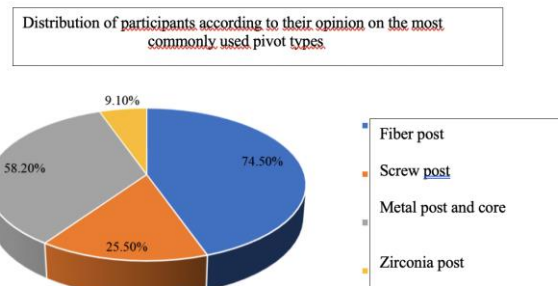
(a)



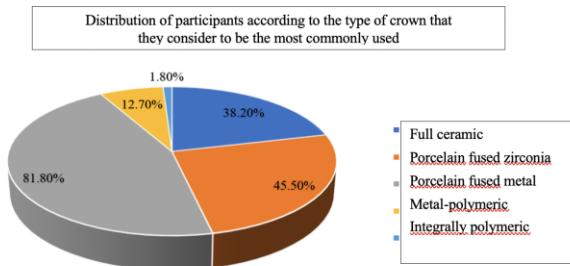
(b)



(c)

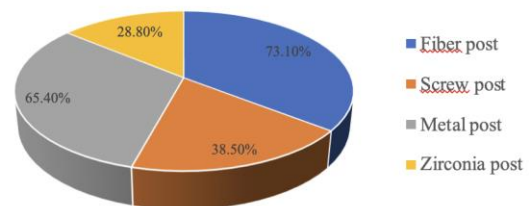


(d)



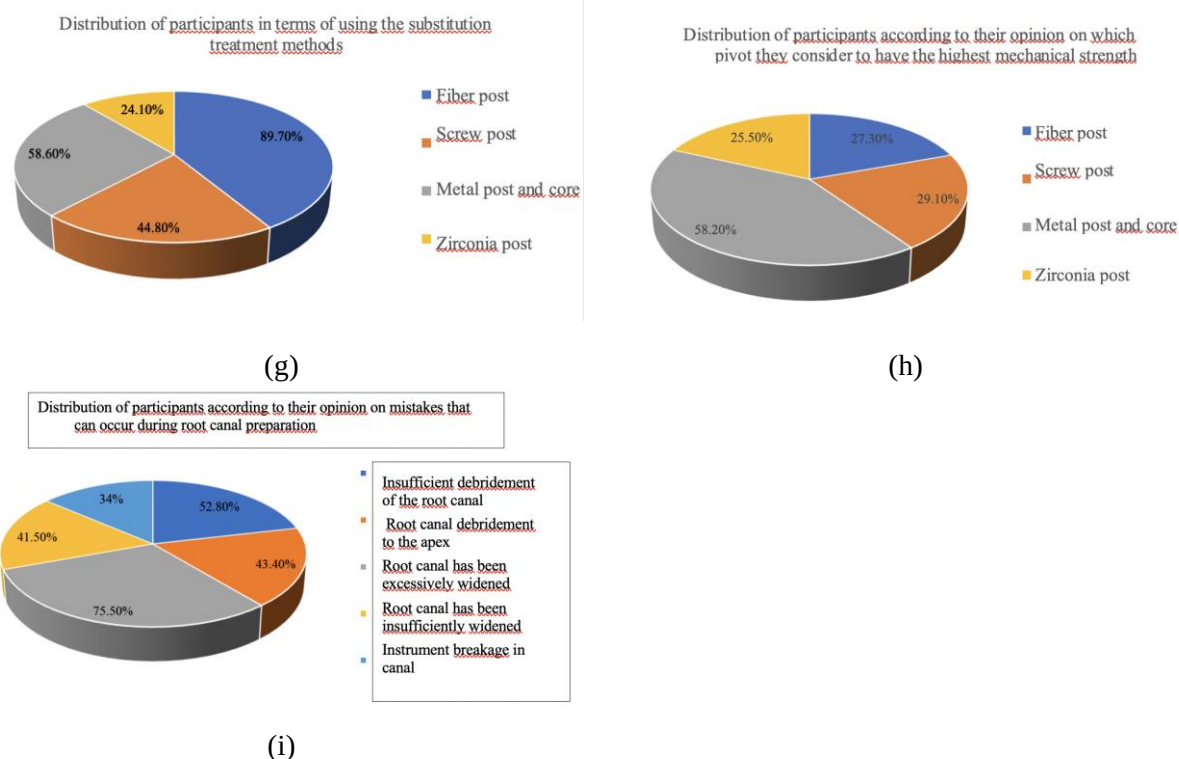
(e)

Distribution of participants who attended one of the substitution treatment methods



(f)





**Figure 2.** Distribution of the study group. (a) Distribution of participants according to their opinion on the types of lesions that are treated by the substitution method; (b) Distribution of participants according to their opinion of the conditions that a dental root must meet in order to use the substitution method; (c) Distribution of participants according to which method is the most used; (d) Distribution of participants according to their opinion on the most commonly used pivot types; (e) Distribution of participants according to the type of crown that they consider to be the most commonly used; (f) Distribution of participants who attended one of the substitution treatment methods; (g) Distribution of participants in terms of using the substitution treatment methods; (h) Distribution of participants according to their opinion on which pivot they consider to have the highest mechanical strength; (i) Distribution of participants according to their opinion on mistakes that can occur during root canal preparation.

#### 4. Discussions

The results of this study can provide information about opinions, attitudes, and knowledge about crown substitution therapy.

Of the respondents, almost 80% were students and of these almost 80% were 6th year students, denoting that the topic was of interest mainly to final year students. This could be explained by the fact that this questionnaire was mainly distributed in online social groups

of students. More than 70% of the respondents were female and about 80% belonged to the age group 20-29 years, among both students and dentists. The topic was of interest to young doctors, with about 70% having experience between 0-5 years. Regarding the sources of information, the analysis of the answers showed that all the participants considered that more sources of information are needed, starting from the university courses.

In the present study the participants considered that post and core techniques are recommended mainly in the treatment of carious lesions, then in coronary fractures, shape anomalies, malpositions and dyschromias. But the results of studies by other authors indicated that post and core techniques can be successfully used in teeth with dental lesions characterized by limited loss of dental tissue [11]. To perform the post and core techniques, respondents considered that dental roots should be intact and without periapical processes. The results are in agreement with the results of other authors who stated that the post and core method is recommended in teeth without intra-radicular and peri-radicular infections and even more it is indicated to maintain an apical seal of 5 mm. Also, teeth should have at least half of the root anchored in the alveolar process [12]

Respondents felt that prefabricated fiberglass posts are most often used. Their fibers have elasticity, high tensile strength, low electrical conductivity, resistance to solubility and resistance to biochemical degradation. These qualities have led to the preference for fiber pivots [13]. As the most commonly used posts are fiberglass posts, the majority of respondents stated that they had assisted or participated in the performance of post and core techniques using this type of posts.

Intra-radicular aggregated metal-ceramic crown has been voted as the most widely used substitution method for lost crown. Other authors consider ceramic materials popular for restorations by the endocrown method. Many

factors that could influence the success of the post and core techniques are: the used materials, the size of the post, the presence of the ferrule effect [14].

Most respondents considered that metal cast post has the highest mechanical strength. The responses received are in agreement with literature data, with numerous studies indicating that non-precious metal cast posts have higher fracture toughness compared to fiber and prefabricated metal posts [15, 16]. However, these issues are still controversial, as other in vitro studies have shown that fiberglass posts increase the fracture toughness of teeth compared to cast or prefabricated metal posts [17,18]. From the category of the most common errors during preparation of the socket for the post, respondents considered excessive widening of the root canal as the most common error.

## **5. Conclusions**

The survey revealed that study participants considered fiber posts to be the most widely used restorative technique for lost crown, followed by the use of cast metal posts. The main type of crown restoration commonly used for coronal lesions was the metal-ceramic crown. Regardless of which category the participants belonged to, students or clinicians, regarding the topic addressed, most of them felt that information from several sources was necessary. The knowledge of methods and techniques of restoration of lost crown creates the premises for a good morpho-functional rehabilitation of dental arches.



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*All authors read and approved the final manuscript. All authors have equally contributed to this work.*

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#### **Conflict of interest statement**

*The authors declare no conflicts of interest concerning this study.*

#### **Data availability statement**

*Will be provided on request.*

#### **Ethics statement**

*Approved by the Scientific Ethics and Deontology Commission of UMF Craiova (no. 57/29.01.2024).*

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