

## EVALUATION OF THE KNOWLEDGE LEVEL OF DENTAL POSTOPERATIVE SENSITIVITY WITHIN DENTAL PRACTITIONERS

Tărăboanță-Gamen Andra Claudia<sup>2</sup>, Pancu Galina<sup>1\*</sup>, Toma Vasilica<sup>2</sup>, Tărăboanță  
Ionuț<sup>1\*</sup>, Gianina Iovan<sup>1</sup>, Irina Nica<sup>1</sup>, Sorin Andrian<sup>1</sup>

<sup>1</sup>“Gr. T. Popa” U.M.Ph. - Iași, Romania, Faculty of Dentistry, Department of Odontology-Periodontology, Fixed Restorations

<sup>2</sup>“Gr. T. Popa” U.M.Ph. - Iași, Romania, Faculty of Dentistry, Department of Pedodontics

Corresponding author; *e-mail*: \* galina.pancu@umfiasi.ro \*ionut.taraboanta@umfiasi.ro

### ABSTRACT

**The aim of the present study** was to assess by using a questionnaire, the knowledge and understanding level of dental postoperative sensitivity through dental practitioners. A number of 431 dental practitioners coming from rural or urban practices, in private or public environment, with a bachelor's degree or with postgraduate studies received this specifically developed questionnaire. The questionnaire consisted of a series of socio-demographic questions, followed by 14 questions related to postoperative sensitivity. The questionnaire contained 7 single-choice and 7 multiple-choice questions. For the statistical analysis of the obtained results Pearson Chi-square and Independent sample t-test were used. For all 14 questions, the correct answers were indicated by the majority of respondents, regardless of the training level or the environment of origin. Both postgraduate and bachelor's degree dental practitioners had a similar level of knowledge regarding the etiology, symptomatology and therapeutic management of postoperative dental sensitivity. The knowledge level about dental postoperative sensitivity does not differ between dental practitioners in the public and private sectors.

**Key words:** questionnaire; postoperative sensitivity; quality of life, management, dentists

### INTRODUCTION

The knowledge level of dental postoperative sensitivity among dentists may vary depending on a number of factors, such as their training and education level and experience in the working field [1].

Akpata and Behbehani reported a frequency of 5-30% for the association between composite resin direct restorations and dental postoperative sensitivity [2]. Therefore, it is important for dental practitioners to possess a comprehensive level of knowledge about the etiological factors and therapeutic management of dental postoperative sensitivity.

Composite resin became the most used material in dental direct restorations due to its adhesion to dental tissues,

resistance and esthetical appearance [3]. However, in some clinical situations these adhesive restorations can be complicated postoperatively by the appearance of dental sensitivity [2]. It can vary in intensity from mild discomfort to severe pain and can significantly affect patient's life quality [1]. Even though this pathology is frequently mentioned in literature, there is still a lack of understanding among dental practitioners regarding the etiology, risk factors or therapeutic approaches. This lack of information can lead to misdiagnosis and mismanagement.

The therapeutic management of dental postoperative sensitivity may vary according to the clinical situation [4]. For this reason, dental practitioners must possess

an optimal knowledge level regarding the available treatment options, as the use of desensitizing agents or different adhesive strategies, the use of alternative restorative materials, the removal of the dental restoration and the application of temporary restorations or to make an endodontic treatment [3].

Composite resin is currently the most used material for direct restoration, both on anterior and posterior teeth [5]. Despite the undoubted advantages, a series of inconveniences may occur such as polymerization shrinkage which can lead to marginal microleakage areas, deformations, and fractures of cuspids or the development of dental postoperative sensitivity [4,5]. These unwanted effects could be managed by using proper restorative techniques [5].

The aim of the present study was to assess by using a questionnaire, the knowledge and understanding level of dental postoperative sensitivity through dental practitioners. The assessment was performed by comparing the knowledge based on education level, by private/public, and urban/rural work sector. The null hypothesis was that there were no differences in knowledge and understanding level of postoperative dental sensitivity between dental practitioners with different education levels or working sectors.

## **MATERIAL AND METHOD**

This cross-sectional and descriptive study aimed to assess the level of knowledge of postoperative tooth sensitivity among dental practitioners by using a questionnaire. The studied population consisted of practicing dentists, working in private offices, hospitals and/or in the university environment (Appendix 1).

This study was conducted using an

online questionnaire specifically developed for this study and consisted of a series of socio-demographic questions followed by 14 questions about dental postoperative sensitivity. The questionnaire was developed based on an analysis of the relevant literature and validated through a pilot study conducted on a sample of 15 dentists. The questionnaire included questions related to dental practitioners' knowledge and understanding of the causes of postoperative sensitivity, risk factors, and optimal therapy.

A professional committee consisting of teaching staff from the department of Cariology and Restorative Dentistry, Faculty of Dental Medicine, "Grigore T. Popa" University of Medicine and Pharmacy in Iași, Romania determined the size of the questionnaire, identified and removed the unclear and irrelevant questions, reviewed and approved it.

Google Forms platform was used to create this questionnaire. Before answering, participants were informed about their role in this study, about the aim of the study and that their responses would be stored for the purpose of the study only. An informed consent was signed by all the participants in the study, and the research was approved by the Ethics Committee of "Grigore T. Popa" University of Medicine and Pharmacy, Iasi.

The questionnaire was realized based on seven single-choice questions (one Yes/No question and six True/False questions) and seven multiple-choice questions. The first section of the questionnaire was designed to check the demographic characteristics of dentists, including years of practice, study level and work sector. The question section mainly focused on the etiological factors, diagnosis and therapeutic management of dental postoperative sensitivity.

A total of 434 subjects accessed the

questionnaire, from which 3 subjects refused to participate in the study, so the final sample consisted of 431 participants who completed the questionnaire between September 2022 and February 2023.

Data collected through questionnaires were stored in a Microsoft Office Excel database. The statistical analysis was performed using SPSS software version 29.0 (IBM Corp, Chicago, USA). The variables were cross-analyzed by education level and by private/public, urban/rural work sector to verify their association. The Chi-square test was used for association, with a statistical significance set at 0.05. To analyze the differences between the study groups, statistical independent t-test was used with a significance level of 0.05.

## RESULTS

Of the 431 participants in the study, 56% were female, i.e. 239 subjects, and 44% were male, i.e. 192 subjects. Regarding the distribution of the participants in the study according to public/private work sector, the data analysis showed that 352 subjects work in private sector (82%) and 79 participants (18%) work in public sector. Regarding the urban/rural work sector, 69% of subjects (297 participants) work in urban sector, while 31% of subjects (134 participants) work in rural areas. Regarding the study level, 28% of participants (132 subjects) had got a postgraduate level of study, while 72% of subjects (299 participants) had got a bachelor's degree (Figure 1).

Distribution of the participants

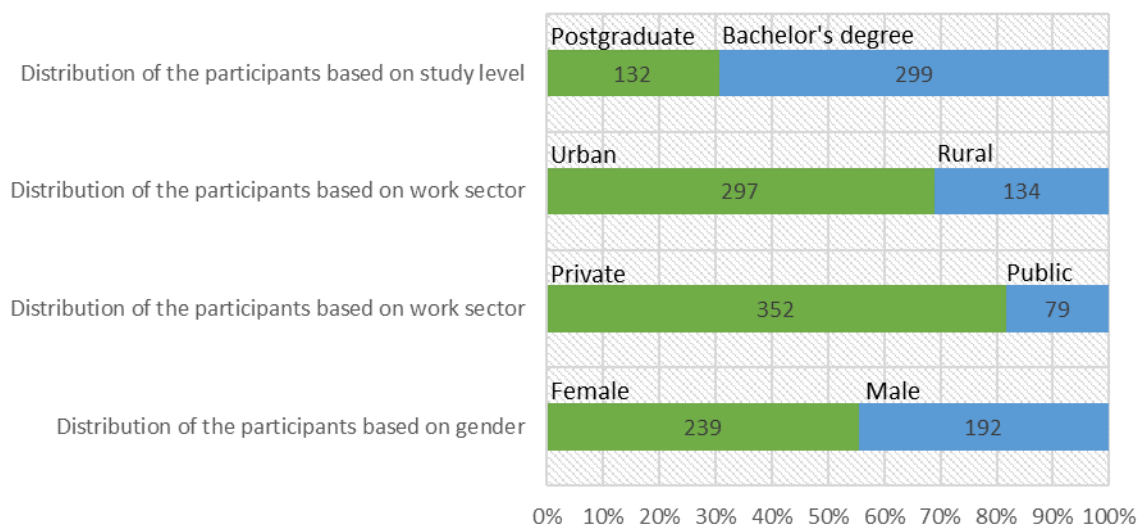


Figure 1. Distribution of the study participants

When analyzing the answers for question 1, 276 (64%) participants stated that they had not experienced dental postoperative sensitivity in their practice, while 155 (36%) claimed to have had patients with this condition. For the second

question 222 subjects (52%) stated that dental postoperative sensitivity occurs more frequently in the posterior teeth than in the anterior teeth while participants 209 (48%) disapproved. When asked about the influence of the quality of a restoration's

bond on dental postoperative sensitivity, 330 (77%) of participants consider it's true (77%) while 101 (23%) subjects considered it false.

Also, 325 of subjects (75%) agreed that the used bonding system can influence the occurrence of dental postoperative sensitivity, while 106 participants (25%) disapproved the statement. On the question about applying more than one layer of adhesive and reducing the risk of postoperative dental sensitivity, 289 people (67%) answered that the statement was true, while 33% or 142 people considered the statement false.

The statement that the surface condition of the restoration can influence the risk of postoperative tooth sensitivity, 217 people claimed this to be true and the remaining 214 that it was false. A total of 342 participants considered that the geometry of the cavity may play a vital role in the occurrence of postoperative dental sensitivity, representing 79% of respondents. A total of 89 subjects (21%) considered this statement to be false.

Analyzing the answers recorded for the 8th question, the type of cavity preparation most frequently associated with dental postoperative sensitivity was considered to be Class I Black (202 participants, 21%), 312 subjects (33%) considered Class II Black, 56 participants (6%) chose Class III Black, 89 subjects (10%) considered Class IV Black and 287 participants (30%) chose Class V Black.

When asked about the average duration of postoperative sensitivity, 348 people (34%) answered that it lasts in 1-2 days, 315 people (31%) considered that the duration is of 3-7 days. The 7-14 days range was chosen by 256 (25%) subjects and the 15 days-1 month range was chosen by 83 (8%) of the respondents. The range from 1-2

months was chosen by 19 (2%) respondents.

For the question that concerned the causes of postoperative sensitivity, 365 subjects (34%) considered that one of the causes could be excessive drying of dentin during the cavity cleaning, 198 participants (17%) answered that a cause is the polymerization shrinkage of the composite resin and 171 subjects (15%) claimed that a possible factor could be saliva contamination of the dentin. A number of 39 participants (3%) claimed that probing may cause postoperative sensitivity and 394 respondents (34%) chose tooth whitening as being the main etiological factor.

When asked about the possible stimuli that trigger dental postoperative sensitivity, 312 (22%) subjects chose the warm stimulus and 415 participants (29%) the cold stimulus. At the same time, 316 respondents (24%) said that chewing could be a possible trigger of postoperative sensitivity, while 192 subjects (14%) said that the pain could appear spontaneous and 162 participants (11%) chose toothbrushing brushing as a trigger. For the questions that asked about the characteristics of pain in postoperative sensitivity, 247 (22%) of the subjects answered that the pain is spontaneous, 388 (35%) participants answered that the pain occurs almost immediately postoperatively and persists from a few weeks to a few months and 415 (37%) of the respondents said that the pain is triggered by thermal, chemical or mechanical stimuli. Also, 45 (4%) subjects considered that the pain is diffuse while 27 of them (2%) said that postoperative sensitivity is characterized by a pulsating pain.

Regarding the association between generations of adhesives and the risk of postoperative sensitivity, 329 (30%) considered that the 4<sup>th</sup> generation is more

frequently associated with this pathology, 293 (27%) chose the 5<sup>th</sup> generation, while 151 subjects (14%) considered the 6<sup>th</sup> generation. The 7th generation of adhesives was chosen by 127 participants (12%) while 185 subjects (17%) answered that the universal adhesive system are more frequently associated with postoperative sensitivity.

A number of 389 (32%) participants considered that the therapeutic approach of postoperative sensitivity consists in When

asked about the possible therapeutic approach taken by practitioners, 389 practitioners (32%) chose the option of expectation, 343 (28%) subjects chose the option of immediate removal of restoration and 401 (33%) participants considered the option of recommending pain medication. A number of 62 (5%) subjects chose that the patient should refer to another dental practitioner, while 32 subjects (2%) chose endodontic treatment.

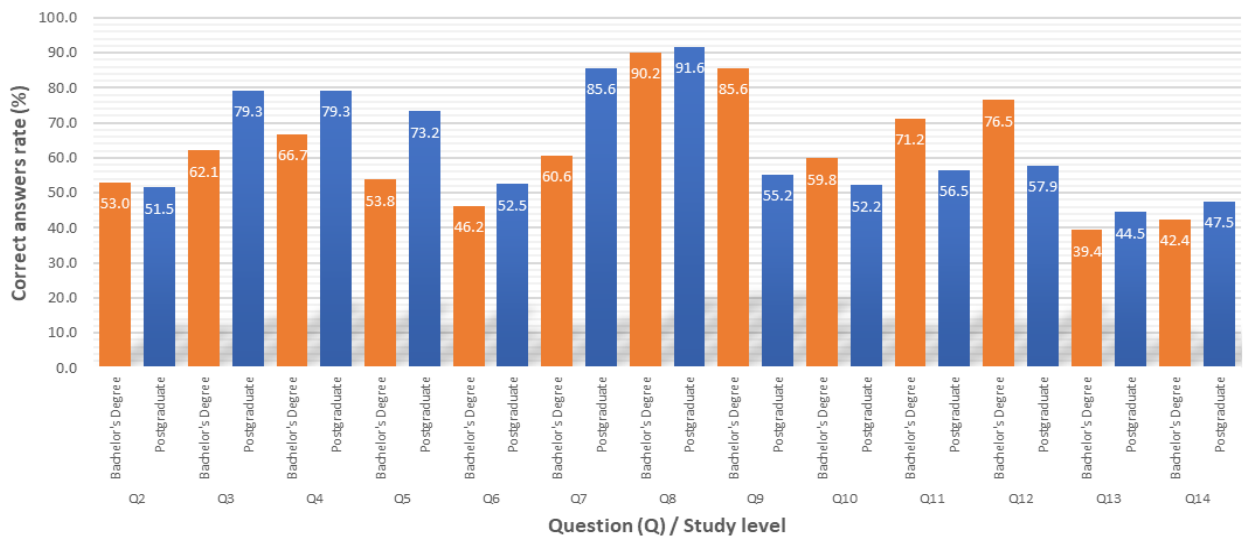


Figure 2. Rate of correct answers according to study level

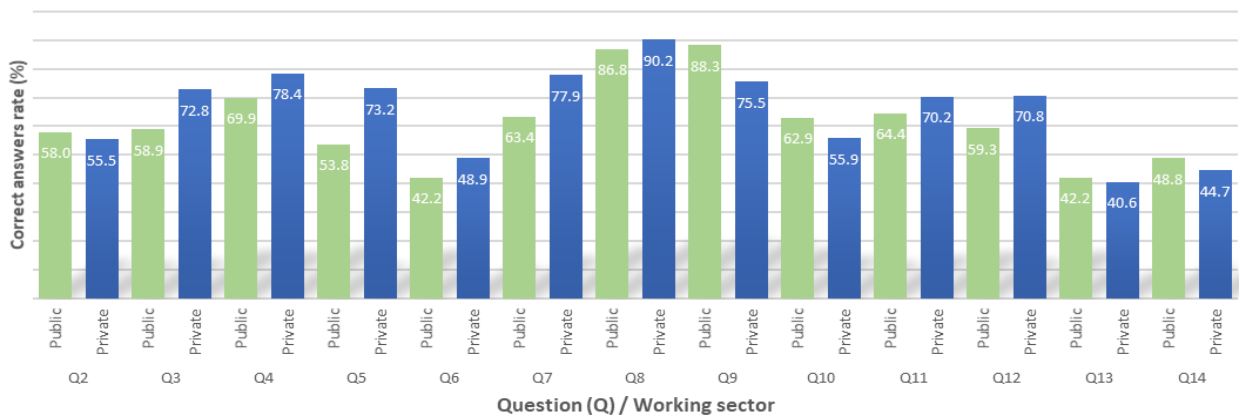


Figure 3. Rate of correct answers according to public/private sector

Statistical analysis showed that significant differences between subjects with

postgraduate and bachelor's degree studies were recorded for questions 3, 4, 5, 7, 9, 11 and 12 (Figure 2). According to the public/private work sector, statistical analysis showed significant differences between the obtained answers for questions 5, 7, 9 and 12 (Figure 3).

## **DISCUSSION**

The literature is not very offering in terms of evaluating the level of knowledge of dental postoperative sensitivity within dental practitioners, this being one of the first studies of this kind [6]. Dental postoperative sensitivity can result as a complication of dental restorative treatment using adhesive resins [7,8]. The etiology of DPS is multifactorial, with numerous causal factors, both preoperative and postoperative [9]. Among them, the aggressive tooth preparation, the incomplete removal of the carious tissue, the ineffective protection of the pulp, the failure of hybridization of the dentinal tissue or the incorrect use of the adhesive systems can be listed [10-12]. In case of extended cavities in dentine DPS can occur through the activation of the nociceptors at this level that induce the perception of pain [9,13]. Also, several studies have demonstrated that the use of adhesive systems, both total and self-etch, may increase the DPS occurrence through the demineralization of the dentin, the dissolution of the smear layer and the exposure of the dentinal tubules [14-17]. The severity of DPS may vary depending on various factors, such as the type of the bonding system, the exposure degree of the dentinal tissue as well as the patient's individual pain threshold [18].

The level of knowledge of DPS within the dental practitioners can be influenced by various factors, such as the

level of training, clinical experience, or access to education programs [18]. A possible hindrance in realizing this type of questionnaire study aimed to understand or evaluate a certain topic is represented by a low response rate. This fact can be explained by a reluctance of the participants to return the questionnaire as a result of the low level of knowledge and understanding of the subject [19]. The lack of time or the participants' perception that the aim of the study is irrelevant are also factors that reduce the response rate [20]. In the present study we benefited from a good response rate that can be explained by the ease of completing the questionnaire in an electronic format.

In our study, regarding the distribution of study participants according to their work sector, respectively public/private, 352 subjects work in private environment (82%) and 79 subjects (18%) work in public environment. Also, 297 work in urban environment, which means 69% of the total subjects and 134 in rural environment, representing 31% of the participants. This distribution can be explained by the fact that the present study was realized in the city of Iași, Romania, with most participants working in the private sector.

When analyzing the distribution according to the level of study, 132 have a postgraduate level of study, which represents 28% and 72% declared that the last completed study cycle was the bachelor's degree. This distribution is explained by the possibility for dental practitioners to practice their profession only on the basis of the bachelor's degree, without the need for additional studies. Also, this distribution can be associated with the reported years of experience in the field, the mean value being 15.3 years with a standard deviation of 8.63.

The obtained results for the first question of the questionnaire (Q1) showed that only 155 participants (36%) which is almost a third of the total number of participants faced dental postoperative sensitivity during their practice. The prevalence of postoperative tooth sensitivity reported in the literature varies widely, with the most widely accepted range between 5–30%, being consistent with the data collected in this study [2].

Regarding the answers to question Q1 according to the activity sector (public/private) we obtained significant differences between groups, the percentage of practitioners from the private practice who encountered DPS was significantly higher compared to subjects that work in public sector. When analyzing the association between the variable Q1 and the level of training (university / postgraduate), statistically significant differences were observed. The subjects with bachelor's degree have experienced DPS more compared to the participants with postgraduate education.

For the second question (Q2), regarding the higher occurrence frequency of DPS in posterior teeth compared to anterior teeth, 222 participants answered that this statement is true (52%) and 209 (48%) claimed that this is false. When analyzing the association between the answers to question Q2 and the activity sector (urban/rural; public/private), no significant differences were recorded. The choice of the correct answer 'true' by the majority of respondents showed that there are no significant differences in the knowledge or understanding level of DSP depending on the level of education or the working sector.

For the statement that the bonding quality of a restoration can cause DPS (Q3), 330 subjects considered that this statement

was true (77%) while 101 subjects considered it false (23%). Regarding the correlation of Q3 and the activity sector (public vs private; urban vs rural) no statistically significant differences were recorded. When analyzing the association between Q3 and the education level (university vs postgraduate) significant differences were recorded. The choice of the correct answer 'true' by the majority of respondents showed that there are no significant differences in the knowledge or understanding level of DSP depending on the level of education or the working sector.

Also, 75% of participants (325 subjects) claimed that the statement regarding the type of the used bonding system can influence the occurrence of DPS is true. The other 106 subjects, representing 25% of the total, declared that the statement was false. The association between Q4 and the activity sector (urban/rural) showed significant differences between groups. The percentage of responses of dental practitioners in urban sector differs significantly from that of rural sector. The analysis of the association between Q4 and the activity sector (public/private) showed no significant differences. Thus, no significant differences were recorded between groups when associating Q4 and the training level. The choice of the correct answer 'true' by the majority of respondents showed that there are no significant differences in the knowledge or understanding level of DSP depending on the level of education or the working sector.

For the question that stated the applying of multiple layers of adhesive to reduce the risk of DPS, 289 participants (67%) answered that the statement was true, while 33%, i.e. 142 subjects, considered the statement false.

The association between Q5 and the

level of training (university / postgraduate) showed significant differences, while for the association between Q5 and the activity sector (urban/rural) no significant differences were recorded.

For the association between the responses recorded to question Q5 and the activity sector (public/private), we obtained significant differences. The percentage of responses of doctors in the public sector differs significantly from that of doctors in the private sector. The choice of the correct answer 'true' by the majority of respondents showed that there are no significant differences in the knowledge or understanding level of DSP depending on the level of education or the working sector.

The statement that the surface condition of the restoration can influence the risk of postoperative tooth sensitivity (Q6), 217 respondents claimed that this fact was true and the remaining 214 that it was false.

When asked about the impact of cavity geometry / configuration on the occurrence of DPS, 79% of the subjects consider it is true, while 21% considered this statement to be false. The choice of the correct answer 'true' by the majority of respondents showed that there are no significant differences in the knowledge or understanding level of DSP depending on the level of education or the working sector.

For question Q8, the correct answers were chosen by most of the participants, showing their good knowledge. 202 subjects (21%) chose Class I Black as the correct answer, 312 subjects (33%) 2nd Black Class, 56 subjects (6%) 3rd Black Class, 89 subjects (10%) 4th Black Class and 287 subjects (30%) 5th Black Class.

According to the answers obtained for the question related to the average duration of DPS, 348 subjects (34%) answered that the duration is 1-2 days, 315

subjects, respectively 31% stated that the pain lasts 3-7 days. The interval of 7-14 days was chosen by 256 participants, which represents 25% of the total, and the 15 days-1 month was chosen by 83% of the respondents, i.e. 8%. Finally, 19 subjects claimed that DPS has an average duration of one to two months, which is 2% of dentists.

For question 10, the correct answers were chosen by most of the participants, showing that the respondents possess good knowledge about DPS. Regarding the possible stimuli that trigger postoperative tooth sensitivity, the most chosen answers were 'hot stimuli' by 312 participants (22%) cold stimuli, by 415 subjects (29%) and chewing by 316 participants (24%). In question Q12 regarding the characteristics of pain, 247 (22%) of the subjects claimed that the pain is spontaneous, 388 (35%) of the total answered that the pain occurs almost immediately postoperatively and that it persists from several weeks to several months and 415 people, respectively 37% of the respondents claimed that the painful sensitivity is triggered by thermal, chemical or mechanical stimuli. When asked about the association between the generations of adhesives and the risk of postoperative tooth sensitivity, 329 of the participants included in the study (30%) considered that fourth-generation adhesives are more frequently associated with postoperative sensitivity, 293 (27%) chose the answer corresponding to the 5th generation, while the answer represented by the 6th generation was chosen by 151 subjects (14%). The 7th generation adhesive system was considered by 127 subjects (12%) as one associated with the occurrence of this complication and finally, 185 (17%) answered the universal adhesive system. When asked about the possible therapeutic attitude approached by practitioners, 389 of them (32%) chose the



option of calming the patient and expectance, 343 subjects (28%) chose the option of immediate removal of the restoration and 401 of them (33%) chose to recommend analgesic medication. The obtained results through the survey are in accordance with other studies [3,14,16,20-22].

One of the limitations of this study was that this questionnaire was based on self-reported responses, and therefore participants may have had different interpretations of a particular question.

The results of this study may have important implications in the development of professional education programs to ensure that all dental practitioners receive an appropriate medical education that adequately prepares them for practice. Also, the results of this questionnaire-based study

could add value to the medical field by encouraging the standardization of dental education, ensuring that all dentists are prepared at the same level of knowledge, regardless of their postgraduate studies, their practice or the environment in which they work.

## CONCLUSION

1. Both postgraduate and bachelor's degree dentists have a similar level of knowledge regarding the etiology, symptomatology and therapeutic management of postoperative dental sensitivity.

2. The knowledge level regarding dental postoperative sensitivity does not differ between dental practitioners in public and private sectors.

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