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Research Article

WORKING WITH TELESCOPIC CROWNS – A SURVEY AMONG DENTAL TECHNICIANS

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A B S T R A C T

When designing removable partial dentures (RPDs), the appropriate choice of design, the retention components, and the materials from which the dentures will be fabricated, are crucial for the outcome of the prosthetic treatment. Telescopic crowns are used both in combined prosthetics (as a complex retention component) and in the manufacturing of complex removable bridge dentures. The main goal of this survey was to analyze the awareness among dental technicians in Bulgaria of the principles of work with telescopic crowns.

A survey was conducted among dental technicians practicing in the country. It was conducted during the February - July 2018 period and included a total of 65 respondents. The obtained results were processed with the aid of the programming language R, and by utilizing analysis of association between variables, as well as descriptive and graphical methods.

In the survey, the number of dental technicians who have manufactured telescopic crowns only just exceeds the number of those who have not worked with this type of constructions. In addition, in terms of manufacturing, the use of the classical model casting and milling techniques are still the preferred choice over innovative technologies such as FGP and 3D printing. Given these results, it is recommended that dental technicians boost their knowledge of innovative manufacturing techniques, and as a result begin to use these fabrication methods more frequently in their practice.

INTRODUCTION

Certain factors are of outmost importance when it comes to the success of prosthetic treatment. These include: the design, the type of restoration, the retention components, and the materials used when designing removable partial dentures.

RPDs can be classified according to various aspects. In terms of their manufacturing, they can be categorized as either clasp or cast dentures. Based on the method of retention, combined dentures can be constructed either with joint, telescopic, or hinged precision attachments or with a combination of them. Often, the preferred retention appliances are the two-part precision attachments. The precision retention components offer a variety of solutions to balance functional stability and aesthetics.

The retention of RPDs is one of the most important criteria for their longevity. On one hand, telescopic crowns can serve as a complex retention component in combined prosthodontics. On the other hand, they can be used in the development of complex removable bridge restorations.

Telescopic crowns have several well-observed benefits over other types of precision attachments. One of the main such advantages is the ability to indirectly connect the abutment teeth via secondary splinting. Prolonged durability is yet another key characteristic of RPDs with telescopic crowns as the presence of saliva has a positive effect on retention and slows down excessive wear of the telescopic crowns' surfaces (3, 6).The axial transferring of masticatory pressure isyet another benefit of telescopic crowns over other complex attachments (9, 11).

The number of abutment teeth, the technology, and the accuracy of fabrication have a significant impact on the long-term success of telescopic crown-retained removable partial dentures (14).

Purpose

The purpose of this survey is to gather information in respect to the awareness among dental technicians on the territory of the Republic of Bulgaria of the principles of work with telescopic crowns and the materials and methods used for their manufacturing.

MATERIALS AND METHODS

A survey was conducted in the February - July 2018 period and it comprised of 65 dental technicians (35 males and 30 females). Out of these - 13 were employed at the Faculty of Dental Medicine in Plovdiv; 10 more – at various dental laboratories also in the town of Plovdiv; additional 6 practicing in the town of Veliko Tar novo; and the remaining 37 spread

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around other towns in the country. The surveys within the towns of Plovdiv, Veliko Tarnovo and Yambol we conducted by approaching dental technicians individually. The rest were surveyed at a course organized by Caris M (a Bulgarian firm providing dental solutions to dentists and dental technicians) in the town of Hissarya in 2018.

The obtained results were processed with the aid of the programming language R, and by conducting analysis of association between variables, as well as descriptive and graphical methods.

The statistical methods used for processing the data include:

- Analysis of frequency distributions and difference in the proportions of the individual rates compared to the U criterion for normal distribution
- Pearson's Chi Square Test of association between questions with one possible answer
- Modified Rao-Scott Chi-Square Test of association for questions with more than one possible answer

For the purpose of this article, only part of the aforementioned statistical analysis has been included.

RESULTS

The questionnaire included a total of eight questions, with the first three revealing the distribution of the sample in terms of gender, age, and work experience (**Table 1, Figure 1**).

Table 1 Factorial observation units

		Number	%	Sp
Gender	Female	30	46,15	6,23
	Male	35	53,85	6,23
Age group (in years)	Up to 30	10	15,38	4,51
	From 31 to 40	11	16,92	4,69
	From 41 to 50	20	40,00	6,12
	Over 51	24	27,69	5,59
Work experience (in years)	Up to 5	6	9,23	3,62
	From 6 to 10	10	15,38	4,51
	From 11 to 20	14	21,54	5,14
	Over 21	35	53,85	6,23

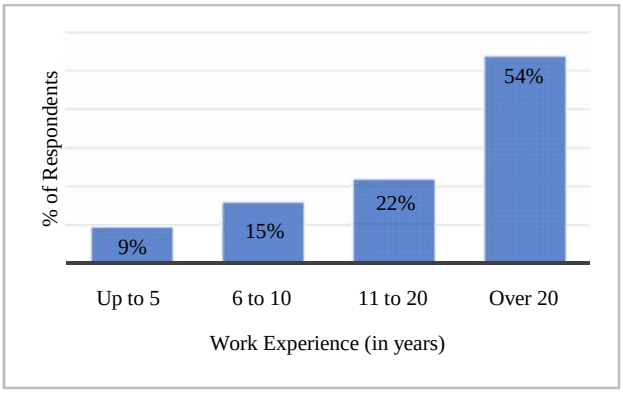

Figure 1 Factorial distribution of respondents according to the unit *Work Experience*

The remaining five questions focused on telescopic crowns and covered the following topics: manufacturing, technological and structural fabrication features, and the potential advantages of telescopic crowns over other types of retention components. Firstly, dental technicians were asked if they had ever used telescopic crowns in their practice. Figure 2 shows the distribution of the respondents according to the unit "manufacturing restorations of the telescopic crown type" in the form of a bar graph. The number of dental technicians included in the survey who have manufactured telescopic crowns slightly exceeds half, meaning that there is still a large portion of dental technicians who have never worked with this type of restoration.

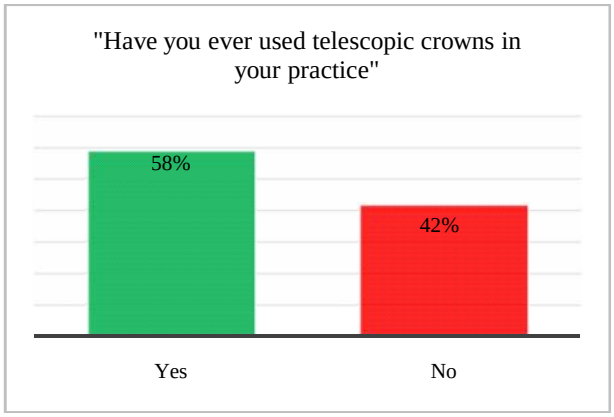

Figure 2 Distribution of the respondents according to the unit "manufacturing restorations of the telescopic crown type"

Key to the present study is the opinion of the respondents about the advantages of telescopic crowns over other retention components. Indeed, 46,2% of them express the opinion, that telescopic crowns are not overall better than the other types of precision attachments (**Figure 3)**. Another 20% of respondents did not provide an answer andonly 33,8% do consider that this type of attachment is superior to the other retention components.

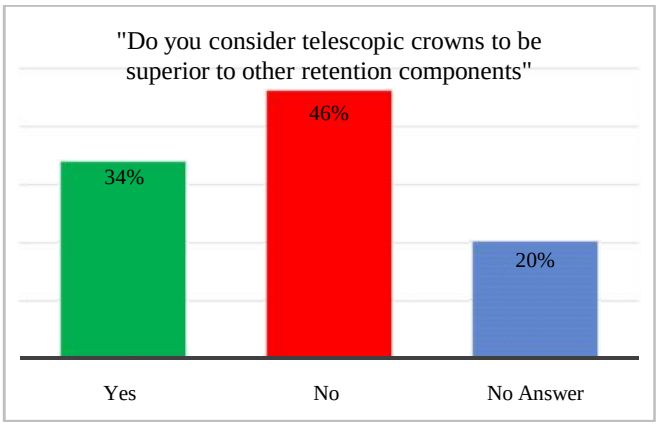

Figure 3 Distribution of the respondents according to their opinion about the advantages of the telescopic crowns as retention components

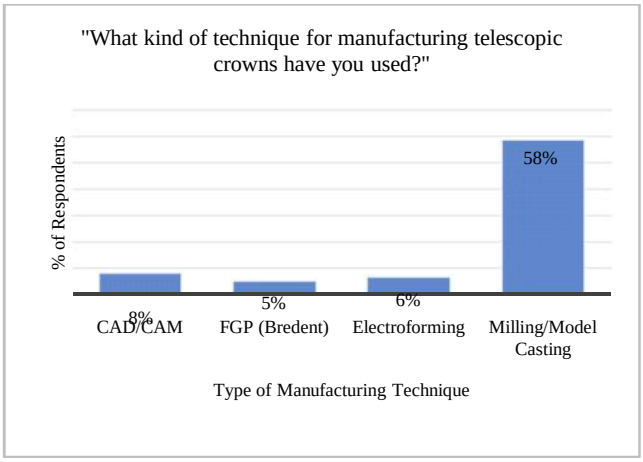

Figure 4 Distribution of the respondents according to the type of manufacturing technique used One last question concerning the manufacturing of telescopic crowns inquired about dental technicians' preferred alloy.

In relation to the respondents' preferred technology for manufacturing telescopic crowns– Figure 4 shows a clear preference for the use of more classical techniques such as the model casting and milling(58%) over more innovative alternatives like the CAD/CAM and FGP (13%)(4, 8,9).

Figure 5 shows that most respondents, a total of 60%, preferred the use of non-precious metal alloys.

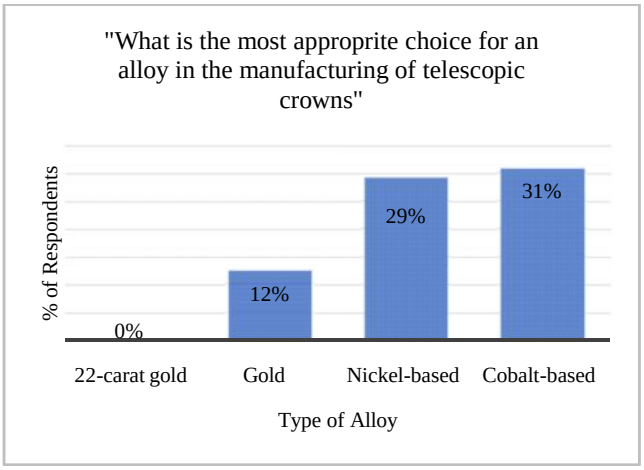

Figure 5 Preferred alloy for manufacturing telescopic crowns

DISCUSSION

The relationship between the variable *Years of Experience* and the use of telescopic crowns was studied and is depicted in Figure 6. It reveals a tendency for dental technicians with less than 5 years of experience to have never used this type of complex attachments. This can be explained by the fact that they have not yet mastered all complex techniques in dental technology. As expected, on the other end of the spectrum, as dental technicians become more experienced (i.e. *Years of Experience* increases), they tend to use telescopic crowns more often.

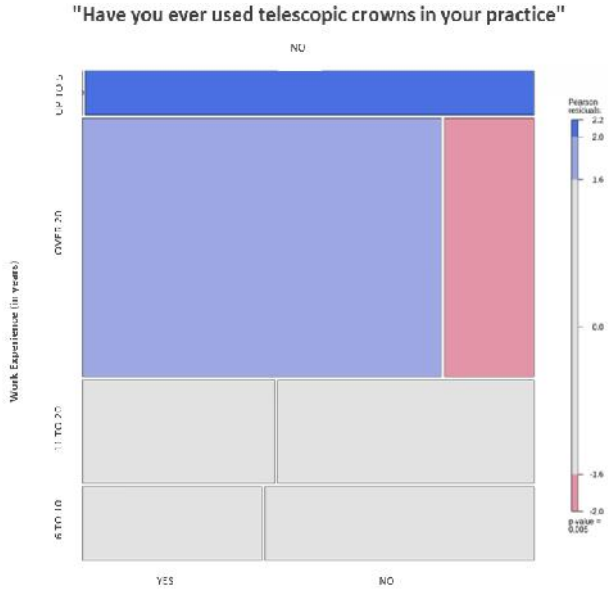

Figure 6 Association among dental technicians between their work experience and use of telescopic crowns in their practice.

The results to question8 (i.e."Do you consider telescopic crowns to be superior to other retention components?") may shed some light as to why as many as 42% of dental technicians have never used telescopic crowns in their practice. Potential reason for this result is, that the majority of dental technicians are still unfamiliar with the many benefits that telescopic crowns provide (such as axial transferring of masticatory pressure, prolonged durability, and improved retention). Thus, a supposition can be made that dental technicians' 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, this appears to be the case as 83% of the respondents who consider telescopic crowns to be superior to other retention components have indeed used telescopic crowns in their practice. On the other hand, less than half (only 45%) of the technicians who do not believe in telescopic crowns 'superiority have used them before.

Using the above analysis on the usage of telescopic crowns, we can extrapolate and suggest that the most probable reason for the low percentage of the respondents who apply FGP and CAD/CAM as a fabrication method, is their lack of familiarity with the well-established benefits of these innovative manufacturing methods (2, 4, 6, 7, 10, 15). For example, research has shown that be sides being a fabrication system that yields good retention, FGP is also consideredasone of the best methods to improve telescopic crowns' lost retention overtime (4). Other probable explanations for dental technicians' preferred fabrication method are the overall infrequent application of telescopic crowns in the country and the relative cost of each manufacturing technique (with the classical techniques being cheaper than the alternatives).

Conventionally, double-crown systems are produced with either precious or non-precious alloys via the lost wax technique (1, 7, 11, 13).While in the past gold alloys had been frequently used - due to the increase in the precious metal's price - this is no longer the case (with only 12% on the respondents having utilized gold alloy and none - the "22 carat gold" alloy) (1,13).

CONCLUSION

With time, it is expected that the number of patients with reduced dentures will rise along with the need for cost-effective treatments such as RPDs with telescopic crowns. Advancements in the application of technologies such as the FGP system and 3D printing have the potential to resolve many of the issues surrounding current RPD use (e.g. long-term retention, function, aesthetics) and oral health. As a result of the conducted questionnaire study, the following recommendations can be made to dental technicians:

1. They should boost their knowledge of innovative methods of fabrication of telescopic crowns. This can be achieved through seminars and instruction courses. Dental technicians can benefit by attending courses at Bego training center and academia, Germany or online on https://ptc-dental.com/, where they can find online and DVD-courses.
2. Subsequently, it is advised that dental technicians shall begin applying innovative methods for the fabrication of this type of complex attachments more frequently – for they are financially feasible and time-saving.

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