

Incidence and quality of root canal fillings in undergraduate dental students

Incidência e qualidade de obturações de canais radiculares em estudantes de graduação em Odontologia

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ABSTRACT

Objective: The purpose of this study was to evaluate the incidence of endodontic treatment and the quality of root canal fillings in Brazilian undergraduate dental students. The study was similar those conducted 10, 20, 30, and 40 years earlier. **Methods:** A total of 407 undergraduate dental students were evaluated by using questionnaires to identify endodontic treatments, with each treatment being radiographed for the analysis of the presence of a periapical radiolucency and the quality of the root canal filling. **Results:** Forty root canal fillings were found: 32 (80%) completely filled, seven (17.5%) incompletely filled, and one (2.5%) overfilled. **Conclusion:** This study showed a low prevalence of endodontic treatment in dentistry students, and the evaluated root canals that were filled were high quality, with few cases suggesting periapical lesions.

Indexing terms: Dental students. Endodontics. Endodontic treatment. Root canal filling. Radiography.

RESUMO

Objetivo: O objetivo deste estudo foi avaliar a incidência do tratamento endodôntico e a qualidade das obturações de canais radiculares numa população de estudantes de odontologia brasileiros. O estudo foi semelhante a estudos prévios realizados há 10, 20, 30 e 40 anos. **Métodos:** Um total de 407 estudantes de odontologia foi avaliado por meio de questionários para identificação de tratamentos endodônticos, sendo cada tratamento radiografado para a análise da presença de radioluscência periapical e a qualidade da obturação endodôntica. **Resultados:** Foram encontrados 40 canais radiculares obturados, sendo 32 (80%) com adequada obturação, sete (17,5%) com subobturação e um (2,5%) sobreobturado. **Conclusão:** Este estudo mostrou uma baixa prevalência de tratamento endodôntico em estudantes de odontologia, e os tratamentos avaliados apresentaram alta qualidade, com poucos casos sugerindo lesões periapicais.

Termos de indexação: Estudantes de Odontologia. Endodontia. Obturação do canal radicular. Radiografia. Tratamento endodôntico.

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INTRODUCTION

Endodontic treatment is performed based on a series of factors and steps that when well conducted are aimed at reducing the chances of failure and accidents [1-3]. A correct radiographic interpretation, the technique employed, the use of suitable materials, and the ability of the operator directly interfere with the success or failure of the treatment. Failure can result from inadequate access, perforations, instrument fractures, overfilling, and incomplete fillings [1-5].

To evaluate the success or failure of endodontic treatment, clinical and radiographic methods were used in the past. Failures could be identified by an increase in the thickness of the periodontal ligament; the absence of bone repair within the lesion, or an increase in the size of rarefaction; the absence of the formation of a new hard

blade; the appearance of bone rarefaction in areas that previously did not exist; unfilled spaces that are visible in the canal, apically or laterally associated with periapical lesions; and active resorptions associated with other radiographic signs [2-7].

A systematic review of cross-sectional studies showed that the prevalence of a periapical radiolucency was very high, broadly equivalent to one radiolucency per patient, and the prevalence of teeth with root canal treatment was very high, too, broadly equivalent to two treatments per patient [8]. In the literature, many studies showed concern about this issue. Comparing the results of epidemiological studies (table 1), we observed the high occurrence of inadequate endodontic treatment in several populations, as well as the radiographic suggestion of a periapical reaction.

Table 1. Summary of endodontic epidemiological studies.

Authors	Population	Patients (n)	Teeth (n)	RTF (n)	Prevalence RFT (%)	PR in RFT (%)	IF (%)
Cleen et al. ⁹	Dutch	184	4196	97	2,3	6	50,6
Buckley & Spångberg ¹⁰	American	208	5272	291	5,5	31,1	42
Weiger et al. ¹¹	German	323	7897	215	2,7	61	86
Sidaravicius et al. ¹²	Lithuania	147	3892	586	15	35	36,4
De Moor et al. ¹³	Belgian	206	4617	314	6,8	40,4	56,7
Boucher et al. ¹⁴	French	208	5373	1026	19,1	27	29,7
Lupi-Pegurier et al. ¹⁶	French	344	7561	1429	18,9	31,5	68,8
Kabak & Abbott ¹⁶	Belarusian	1423	31312	6339	20	45	52,3
Loftus et al. ¹⁷	Irish	302	7427	149	2	25	52,6
Peculiene et al. ¹⁸	Unspecific	83	2186	283	13	43,1	71,4
Sunay et al. ¹⁹	Turkish	375	8863	470	5,3	53,5	91
Asgary et al. ²⁰	Iranian	1064	28463	1013	3,5	52	57,7
Covello et al. ²¹	Italian	384	9423	1076	11,41	41,6	59,48
Kamberi et al. ²²	Kosovar	193	4131	95	2,3	12,3	46,3
Matijević et al. ²³	Croatian	1462	38440	3279	8,53	8,5	66,8
Özbaş et al. ²⁴	Turkish	438	11542	179	1,55	37,99	77,95
Peters et al. ²⁵	Dutch	178	4594	224	4,8	24,1	55,8
Mukhaimer et al. ²⁶	Palestine	258	6482	855	1,31	15,1	74,5
Jersa & Kundzina ²⁷	Riga	312	7065	1255	17,76	31	77,29
Ureyen Kaya et al. ²⁸	Turkish	1000	23268	753	2,6	15,8	59
Di Filippo et al. ²⁹	London	136	3396	115	3,38	38,7	44,3
Ilić et al. (2014) ³⁰	Serbian	153	3526	440	12,5	51,8	55,9
Kirkevang et al. ³¹	Danish	327	8666	404	12	42	75
Archana et al. ³²	Indian	1340	30298	1234	4,07	37,4	61,7
Oginni et al. ³³	Nigerian	756	21468	2597	12,2	41	40
Mean of studies	-	472,16	11574	988	8,34	34	59,56

In this context, some studies evaluated endodontic treatment and its quality in university students, with a high prevalence of poorly filled canals [6,8]. With the constant evolution of technologies and concern with the maintenance of the aseptic chain, to study the prevalence situation of endodontic treatment in the university population, evaluating the success rate of any treated teeth seems to be appropriate [3,4].

The present study's aim was to analyze the prevalence of endodontic treatment as well as the quality of filled teeth and periapical status in a Brazilian subpopulation of dental students, taking into consideration other studies conducted 10, 20, 30, and 40 years ago along the same lines.

METHODS

This study received approval from the local institutional review board (CAAE: 01958818.4.0000.5137). A total of 407 students who were enrolled in the dentistry graduation course in our university were evaluated through questionnaires aimed at identifying students with endodontically treated teeth. The questionnaire included questions about dental history, related to the presence of endodontic treatment or the lack thereof, its cause, and when it was performed, as well as the number of teeth remaining, excluding third molars. The participation in this research was conditioned to the previous signing of an informed consent form.

After the presence of endodontically treated teeth was identified, the students were submitted to digital radiographic examination for further evaluation of the quality of the treatment performed.

Radiographs were performed and revealed 23 root-filled teeth (RFT), with 40 roots in total evaluated. The roots were categorized into three groups according to the quality of the root canal filling parameters [34]:

- Completely filled canal: filling performed 0.5 to 1.5 mm from the radiographic apex and without voids in the obturator body
- Incompletely filled canal: filling performed 2.0 mm or more from the radiographic vertex with empty spaces in the obturator body
- Overfilled canal: filling at or above the radiographic apex

For each of the three variables, the presence or absence of periapical reaction evidenced by radiography was evaluated [35]. The data were tabulated and analyzed in Microsoft Excel for Windows (Microsoft, Redmond, Washington, USA) via descriptive statistics (mean and percentage).

RESULTS

In this study's subpopulation of 407 individuals, 15 subjects (3.68%) had endodontically treated teeth. A total of 10,582 teeth were analyzed, and the prevalence of teeth with endodontic treatment was 0.2% (n=23). According to Table 2, we founded all 40 filled canals.

Throughout our sample, we found only two canals filled with periapical radiolucencies. The number and percentage of completely, incompletely, and overfilled canals, as well as the presence or absence of periapical reaction were recorded (Table 2). Representative cases of each of the conditions found can be visualized in Figure 1.

DISCUSSION

Studies investigating the prevalence of endodontic treatments, as well as their technical quality and the occurrence of apical periodontitis are important for increasing endodontic epidemiology [9,33]. Particularly, some studies have been carried out during the past few decades through radiographic evaluation in dentistry students to verify the quality of endodontic treatment,

Table 2. Radiographic survey of endodontic treatment in dentistry students.

	n	%
Treated root canals	40	100%
Completely filled	32	80%
With periapical reaction	0	0%
No periapical reaction	32	100%
Incompletely filled	7	17.5%
With periapical reaction	2	28.57%
No periapical reaction	5	71.43%
Over-filled	1	2.5%
With periapical reaction	0	0%
No periapical reaction	1	100%

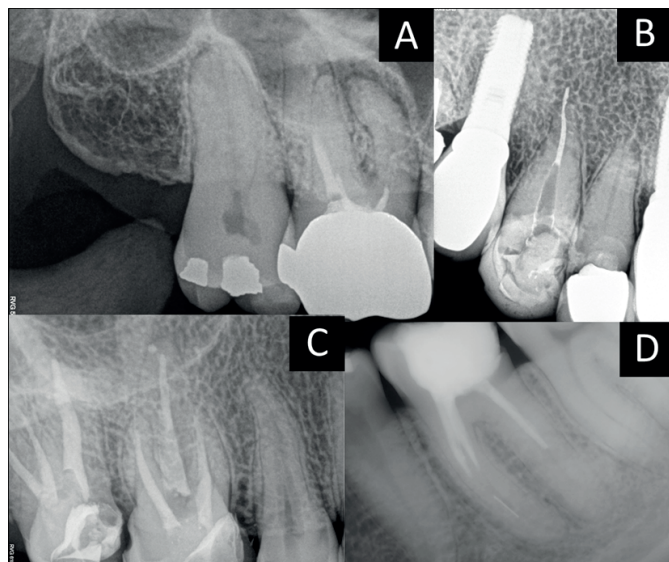


Figure 1. Representative of each of the conditions detected. A - Incompletely filled canal with presence of radiolucence; B - Overfilled canal with absence of radiolucence; C - Completely filled canal with absence of radiolucence; D - - Incompletely filled canal with absence of radiolucence.

observing the quality of treated teeth, as well as the success or failure of the treatment [8,11].

Our sample showed a low occurrence of endodontic treatment and periapical radiolucencies compared with all studies described in table 1. This could be due to the fact that our sample was made up of students, mostly young adults. Nevertheless, the occurrence of periapical reactions (20%) was greater than or compatible with that of some previous studies [9,23,26,28].

To systematize and match the discussion, the present study selected similarly themed investigations that considered Brazilian populations and dental students. The existence of these studies in the literature motivated us to choose this population (Brazilian dentistry students), which also made access and data collection easier. In 1972, dental students of the Dental School of UNESP, Araraquara, São Paulo State, Brazil, were examined, and it was found that 67.3% of root canals had inadequate fillings after radiographic analysis, and 70.4% had periapical reactions [36]. Also, in 1972, a similar work including dental students at the University of Uberlândia, Minas Gerais, Brazil, observed 90.1% root canals with inadequate fillings and 62.1% with chronic periapical reactions [37]. Sixteen years later, a survey at the abovementioned two colleges, funded in Araraquara, revealed 65.54% of root

canals with incomplete fillings and 40% with periapical reactions. In Uberlândia, the prevalence was 60.26% for deficient fillings and 44.7% for periapical reactions [37]. Through this comparison, a large fall in the percentage of poorly obtained root canals was observed, but the authors considered the results to still be alarming, taking into account the population segment involved students of higher education [37].

In a comparative analysis with the results obtained from various authors, a re-reduction in the number of failed fillings was observed [8,40]. In 1988, an improvement in the quality of endodontic treatment was detected between 1969 and 1984 [41]. It was observed that in the late 1960s, the percentage of poorly performed treatments was 83%, and after the 1980s, this percentage fell to 64.25%. This shows a fall in the percentage over the past few years [41].

In 2003, a study analyzed the teeth submitted to endodontic treatment for a minimum period of two years, based on periapical radiography, with the objective of evaluating the degree of success and failure of the endodontic treatment [5]. The results showed that 78.9% of the endodontic treatments performed had successes, concluding that there was a huge statistical difference between the percentages of success and failure [5]. In 2002, a study conducted at the School of Dentistry of the University of Itaúna analyzed filled root canals, wherein 54.3% presented deficient fillings and 36.3% periapical reactions [42]. In the present study, of the total of 40 root canals treated, 7 (17.5%) were incompletely filled, two (28.57%) with periapical reactions, and one (2.5%) was overfilled without radiographically visible periapical reaction.

One of the limitations of the present study is the initial selection of the presence of endodontic treatments through a self-administered questionnaire, which may have led to the omission of some data due to participants' memory bias. However, in the best of our conclusions, we showed a low occurrence of endodontic treatment in the investigated population, as well as a significant improvement in the quality of endodontic treatment compared with previous studies. These results are possibly a response to the great advances of endodontics, with the advent of improvements in equipment for instrumentation, filling, and diagnostics, in addition to the great current concern with the maintenance of the aseptic chain.

CONCLUSION

This study showed a low prevalence of endodontic treatment in dentistry students, and the evaluated filled root canals were high quality, with few cases suggesting periapical lesions.

Collaborators

BE COSTA and GM LIMA contributed in the collecting data and writing phase, SQ TONELLI and E NUNES contributed in the writing phase and data analysis, FF SILVEIRA collaborated in the design of the study, collecting data and written review.

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