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ORIGINAL RESEARCH

Endo-Perio Relationship Knowledge, Understanding, and Confidence Among Dentists

Shahad B Alsharif [1], Khuloud Bakhashwain[2], Omnia Felemban[2], Majd B Alsharif [3]

[1]Department of Periodontology, Faculty of Dentistry, King Abdulaziz University, Jeddah, Saudi Arabia; [2]Faculty of Dentistry, King Abdulaziz University, Jeddah, Saudi Arabia; [3]Department of Endodontics, Faculty of Dentistry, King Abdulaziz University, Jeddah, Saudi Arabia

Correspondence: Shahad B Alsharif, Department of Periodontology, Faculty of Dentistry, King Abdulaziz University, P.O. Box 80200, Jeddah, 21589, Saudi Arabia, Tel +966 12 6400000, Email sbalsherif@kau.edu.sa

Purpose: Proper knowledge and confidence regarding Endo-Perio relationship plays an important role in correct clinical decisions and management of these conditions. The aim of this study is to assess dentists' knowledge and understanding, in addition, their confidence regarding Endo-Perio relationship, consequently, to investigate the prevalence of misconceptions.

Methods: This cross-sectional study, conducted from December 2021 to March 2022, utilized voluntary anonymous questionnaire, distributed among general dentists, graduates of King Abdulaziz University, Faculty of Dentistry, Jeddah, Saudi Arabia, year of 2021 (n = 151). The questionnaire had two parts, demographic and 13 closed ended scientific questions to assess knowledge and understanding with 4 points Likert scale after each question to assess confidence and misconceptions. Descriptive statistics and Chi-square test at a statistical significance of P-value <0.05 were conducted to analyze the data using SPSS.

Results: Total of 98 participants completed the questionnaire setting a response rate of (64.9%). Only (21.4%) had sufficient overall knowledge and understanding regarding Endo-Perio relationship with no significant association found between knowledge and gender (p = 0.8). A little more than one-third of our participants (37.83%) were overly confident; false confident, thus, had misconceptions.

Conclusion: Our study revealed that the majority of our participants had deficient knowledge regarding Endo-Perio relationship. Thus, to compensate for this reported deficiency, changing teaching strategies and implementing continuing education courses are suggested. More studies assessing the interaction between knowledge and confidence in different dental topics are needed.

Keywords: dental education, undergraduate, knowledge, teaching assessment, endo-perio, misconceptions

Introduction

The dental pulp and the periodontium are connected and most importantly they affect each other in both health and disease.[1] The connection between these two structures is through several passageways, these include, lateral and accessory canals, apical foramen, apical delta, the exposed dentinal tubules, and furcation canals. These pathways can lead to the exchange of irritants and infectious elements between the two structures causing spread of the disease, and thus the formation of Endo-Perio lesions.[2,3] Turner and Drew in 1919 were the first to describe the effect of periodontal disease on the dental pulp.[4] Simring and Goldberg in 1964 were the pioneers to illustrate the association between the dental pulpal tissue and the periodontal disease. Subsequently, the terminology "Endodontic-Periodontic Lesion" was used to define lesions as a result of inflammatory processes of varying degrees in both the dental pulpal tissue and the periodontal structures.[5]

Etiological factors which play essential role in the development of Endo-Perio lesions can be classified into two main categories, living organisms, such as bacteria, fungi, and viruses, and non living organisms, such as foreign bodies, root canal filling material, dentin and cementum chips, Charcot-Leyden crystals, Rushton hyaline bodies, Russell bodies, and cholesterol crystals.[6,7] Other contributing factors are trauma, perforations, root resorption, poor endodontic treatment, coronal leakage, developmental malformations, and vertical root fracture.[6]

Several classifications for Endo-Perio lesions have been introduced in the literature[8–10] with the most commonly used worldwide being Simon et al's classification.[8] Diagnosis of primary endodontic lesions and primary periodontal lesions

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are usually straightforward. However, if both structures are involved, the diagnosis can be complicated and challenging as they are similar clinically and radiographically.[1,7] The proper diagnosis is crucial as it influences the treatment performed and thus the outcome of the condition.[6] Dental providers are required to have proper knowledge with clear understanding of Endo-Perio relationship in order to diagnose correctly and perform proper sequence of the needed treatment accordingly.[11]

The literature has many published reviews, expert opinions, and different proposed classification articles regarding Endo-Perio lesions; however, studies assessing the knowledge of dentists are lacking. In a survey-based cross-sectional study performed in Turkey, to investigate the level of knowledge of general dental practitioners toward Endo-Perio lesions, it was reported that general practitioners had deficient level of knowledge compared to specialists, with Endodontists and Periodontists being significantly more aware of Endo-Perio lesions compared to other specialists.[12] Similarly, another cross-sectional study among Russian dentists reported lack of enough information.[13] Furthermore, another survey-based study conducted in India among dental practitioners to assess their knowledge and skills concerning Endo-perio lesions concluded that only (31%) were able to manage these conditions, mainly specialists, with the majority of the participants indicated the need for additional education about Endo-Perio relationship in their undergraduate curriculum.[14]

Oxford dictionary defined confidence as "feeling certain about something". Measuring confidence together with knowledge assessment can aid in detecting misconceptions. Misconception is defined in oxford dictionary as "a belief or an idea that is not based on correct information, or that is not understood by people". Dentists' misconceptions can occur when they believe that they understand the scientific information, however, they do not. Confidence and misconception assessment is significant in dental education to detect subjects with most misunderstanding, accordingly, aid educators to modify their curriculum to remedy deficiencies,[15] most importantly, to prevent patients' harm and provide them with adequate care. Few studies assessed interaction between confidence and knowledge correctness, thus inspecting misconceptions in different health fields: medicine, nursing, and psychology;[16–21] however, studies assessing misconceptions in dentistry are lacking. A cross-sectional study, performed at the University of California, San Francisco, USA, aimed to investigate the prevalence of misconceptions among dental students in two different subjects, endodontics and dental implants, reported that their participants were overly confident on their incorrect answers with consistent rate of overconfidence (75%) regardless of the subject, thus, misconceptions reported in both subjects.[22]

We hypothesized that newly graduated dentists have sufficient knowledge with true confidence regarding Endodontic–Periodontic relationship. Therefore, the aim of this cross-sectional study is to assess dentists' knowledge and understanding, in addition to, their confidence regarding Endodontic–Periodontic relationship, consequently, to investigate the prevalence of misconceptions.

Materials and Methods

The research was reviewed and approved by The Research Ethics Committee of King Abdulaziz University, Faculty of Dentistry, Jeddah, Saudi Arabia. (Protocol number #322-11-21) and was conducted in accordance with the Helsinki Declaration of 1964, as revised in 2013.

Study Population and Design

This cross-sectional questionnaire-based study was conducted from December 2021 to March 2022. Study population were general dentists, graduates of King Abdulaziz University, Faculty of Dentistry, Jeddah, Saudi Arabia, year of 2021 (n = 151), all graduates both males and females aged 24–25 years. Graduates of years other than 2021 and other dental schools were excluded.

Sample size calculation was done utilizing the Raosoft sample size online calculator[23] with population size of 151 general dentists, 50% response distribution, 90% confidence level, and a 5% margin of error. The minimum calculated sample size was 98 participants.

Anonymous questionnaire was distributed among the graduates. Participation in the study was voluntary and the data acquired was confidential. The questionnaire utilized an online format using Google Forms (Google, Inc., USA). Detailed

research information with questionnaire link was sent to all participants through WhatsApp with weekly reminders. Informed consent was obtained from all participants.

Questionnaire Design

The questionnaire was formulated in English by the authors. Two independent dental academicians, one in the field of Periodontology and the other in the field of Endodontics, evaluated the questionnaire for content validation. The questionnaire was piloted with 55 general dentists, graduates of King Abdulaziz University, Faculty of Dentistry, Jeddah, Saudi Arabia, year of 2020, to assess the clarity of the questions and for reliability assessment. Questionnaire reliability was calculated using Cronbach's alpha and was 0.732. After minor rephrasing of some questions, the questionnaire was finalized and approved by all authors and the two dental academicians.

The questionnaire was divided into two parts. The first included demographic questions, gender, name of dental school, and year of graduation. The second part consisted of 13 closed ended scientific questions to assess Endo-Perio relationship knowledge and understanding of the participants, these questions covered different aspects, etiology (3 Questions), classification (1 question), diagnosis (3 questions), prognosis (3 questions), and treatment (3 questions). For overall knowledge, if the participant answered ≥60% of the questions correctly, 8 to 13 correct answers, then considered to have sufficient level of knowledge. However, if the participants answered <60% of the questions correctly, 0 to 7 questions, then considered having inadequate level of knowledge.

To assess the participants' confidence, after each question, the participants were asked to give their confidence regarding their answer using a 4 points Likert scale, 1 = *not confident*, 4 = *very confident*. Participants who answered 1 and 2 were considered as *not confident*, while 3 and 4 were considered as *confident*. If the participant answered the knowledge question correctly and rated him/her selves as confident, then he/she was determined to be "true confident", if the answer was correct, however, the participant rated him/her selves as not confident, then "false non-confident", if the answer was incorrect but rated him/her selves as not confident, then "true non- confident", however, if the answer was incorrect but rated him/her selves as confident, then "false confident", subsequently, "misconception".

Statistical Analysis

All data analyses were conducted using the Statistical Package for Social Sciences software (IBM SPSS, Inc., Chicago, version 28). Descriptive statistics, frequencies and percentages, were obtained to describe participants' knowledge and confidence. Chi-square test to measure the association between knowledge and gender was conducted. The significance level was set at P-value <0.05.

Results

Sample Characteristics

Of the total 98 participants, the majority of the participants were females (65.3%, n = 64) and (34.7%, n = 34) were males. Response rate was 64.9%.

Response to Some Questions

The participants were asked about the main known etiological reason for Endo-Perio lesions; the majority of them (92.9%, n = 91) answered bacteria, rather than trauma, root resorption, or dental malformations. When they were given a clinical scenario of an Endo-Perio lesion with full clinical information and the needed radiograph, 44.9% (n = 44) were able to determine the etiology of the lesion. Only 16.3% (n = 16) were aware of the most common Endo-Perio lesion classification, which was first proposed by Simon et al. Regarding diagnosis, when they were asked about the most important diagnostic measure to determine the origin of the lesion, about half of the participants (49.0%, n = 48) were aware of the correct answer; which is pulp vitality. However, when they were asked to choose the proper diagnosis of two different clinical scenarios of Endo-Perio lesions presented with the associated radiographs, only 12.2% (n = 12) were able to diagnose both cases correctly. Concerning prognosis, only 3.1% (n = 3) were able to give the correct answers for

all three questions. However, a higher number of participants (15.3%, n = 15) were able to answer treatment questions, all three, correctly.
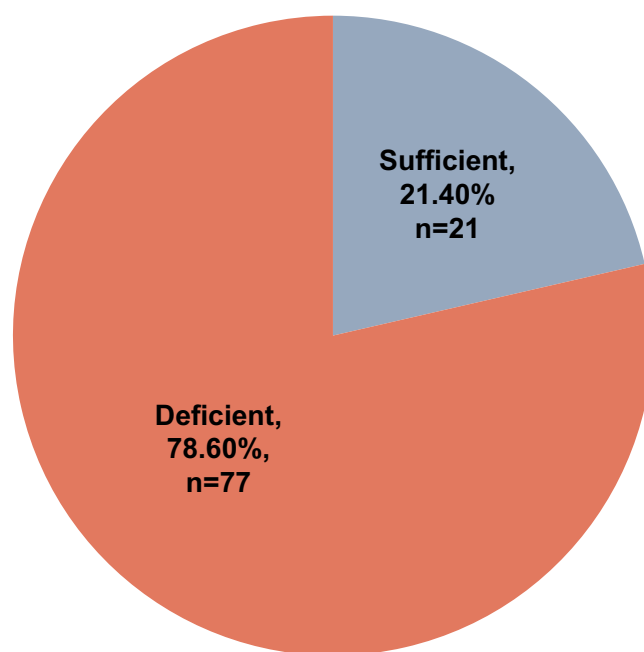
Overall Knowledge Regarding Endo-Perio Relationship

For overall knowledge assessment of Endo-Perio relationship, only 21.4% (n = 21) showed sufficient level of knowledge while the majority of the participants (78.6%, n = 77) had deficient level of knowledge (Figure 1) with mean number of correct answers for all participants was 6. No significant association was found between participants' knowledge and gender, P-values = 0.8.

Confidence and Misconceptions

Mean percentages of different confidence and knowledge interaction for all questions in descending order were as follows: first, false confident; misconceptions, was 37.83%, true confident was 36.97%, true non-confident was 16.63%, and lastly, false non-confident was 8.55%. Table 1 presents the detailed confidence and misconception information.

Discussion

Adequate Endo-Perio relationship knowledge is required for proper clinical management of Endo-Perio lesions. History of the affected tooth, proper clinical examination, and diagnostic radiographs are essential to determine the diagnosis, subsequently, decide the appropriate sequence of treatment.[2,5] Unfortunately, the majority of our participants failed to diagnose Endo-Perio cases; similarly, very minority of our participants were able to demonstrate proper treatment knowledge. This was in agreement with Grudianov and Makeeva's study as most of their participants were lacking adequate knowledge regarding Endo-Perio lesions; furthermore, they underestimated some aspect of the treatment.[13] Despite that Simon et al's classification of Endo-Perio lesions, which was taught to our participants during their undergraduate education, is the most commonly used worldwide, limited participants were aware of it and were able to report the correct 5 categories of the classification, which is based on the pathology of origin as follows: primary endodontic lesions, primary endodontic lesions with secondary periodontic involvement, primary periodontic lesions, primary periodontic lesions with secondary endodontic involvement, and true combined lesions.[8]

Figure I The overall knowledge regarding Endo-Perio relationship among the participants.

Table 1 True Confident, True Non-Confident, False Non-Confident, and False Confident 'Misconceptions" by Questions

Question	True Confident	True Non-Confident	False Non-Confident	False Confident "Misconceptions"
Q1 **(Etiology**), n=98	79.6%, n=78	3.1%, n=3	13.3%, n=13	4.1%, n=4
Q2 **(Etiology)**, n=98	38.8%, n=38	9.2%, n=9	7.1%, n=7	44.9%, n=44
Q3 **(Etiology)**, n=98	54.1%, n=53	7.1%, n=7	21.4%, n=21	17.3%, n=17
Q4 **(Classification)**, n=98	14.3%, n=14	37.8%, n=37	2.0%, n=2	45.9%, n=45
Q5 **(Diagnosis)**, n=98	43.9%, n=43	22.4%, n=22	4.1%, n=4	29.6%, n=29
Q6 **(Diagnosis)**, n=98	28.6%, n=28	8.2%, n=8	0%, n=0	63.3%, n=62
Q7 **(Diagnosis)**, n=98	28.6%, n=28	20.4%, n=20	4.1%, n=4	46.9%, n=46
Q8 **(Prognosis)**, n=98	24.5%, n=24	39.8%, n=39	6.1%, n=6	29.6%, n=29
Q9 **(Prognosis)**, n=98	12.2%, n=12	11.2%, n=11	11.2%, n=11	65.3%, n=64
Q10 **(Prognosis)**, n=98	22.4%, n=22	20.4%, n=20	18.4%, n=18	38.8%, n=38
Q11 **(Treatment)**, n=98	36.7%, n=36	14.3%, n=14	0%, n=0	49.0%, n=48
Q12 **(Treatment)**, n=98	43.9%, n=43	12.2%, n=12	9.2%, n=9	34.7%, n=34
Q13 **(Treatment)**, n=98	53.1%, n=52	10.2%, n=10	14.3%, n=14	22.4%, n=22
Mean	36.97%, n=36	16.63%, n=16	8.55%, n=8	37.83%, n=37

The overall knowledge concerning Endo-Perio relationship among most of our participants was deficient. This could be related to the involvement of mainly theoretical education regarding Endo-Perio relationship in our undergraduate curriculum through lectures and seminars with limited clinical involvement of Endo-Perio cases, these clinical cases are usually referred to postgraduate clinics. Other cross-sectional studies have found comparable results.[12–14] In addition, our study reported no significant association between participants' knowledge and gender, which is similar to Yılmaz Çırakoğlu and Karayürek's study.[12]

The interaction of confidence and knowledge among dental providers can be in four different ways; "true confident", the ideal interaction, a confident provider with correct knowledge will most probably deliver adequate care to the patients, "true non-confident", a non-confident provider with incorrect knowledge will usually realize the knowledge deficiency and subsequently might seek to enhance it, "false non-confident", a non-confident provider with correct knowledge is probably guessing the information or was hesitant about it but eventually will realize the need for knowledge improvement, however, "false confident", the worst interaction, a confident provider with incorrect knowledge, "misconception", is usually unaware of the deficiency, consequently, will not seek additional knowledge, most importantly, this provider might neglect patients' need or even cause harm due to improper clinical decisions and treatments.[15,16] Based on our results, the interaction category with the highest mean percentage was false confident, "misconception". Our participants seemed to be overly confident regarding Endo-Perio relationship knowledge. This overconfidence was consistent with Grazziotin-Soares et al's study despite the difference in dental subjects assessed.[22] Overconfidence can be referred as the degree to which people overestimate their performance on cognitive task.[21] Literature reported that most individuals are usually overly confident of their abilities. This could be due to the fact that they are incapable of assessing their own competence.[24]

Conventionally, dental education has emphasized on building and assessing scientific knowledge rather than confidence and misconceptions.[15] Based on our results, it is suggested to measure knowledge together with confidence to cope for misconceptions. Grazziotin-Soares et al proposed in their study three steps to help students to recognize their

faults and overconfidence, first, educators has to identify students' misconceptions, followed by informing them about their "biased view", and lastly, encourage them to practice self-assessment.[22]

The limitation in this study is the small sample size, although it was relatively similar to other studies, Yılmaz Çırakoğlu and Karayürek had 115 participants,[12] Khandelwal et al had 65 participants,[14] and Grazziotin-Soares et al had 104 participants.[22] Another possible limitation is that our study was conducted in a dental school at Saudi Arabia; thus, the generalization of our results might not be applicable, although that was also the case in all other studies as each was performed in a different country, respectively, Turkey, India, USA; however, despite the different geographical locations, the results reported from these studies were comparable to our results. To our knowledge, our study was the first to assess dentists' level of knowledge regarding Endo-Perio relationship and link it with their confidence in order to explore the prevalence of misconceptions. Due to the significance of this topic, additional studies investigating knowledge, confidence, and misconceptions on different dental topic are suggested.

Conclusion

Our study revealed that the majority of our participants had deficient knowledge regarding Endo-Perio relationship. As adequate Endo-perio relationship knowledge is essential for proper clinical management of Endo-Perio lesions and in order to compensate for this reported deficiency, changing teaching strategies to include not only comprehensive theoretical education but also management of clinical cases and implementing continuing education courses are suggested. A little more than one-third of our participants were overly confident; false confident, thus, had misconceptions. More studies assessing the interaction between knowledge and confidence in different dental topics are needed.

Disclosure

The authors declare that they have no conflicts of interests.

References

1. Singh P. Endo-perio dilemma: a brief review. *Dent Res J.* 2011;8(1):39–47.
2. Bonaccorso A, Tripi TR. Endo-perio lesion: diagnosis, prognosis and decision-making. *ENDO.* 2014;8(2):105–127.
3. Rotstein I, Simon JH. The endo-perio lesion: a critical appraisal of the disease condition. *Endod Topics.* 2006;13(1):34–56. doi:10.1111/j.1601-1546.2006.00211.x
4. Turner JG, Drew AH. An experimental inquiry into the bacteriology of pyorrhoea. *Proc R Soc Med.* 1919;12:104–118.
5. Simring M, Goldberg M. The pulpal pocket approach: retrograde periodontitis. *J Periodontol.* 1964;35(1):22–48. doi:10.1902/jop.1964.35.1.22
6. Parolia A, Gait TC, Porto IC, Mala K. Endo-perio lesion: a dilemma from 19 th until 21 st century. *J Interdiscip Dentistry.* 2013;3:2–11. doi:10.4103/2229-5194.120514
7. Sunitha VR, Emmadi P, Namasivayam A, et al. The periodontal - endodontic continuum: a review. *J Conserv Dent.* 2008;11(2):54–62. doi:10.4103/0972-0707.44046
8. Simon JH, Glick DH, Frank AL. The relationship of endodontic-periodontic lesions. *J Periodontol.* 1972;43(4):202–208. doi:10.1902/jop.1972.43.4.202
9. Al-Fouzan KS. A new classification of endodontic-periodontal lesions. *Int J Dent.* 2014;2014:919173. doi:10.1155/2014/919173
10. Armitage GC. Development of a classification system for periodontal diseases and conditions. *Ann Periodontol.* 1999;4(1):1–6. doi:10.1902/annals.1999.4.1.1
11. Simon JH, Glick DH, Frank AL. The relationship of endodontic-periodontic lesions. *J Endod.* 2013;39(5):e41–6. doi:10.1016/j.joen.2013.02.006
12. Yılmaz Çırakoğlu N, Karayürek F. Knowledge and awareness levels of dentists' about the endo-perio lesions: the questionnaire-based research. *ADYÜ Saglik Bilimleri Derg.* 2021;7(1):64–70. doi:10.30569/adiyamansaglik.815597
13. Grudianov AI, Makeeva MK. Частота встречаемости эндодонто-пародонтальных поражений и информированность врачей об особенностях их диагностики и лечения [Endo-perio lesions prevalence and awareness of dentists about diagnostics and treatment]. *Stomatologiia.* 2014;93(3):11–14. Russian.
14. Khandelwal A, Billore J, Gupta B, et al. Knowledge, attitude and perception on endo-perio lesions in practicing dentists- A qualitative research study. *J Adv Med Dent Scie Res.* 2020;8(11):31–34.
15. Curtis DA, Lind SL, Dellinges M, Schroeder K. Identifying student misconceptions in biomedical course assessments in dental education. *J Dent Educ.* 2012;76(9):1183–1194. doi:10.1002/j.0022-0337.2012.76.9.tb05373.x
16. Tweed M, Thompson-Fawcett M, Schwartz P, Wilkinson TJ. Determining measures of insight and foresight from responses to multiple choice questions. *Med Teach.* 2013;35(2):127–133. doi:10.3109/0142159X.2012.733834
17. McMahan CA, Pinckard RN, Jones AC, Hendricson WD. Fostering dental student self-assessment of knowledge by confidence scoring of multiple-choice examinations. *J Dent Educ.* 2014;78(12):1643–1654. doi:10.1002/j.0022-0337.2014.78.12.tb05843.x
18. Ibabe I, Sporer SL. How you ask is what you get: on the influence of question form on accuracy and confidence. *Appl Cogn Psychol.* 2004;18:711–726. doi:10.1002/acp.1025

19. Barr DA, Burke JR. Using confidence-based marking in a laboratory setting: a tool for student self-assessment and learning. *J Chiropr Educ*. 2013;27(1):21–26. doi:10.7899/JCE-12-018

20. Wakabayshi T, Guskin K. The effect of an 'unsure' option on early childhood professionals pre- and post-training knowledge assessments. *Am J Eval*. 2010;31:486–498. doi:10.1177/1098214010371818

21. Stankov L, Lee J. Overconfidence across world regions. *J Cross Cult Psychol*. 2014;45:821–837. doi:10.1177/0022022114527345

22. Grazziotin-Soares R, Lind SL, Ardenghi DM, Curtis DA. Misconceptions amongst dental students: how can they be identified? *Eur J Dent Educ*. 2018;22(1):e101–e106. doi:10.1111/eje.12264

23. Raosoft. Raosoft sample size calculator. Raosoft, Inc., Seattle; 2004. Available from: http://www.raosoft.com/samplesize.html. Accessed November 25, 2021.

24. Kruger J, Dunning D. Unskilled and unaware of it: how difficulties in recognizing one's own incompetence lead to inflated self-assessments. *J Pers Soc Psychol*. 1999;77(6):1121–1134. doi:10.1037/0022-3514.77.6.1121