

## Questionnaire Study among Doctors of Dental Medicine on the Applications of Telescopic Crowns

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### Abstract

In planning a removable partial denture, the proper choice of design, materials, and type of attachments is of crucial importance for the treatment outcome. Telescopic crowns - a complex type of attachment - are applicable in both combined prosthetics and complex removable dental bridges. The aim of this study is to explore the informedness of dental practitioners in Bulgaria of the application of telescopic crowns.

A questionnaire study among 208 dental practitioners in Bulgaria was conducted over a 6-month period (February – July 2018). To analyze the data, the programming language R was used, and descriptive graphical methods and association analysis of variables employed.

The results showed that the proportion of dental practitioners who have ever used telescopic crowns in prosthetics (either using a single or multiple techniques) is still considerably below half (40%). Furthermore, the percentage of dental practitioners applying an innovative method of telescopic crowns fabrication (i.e. 3D printing, CAD/CAM, or FGP) is still just over one in ten (11%). As a result of these findings, it is recommended that dental practitioners keep up to date with the latest advancements related to telescopic crowns and their numerous benefits. In turn, it is expected that the number of dental practitioners using this type of complex prosthetic attachment will increase as RPDs with telescopic crowns become a preferred treatment choice for partially edentulous patients.

**Clinical article (J Int Dent Med Res 2021; 14(3): 1052-1056)**

**Keywords:** Questionnaire study, telescopic crowns, methods.

**Received date:** 11 April 2021.

**Accept date:** 08 July 2021

### Introduction

In the specialized dental literature, it is often recommended using removable dental prosthesis due to their lower cost, ease of oral-hygiene maintenance, and shorter treatment times<sup>15</sup>. In recent years, to tackle the condition of patients being partially edentulous, more and more dentists have begun using removable partial dentures (RPDs) in an attempt to restore function and improve dental aesthetics. Variables such as the patient's tooth position, tissue anatomy, occlusal relationships, as well as the desired aesthetics-improvement should determine the RPD's construction plan so as to best meet the patient's needs<sup>18</sup>.

In terms of RPDs fabrication, the CAD/CAM

systems are widely used. One of their major advantages is that they allow for the application of different materials such as Cr-Co alloy, PEEK, and Zirkonia, among others<sup>8,17</sup>. In various studies, it has been suggested that the milling and casting techniques have lower level or retention force compared to other systems of fabrication<sup>9,17</sup>.

From the perspective of their design, removable partial dentures can be classified as either clasp dentures (using a single attachment) or cast metal dentures. In most cases, the latter type of RPD uses two-part precision/complex attachments – which are in general preferred for they provide a variety of solutions allowing for a good balance between stability and aesthetics.

Complex attachments can be further broken down into joint attached dentures, stud attached dentures, telescopic crowns attached dentures, and combined attachments. Telescopic crowns specifically, have several well-documented benefits. One of these major advantages of RPDs attached through telescopic crowns is the

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ability to indirectly connect the abutment teeth via secondary splinting<sup>1,6</sup> - resulting in improved stability. The presence of saliva has the additional effect of protecting the surfaces of the telescopic crowns from excessive wearing<sup>3,6,7</sup>. Despite all the mentioned benefits, it is important to note that success of the treatment with telescopic crowns largely depends on the marginal adaptation of the primary telescopic crown<sup>2</sup>, the number of abutments, and last but not least – the patient’s subsequent proper care<sup>10,15</sup>.

In the last decade, the studies and publications on telescopic crowns have been primarily concerned with exploring various materials and methods of fabrication, as well as with the influential factors for their effective retention<sup>11,12,13</sup>. The authors researching in this field have used various devices and employed different methods and modifications to assess the retention capability - with most research showing improvement in this area<sup>14,15,16</sup>. In Bulgaria, the topic has not been yet extensively studied.

The present questionnaire study is aimed at exploring the informedness of dental practitioners in Bulgaria concerning the mode of telescopic crowns, as well as the materials and methods employed in their fabrication.

### Materials and methods

A study was conducted among dental practitioners in Bulgaria. It was performed over a 6-month period (February – July 2018), and it encompassed 208 respondents (100 male and 108 female).

The results have been processed using the programming language R and through employing descriptive graphical methods and association analysis of variables.

The statistical methods used in the statistical data processing include:

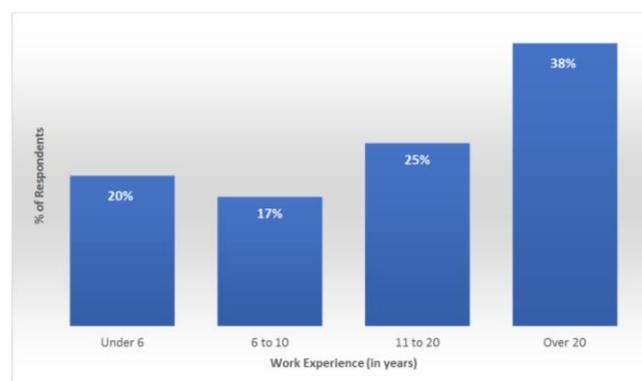
- Frequency distribution analysis and difference in the proportion of units with U criterion of normal distribution.
- Pierson’s chi<sup>2</sup> test, for associating single response questions.
- Modified Rao-Scott analysis for associating multiple response questions.

### Results

For the purpose of the study, a questionnaire with 9 questions was developed. The first five revealed the distribution of respondents regarding the features of observation: Sex, Age, Work Experience (**Table 1 and Figure 1**), and Clinical Specialty.

|                                   |          | №   | %            | Sp   |
|-----------------------------------|----------|-----|--------------|------|
| <u>Sex</u>                        | Female   | 108 | <b>51.92</b> | 3.47 |
|                                   | Male     | 100 | <b>48.08</b> | 3.47 |
| <u>Age group</u>                  | Under 30 | 54  | <b>25.96</b> | 3.05 |
|                                   | 30 to 40 | 48  | <b>23.08</b> | 2.93 |
|                                   | 41 to 50 | 56  | <b>26.92</b> | 3.08 |
|                                   | 51 to 60 | 39  | <b>18.75</b> | 0    |
|                                   | Over 60  | 11  | <b>5.29</b>  | 3.05 |
| <u>Work experience (in years)</u> | Under 6  | 42  | <b>20.19</b> | 2.79 |
|                                   | 6 to 10  | 36  | <b>17.31</b> | 2.63 |
|                                   | 11 to 20 | 51  | <b>24.52</b> | 2.99 |
|                                   | Over 20  | 79  | <b>37.98</b> | 3.37 |

**Table 1.** Factorial features of observation.



**Figure 1.** Distribution of the respondents towards the work-experience factor

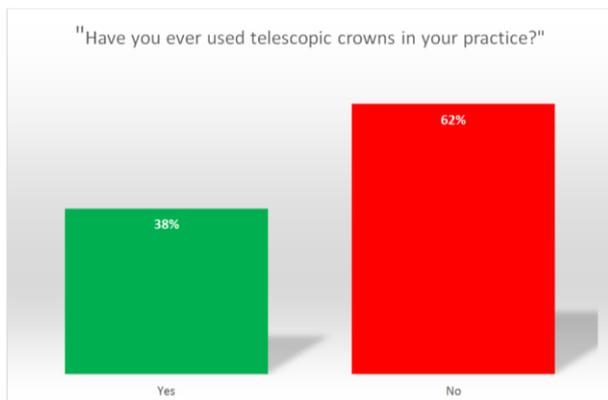
The next two questions (#6-7) were concerned with the telescopic crowns – their fabrication, technological and constructive specifics, and their clinical application.

In Table 2 the respondents’ answers to question #7 (“What manufacturing technique have you used when fabricating telescopic crowns?”) are summarized.

The most significant results from the sixth and seventh questions are as follows:

- The number of dental practitioners who have applied in their practice RPDs with telescopic crowns sits at only 38%.

• The "milling/cast metal" is the most frequently used fabrication technique. FGP (Bredent) и 3D printing are techniques rarely used by the participating dental practitioners prior to the conducting of this study.

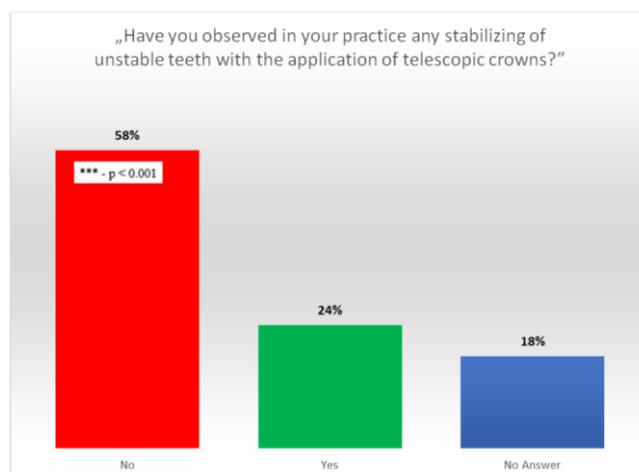


**Figure 2.** Relative share of the respondents according to their response to the question – "Have you ever used telescopic crowns?"

| Technique  | Number    | %           |
|--|-----------|-------------|
| <b>Single technique</b>  |           |             |
| a) 3D printing   | 1         | 0.5%        |
| b) CAD/CAM   | 19        | 9%          |
| c) FGP (Bredent)   | 3         | 1.4%        |
| d) milling/ cast metal   | 46        | 22.1%       |
| <b>Total</b>   | <b>69</b> | <b>33%</b>  |
| <b>More than one technique</b>   |           |             |
| a) 3D printing<br>d) milling/ cast metal                                   | 1         | 0.5%        |
| b) CAD/CAM<br>e) FGP (Bredent)   | 1         | 0.5%        |
| c) CAD/CAM<br>d) milling/ cast metal                                       | 7         | 3.5%        |
| c) FGP (Bredent)<br>d) milling/ cast metal                                 | 1         | 0.5%        |
| a) 3D printing<br>b) CAD/CAM<br>d) milling/ cast metal                     | 1         | 0.5%        |
| a) 3D printing<br>c) FGP (Bredent)<br>d) milling/ cast metal               | 1         | 0.5%        |
| a) CAD/CAM<br>c) FGP (Bredent)<br>d) milling/ cast metal                   | 1         | 0.5%        |
| a) 3D printing<br>b) CAD/CAM<br>v) FGP (Bredent)<br>d) milling/ cast metal | 2         | 1%          |
| <b>Total</b>   | <b>15</b> | <b>7.5%</b> |
| No responses   | 124       | 59.5%       |

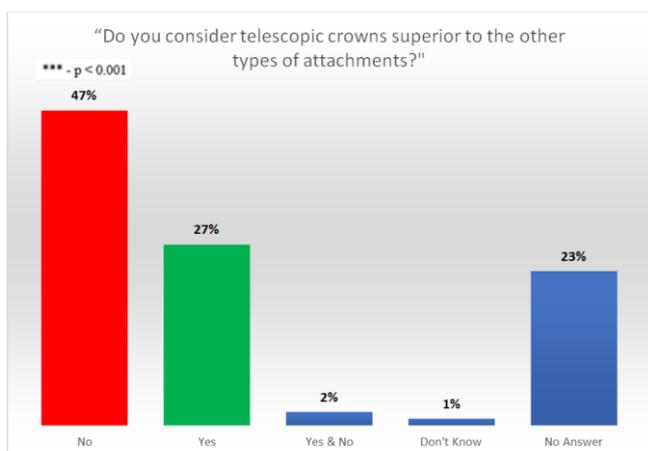
**Table 2.** Telescopic crowns fabrication techniques used by dental practitioners.

The eighth question in the questionnaire study - "Have you observed in your practice any stabilizing of unstable teeth with the application of telescopic crowns?" - was designed to assess the impression of respondents of the effect telescopic crowns exert on teeth stabilization. Out of the total 208 respondents, 50 (24%) gave a positive response, 120 (58%) responded negatively and the remaining 38 (18%) did not provide an answer (Figure 3). To correlate the relative share of the positive and of the negative responses, the Fisher's exact test was applied. The results show a significantly higher proportion of respondents whose experience has shown no effect of the telescopic crowns on the stabilization of unstable teeth, compared to the respondents of positive observation in that respect,  $p < 0.001$ .



**Figure 3.** Relative share of the respondents according to their response to the question: „Have you observed in your practice any stabilizing of unstable teeth with the application of telescopic crowns?"

In the last question, the respondents are asked to give their opinion on whether the telescopic crowns surpass the other types of attachments in terms of retention of the removable partial dentures. Out of the total 208 respondents, 56 (27%) gave a positive response, 97 (47%) responded negatively, 4 (2%) said both „Yes and No“, 2 (1%) answered with „I don't know“, and 49 (23%) did not respond to that question. Comparing the negative to the positive answers (through Fisher's exact test) shows a considerable predominance of the opinion that the telescopic crowns are not superior to the other types of attachments,  $p < 0.001$  (Figure 4).



**Figure 4.** Relative share of the respondents according to their response to the question: “Do you consider telescopic crowns superior to the other types of attachments?”

## Discussion

Dental practitioners’ general lack of experience with telescopic crowns (i.e. over 60% of them have never applied RPDs in their practice) is to a great extent a result of their clinically oriented professional habit. For most, the process of scientific build-up of reports and information about the phenomenon is not of key significance. Rather, it is the introduction of specific recommendations, protocol, and clinical application of novelties that is of greatest value.

The results to the last two questions may shed some light as to why nearly two-thirds of dental practitioners have never used telescopic crowns in their practice. As depicted in Figures 3 and 4, the majority of them are still unfamiliar with the many benefits that telescopic crowns provide (such as axial transferring of masticatory pressure, prolonged durability, improved retention, as well as having a stabilizing effect). Thus, a supposition can be made that the respondents’ familiarity with the advantages of telescopic crowns is a primary factor in their decision to use this type of precision attachment. Further investigating the results and dissecting the data, this appears to be the case as 61% of the respondents who consider telescopic crowns to be superior to other retention components have used telescopic crowns before. On the other hand, only 38% of the dental practitioners who do not believe in telescopic crowns’ superiority have used them in their practice.

Similar to the above analysis on telescopic

crowns - the most likely reason why the *FGP (Bredent)* и *3D printing* techniques have been rarely used is the respondents’ lack of familiarity with the well-established benefits of the two systems. Research has shown that telescopic crowns produced with 3D printing technology have high retention values<sup>4,9</sup>. Furthermore, besides being a fabrication system that yields good retention, FGP is also considered as one of the best methods to improve telescopic crowns’ lost retention over time. Another likely reason for dental practitioners’ preferred choice of manufacturing methods is and the relative cost of each fabrication technique (with the classical techniques being cheaper than the alternatives), as well as the overall infrequent application of telescopic crowns in the country.

## Conclusions

In the coming years, it is expected that the number of partially edentulous patients will rise along with the need for cost-effective treatments such as removable partial dentures. The many benefits associated with the use of telescopic crowns have made these complex attachments a logical choice for a precision attachment when constructing an RPD. As a result of the conducted questionnaire study, the following recommendations can be made to dental practitioners:

- 1) They should keep up to date with the latest advancements related to telescopic crowns. This can be achieved through seminars and instruction courses. For instance, dentists may attend one of the practical courses or clinical demonstrations at the Sofia Dental Meeting congress held every year in Bulgaria. Furthermore, it is believed that dental practitioners can benefit greatly by attending courses at the Centre of Dental Education at the Zonguldak Bulent Ecevit University in Turkey or at the BEGO Training Center and Academia in Germany.

Subsequently, it is advised that the use of telescopic crowns becomes universally accepted in the country as dental practitioners begin applying this type of complex attachments more frequently – for they can serve as an integral part in a long-term, successful dental treatment for patients with reduced dentures.

## Declaration of Interest

The authors report no conflict of interest.

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