

Dentistry undergraduates' knowledge of dental caries diagnosis and treatment

Conhecimento de graduandos em Odontologia sobre diagnóstico e tratamento da cárie dentária

Conocimiento de estudiantes de Odontología sobre el diagnóstico y el tratamiento de la caries dental

Received: 02/10/2020

Approved: 11/05/2021

Published: 14/10/2021

Caroline Pagani Martins¹Ana Paula Thomas²Talita Roberta Scaraboto³João Felipe Besegato⁴Pablo Guilherme Caldarelli⁵

This is a quantitative, descriptive and cross-sectional survey, carried out at a public university in 2018. It aims to evaluate the knowledge of undergraduate dentistry students about dental caries. A questionnaire was applied to 90 students from the 1st, 3rd and 5th period. The Pedagogical Course Project was also analyzed. Descriptive and comparative analysis of proportions was performed using Fisher's exact test ($p < 0.05$). Of those surveyed, 78.9% were female; 56.7% aged 21 to 24 years, 3.3% were 25 years or older. In the knowledge of dental caries, a statistically significant difference was found ($p < 0.05$) when comparing the number of correct answers between the three years evaluated for five of the ten questions. The results show statistical differences for the questions that addressed *the concept of dental caries* (1st year X 3rd year and 3rd year X 5th year), *the role of saliva in the development of the disease* (1st year X 3rd year, 1st year X 5th year and 3rd year X 5th year), *the diagnosis of active non-cavitated caries lesion* (1st year X 3rd year and 1st year X 5th year), *the diagnosis of active cavitated caries lesion* (1st year X 3rd year) and *the diagnosis of inactive cavitated caries lesion* (1st year X 5th year and 3rd year X 5th year). It was found that the curricular structure makes it difficult to integrate basic contents related to Cariology and clinical dental practice throughout graduation, and it is necessary to adapt it so that the contents related to caries are approached longitudinally, integrating the axes of Science Basic, Dental Sciences and Dentistry in Public Health.

Descriptors: Teaching; Curriculum; Dental Caries; Dentistry.

Esta é uma pesquisa quantitativa, descritiva e transversal, realizada numa universidade pública em 2018, com o objetivo de avaliar os conhecimentos de estudantes do curso de graduação em Odontologia sobre a cárie dentária. Aplicou-se um questionário para 90 estudantes do 1^o, 3^o e 5^o período. Foi analisado também o Projeto Pedagógico de Curso. Realizou-se análise descritiva e comparativa de proporções por meio do teste Exato de Fisher ($p < 0.05$). Dos pesquisados 78,9% eram do sexo feminino; 56,7% com 21 a 24 anos, 3,3% tinham 25 anos ou mais. No conhecimento da cárie dentária, encontrou-se diferença estatisticamente significante ($p < 0.05$) ao se comparar a quantidade de erros e acertos entre os três anos avaliados, para cinco das dez perguntas. Os resultados mostram diferenças estatísticas para as questões que abordavam o *conceito de cárie dentária* (1^o ano X 3^o ano e 3^o ano X 5^o ano), o *papel da saliva no desenvolvimento da doença* (1^o ano X 3^o ano, 1^o ano X 5^o ano e 3^o ano X 5^o ano), o *diagnóstico de lesão de cárie não cavitada ativa* (1^o ano X 3^o ano e 1^o ano X 5^o ano), o *diagnóstico de lesão de cárie cavitada ativa* (1^o ano X 3^o ano) e o *diagnóstico de lesão de cárie cavitada inativa* (1^o ano X 5^o ano e 3^o ano X 5^o ano). Verificou-se que a estrutura curricular dificulta a integração de conteúdos básicos vinculados à Cariologia e à prática clínica odontológica ao longo da graduação, sendo necessário adequá-la para que os conteúdos relacionados à cárie, de modo que sejam abordados longitudinalmente, integrando os eixos de Ciências Básicas, Ciências Odontológicas e Odontologia em Saúde Coletiva.

Descritores: Ensino; Currículo; Cárie Dentária; Odontologia.

Esta es una investigación cuantitativa, descriptiva y transversal, realizada en una universidad pública en 2018, con el objetivo de evaluar los conocimientos de los estudiantes del curso de pregrado en odontología sobre la caries dental. Se aplicó un cuestionario a 90 estudiantes del 1^o, 3^o y 5^o periodo. También se analizó el Proyecto Pedagógico de Curso. Se realizó un análisis descriptivo y comparativo de proporciones mediante la prueba exacta de Fisher ($p < 0,05$). El 78,9% de los encuestados eran del sexo femenino; el 56,7% tenían entre 21 y 24 años, y el 3,3% tenían 25 años o más. En el conocimiento de la caries dental, se encontró una diferencia estadísticamente significativa ($p < 0,05$) al comparar el número de respuestas incorrectas e correctas entre los tres años evaluados, para cinco de las diez preguntas. Los resultados muestran diferencias estadísticas para las preguntas que abordaban el *concepto de caries dental* (1^o año X 3^o año y 3^o año X 5^o año), *la función de la saliva en el desarrollo de la enfermedad* (1^o año X 3^o año, 1^o año X 5^o año y 3^o año X 5^o año), *el diagnóstico de la lesión de caries no cavitada activa* (1^o año X 3^o año y 1^o año X 5^o año), *el diagnóstico de la lesión de caries cavitada activa* (1^o año X 3^o año) y *el diagnóstico de la lesión de caries cavitada inactiva* (1^o año X 5^o año y 3^o año X 5^o año). Se constató que la estructura curricular dificulta la integración de los contenidos básicos vinculados a la Cariología y a la práctica clínica odontológica a lo largo del pregrado, siendo necesario adaptarla para que los contenidos relacionados con la caries sean abordados longitudinalmente, integrando los ejes de Ciencias Básicas, Ciencias Odontológicas y Odontología en Salud Colectiva.

Descritores: Enseñanza; Curriculum; Caries Dental; Odontología.

1. Dentist surgeon. Specialist in Family Health. Master's student in Public Health at the Universidade Estadual de Londrina (UEL), Londrina, PR, Brazil. ORCID: 0000-0001-6217-4944 E-mail: carol_pagani@hotmail.com

2. Dental surgeon. Specialist in Endodontics. Londrina, PR, Brazil. ORCID: 0000-0002-8932-7522 E-mail: anapaulathomas93@gmail.com

3. Dental surgeon. Specialist in Family Health at UEL, Londrina, PR, Brazil. ORCID: 0000-0002-7507-7390 E-mail: talitascaraboto@gmail.com

4. Dental surgeon. Master in Dentistry. PhD Student in Dental Sciences in the Faculdade de Odontologia de Araraquara, Universidade Estadual Paulista, Araraquara, SP, Brazil. ORCID: 0000-0001-8747-779X. E-mail: besegato@outlook.com

5. Dental surgeon. Specialist in Health Management. Master in Public Health Dentistry. PhD of Dentistry (Cariology). Adjunct Professor, Department of Oral Medicine and Child Dentistry, UEL, Londrina, PR, Brazil. ORCID: 0000-0002-4589-9713. E-mail: pablocaldarelli@uel.br

INTRODUCTION

Dental caries is currently understood as a complex biofilm-sugar-dependent disease, resulting from mineral loss from tooth structures¹. The necessary factor for the development of the disease is the accumulation of biofilm, while the determinants are: sugar consumption (negative determinant) and exposure to fluoride (positive determinant). The modulating factors are divided into biological, including saliva, and social, represented by the socioeconomic context and access to education and health services².

Scientific and technological advances have enabled greater knowledge of mechanisms related to the development and control of dental caries. However, coping with this disease, especially untreated injuries, is still a challenge in many countries, as it affects individuals, society, economy and health systems³. In this context, it is essential that the theme is recurrent throughout the academic training of dentistry students^{4,5}.

The professional training of dentists is characterized by favoring specialization at the expense of the generalist profile advocated for primary health care. This posture is linked to the model of oral health care practiced in Brazil for many decades, based on curative, technical, biological and individualistic behaviors, which despite being criticized for not meeting the needs of the population in psychosocial and socioeconomic aspects, is still reproduced in the syllabus of courses in the health area⁶.

It is important in the education process of Dentistry students that their actions and choices when they become professionals, there is an evaluation of decision-making, as there is a strong tendency to reproduce patterns established since graduation⁷. It is possible to infer, in this scenario, that professionals who were trained to assess caries disease from a biological perspective will tend to perform curative treatments and that they do not necessarily fit the reality and needs of patients⁸.

In order to promote changes in the model of dental education, the Brazilian National Curriculum Guidelines (*Diretrizes Curriculares Nacionais - DCN*) were approved in 2002 for undergraduate courses in Dentistry, which seek to guide the training of dentists with a generalist, humanist, critical and reflective profile. In addition, they establish that undergraduate courses in Dentistry must have a pedagogical project (PPC) converging with comprehensive training, whereby the student is able to articulate and perform preventive and curative actions as well as individual and collective⁹. Furthermore, from the 2004 Brazilian National Oral Health Policy (*Política Nacional de Saúde Bucal - PNSB*), the guiding principles of the actions were established: the professional's responsibilities in facing the factors associated with the health-disease process and the creation of support for comprehensive health care and the needs of different population groups¹⁰.

A study with undergraduate Dentistry students about caries disease showed that, despite its importance, this topic is still incipient and needs updating¹¹. Other studies show specific isolated approaches to factors related to the disease, such as the role of saliva¹² and the rational use of fluorides¹³. Thus, this study aims to assess the knowledge of undergraduate dentistry students about dental caries.

METHODS

This study was quantitative, descriptive and cross-sectional. The study setting was the undergraduate course in Dentistry at the Universidade Estadual de Londrina (UEL), located in the Northern region of the state of Paraná. Data were collected during the second semester of 2018, in October, considering students from the 1st, 3rd and 5th years of the course.

The students were randomly selected in classes. Students who refused to sign the Informed Consent Form, those who had not yet completed 18 years of age and those absent due to illness or leave were excluded.

A questionnaire structured in two sections was used. The first part of the questionnaire referred to the profile data of the students (gender, age, nature of primary and secondary education and period of the course in which they are enrolled). The second had 10 multiple choice questions, each with five possible answers and only one of them correct, about specific knowledge related to dental caries.

Also, there were questions on concept, factors related to the development of the disease (the role of saliva, diet and biofilm), the clinical approach and the diagnosis of cavitated and non-cavitated, active and inactive dental caries lesions. For this, images of clinical cases from the image bank of the responsible researcher and teaching materials were shown¹⁴. The application of the questionnaire lasted an average of 30 minutes in each of the classes.

In addition, the PPC was analyzed, which contains the syllabus and learning programs of the Dentistry course at UEL.

Data were tabulated using the Microsoft Office Excel® program and statistically analyzed using the BioStat 5.0® program. Descriptive analysis was used. For multiple comparisons, Fisher's exact test ($p < 0.05$) was used between the 1st, 3rd and 5th year classes of the course.

The research was conducted after approval by the Research Ethics Committee of UEL under No. 2.782.732 and the signing of the Free and Informed Consent Form (FICF) by the students, who participated voluntarily, with a guarantee of anonymity.

RESULTS

90 undergraduate Dentistry students participated, 30 students from each period considered (1st, 3rd and 5th). Of those surveyed, 78.9% were female; 56.7% were aged 21 to 24 years, 3.3% were aged 25 or over; 47.8% attended elementary school in public schools and 52.2% in private schools; 50% attended high school in private institutions and 50% in public schools (Table 1).

Table 1. Dentistry students by gender, age and educational background (primary and high school) according to the year of the course. Londrina, PR, Brasil, 2018.

Profile	1 st year		3 rd year		5 th year		Total	
	(No.)	%	(No.)	%	(No.)	%	(No.)	%
Gender								
Male	5	16.7	8	26.6	6	20.0	19	21.1
Female	25	83.3	22	73.3	24	80.0	71	78.9
Age								
≤ 20 years	25	16.7	11	36.7	0	0.0	36	40.0
21 to 24 years	5	83.3	18	60.0	28	93.3	51	56.7
≥ 25 years	0	0.0	1	3.3	2	6.7	3	3.3
Elementary education								
Private school	16	53.3	16	53.3	11	36.7	43	47.8
Public school	14	46.7	14	46.7	19	63.3	47	52.2
High school education								
Private school	20	66.7	14	46.7	11	36.7	45	50.0
Public school	10	33.3	16	53.4	19	63.3	45	50.0

Regarding the knowledge of dental caries, there was a statistically significant difference ($p < 0.05$) when comparing the number of correct answers between the three years evaluated, for five of the ten questions. The results show statistical differences for the questions that addressed the concept of dental caries (1st year X 3rd year and 3rd year X 5th year), the role of saliva in the development of the disease (1st year X 3rd year, 1st year X 5th year and 3rd year X 5th year), the diagnosis of active non-cavitated caries lesion (1st year X 3rd year and 1st year X 5th year), the diagnosis of active cavitated caries lesion (1st year X 3rd year) and the diagnosis of inactive cavitated caries lesion (1st year X 5th year and 3rd year X 5th year) (Table 2).

Table 2. Comparisons between periods of the Dentistry students course according to accuracy of answers. Londrina, PR, Brasil, 2018.

Theme of question	Accuracy of answer	Year of course			Multiple comparisons		
		1 st year No. (%)	3 rd year No. (%)	5 th year No. (%)	1 st X 3 rd p-value	1 st X 5 th p-value	3 rd X 5 th p-value
Concept of dental caries	Right	15 (50.0)	30 (100.0)	15 (50.0)	< 0,0001*	1,000	< 0,0001*
	Wrong	15 (50.0)	0 (0.0)	15 (50.0)			
Necessary and determinant factors of caries disease	Right	7 (23.4)	7 (23.4)	8 (26.7)	1,000	1,000	1,000
	Wrong	23 (76.6)	23 (76.6)	22 (73.3)			
Role of saliva in the development of caries disease	Right	2 (6.66)	10 (33.3)	20 (66.7)	0,021*	< 0,0001*	0,019*
	Wrong	28 (93.3)	20 (66.7)	10 (33.3)			
Role of diet in the development of caries disease	Right	1 (3.4)	1 (3.4)	4 (13.3)	1,000	0,353	0,353
	Wrong	29 (96.6)	29 (96.6)	26 (86.7)			
Role of biofilm in the development of caries disease	Right	24 (80.0)	17 (56.7)	20 (66.7)	0,095	0,382	0,596
	Wrong	6 (20.0)	13 (43.3)	10 (33.3)			
Clinical approach to caries disease	Right	5 (16.7)	5 (16.7)	7 (23.4)	1,000	0,748	0,748
	Wrong	25 (83.3)	25 (83.3)	23 (76.6)			
Diagnosis of active non-cavitated caries lesion	Right	6 (20.0)	22 (73.3)	22 (73.3)	< 0,001*	< 0,001*	1,000
	Wrong	24 (80.0)	8 (26.7)	8 (26.7)			
Diagnosis of inactive non-cavitated caries lesion	Right	11 (36.7)	8 (26.7)	11 (36.7)	0,580	1,000	0,580
	Wrong	19 (63.3)	22 (73.3)	19 (63.3)			
Diagnosis of active cavitated caries lesion	Right	29 (96.6)	17 (56.7)	23 (76.6)	< 0,0001*	0,052	0,170
	Wrong	1 (3.4)	13 (43.3)	7 (23.4)			
Diagnosis of inactive cavitated caries lesion	Right	10 (33.3)	11 (36.7)	26 (86.7)	1,000	< 0,0001*	< 0,0001*
	Wrong	20 (66.7)	19 (63.3)	4 (13.3)			

Fisher's exact test ($p < 0.05$). p-values containing (*) denote statistically significant difference.

DISCUSSION

The causes and consequences of dental caries, how to treat or prevent it, have been the object of study in Dentistry since when "caries lesion" was confused with "caries disease". In general, among all areas of Dentistry, Cariology has perhaps been the one that has undergone the greatest change in concepts and paradigms. The changes in the concepts of caries disease and the importance of using fluoride for its control were so drastic that they have not yet been fully incorporated into the syllabus of Dentistry courses⁴ and into the practices of health services¹⁵.

The teaching of Cariology is essential for the training of dental surgeons, since knowledge about causes, diagnosis, prevention, control and treatment of dental caries are essential for the professional to commit to improving the oral health conditions of individuals and communities. Historically, Cariology has always been separated between Restorative Dentistry and Preventive Dentistry, which compromises integrality of education⁴ and, consequently, of health care.

The syllabus structure of Dentistry colleges is mostly organized in a way that makes it difficult to integrate knowledge between basic, restorative and preventive/social disciplines⁴. In the analyzed Dentistry course, PPC shows integration difficulties when allocating the syllabus component of Cariology in the 3rd year of the course, after the theoretical and practical approaches of Restorative Dentistry (1st and 2nd year). This may also be related to the large proportion of errors presented by 1st and 3rd year students in questions with basic contents of Cariology. For the specific question about the role of biofilm in the development of caries disease, which showed 80% of correct answers among 1st year students, the analysis of the PPC allowed us to observe that this content was being addressed in the semester of data collection

through the component Oral Microbiology, confirming the difficulty of integrating and applying the contents of basic sciences to clinical dental practice.

A study that analyzed 61 teaching plans for subjects and curricular internships in the Dentistry course of a university in the state of Rio Grande do Sul found that the words "humanization", "interprofessionality" and "comprehensiveness" were mentioned only in 5%, 20% and 15 % of documents, respectively¹⁶. In other words, in Brazil, even after the approval of the DCN in 2002, the challenge remains to establish curricular structures that endorse integration of Basic Sciences Applied to Dentistry, Dental Sciences and Dentistry in Public Health in order to reorient the model of care to oral health. In this sense, basic and professional disciplines must be effectively articulated in favor of a more contextualized learning¹⁷, so that clinical decision-making is already established in graduation¹⁸.

Outside of Brazil, specific in Europe, syllabus guidelines for the area of Cariology were non-existent until 2011, raising the need for entities such as the European Organization for Research in Cariology (ORCA) to discuss the formulation of a document that presented the competences at the end of graduation in Dentistry¹⁹. However, although in this process there has been a consensus that dentists should master biological, medical, basic and clinical sciences applied to diagnose, prevent and treat dental caries, there are no studies that assess the consolidation of these guidelines in practice .

This study showed the difficulty of senior students in correctly conceptualizing dental caries (50% correct), possibly due to a break in continuity of the approach to basic concepts linked to the subject. A similar problem was found in a study carried out in the state of Bahia¹⁵. Thus, it is essential that aspects and factors related to dental caries are discussed throughout the entire training process and integrated with other areas of knowledge, in an interdisciplinary way. Thus, in addition to encouraging responsibility, the student's critical and reflective development, it is possible to prepare them to face the disease with a broader and more resolute view in clinical practice after graduation²⁰.

All 3rd year students of the course correctly conceptualized caries disease (complex biofilm-sugar-dependent disease). In this context, according to the analysis of the PPC and course syllabus, it is highlighted that these students had taken the syllabus component of Cariology in the semester immediately prior to the application of the questionnaire. However, this concept did not seem to have been effectively apprehended by those who finish the course, considering that among the 5th year students the number of correct answers was reduced to 50%. On the other hand, when asked about the role of saliva in the development of caries disease, senior students had the highest success rate (66.7%).

It was also observed more correct answers by the 5th year students in questions that dealt with the diagnosis of caries lesions, which may be related to the pre-clinical and clinical syllabus components and those of Restorative Dentistry experienced in a transversal way (1st to 5th year) in the course syllabus as outlined in the PPC and learning programs. In the question about the diagnosis of active non-cavitated caries lesion (white, opaque and rough spot), for example, a total of 20% of correct answers was obtained in the 1st year, while in the others the percentage was 73.3% in each of years. In the diagnosis of inactive cavitated caries lesion, the percentage of correct answers was 33.3% among 1st year students, increasing to 86.7% in the 5th year.

However, regarding the diagnosis of inactive non-cavitated caries lesion (white, shiny and smooth spot) and the role of diet in the development of caries disease, there was a similarity between the high percentages of error in the 1st, 3rd and 5th year.

Considering that the way in which the professional in training apprehends contents related to the approach to the disease and the use of means for its control will influence their attitude in coping with the disease², theoretical and practical teaching/learning strategies should be developed based on scientific evidence. However, it is important to emphasize that even if a content is present in the syllabus of a course, it does not guarantee that it is being approached in a didactic, pedagogical, meaningful and integrated way. The ability to apply

theory and practice is up to the professor, confirming the responsibility they take in the teaching-learning process¹⁸.

At the same time, students completing the course were more able to diagnose caries lesions, converging with the research findings of the Universidade Estadual de Campinas (UNICAMP)² and the Universidade Federal do Espírito Santos (UFES)⁵. However, there was difficulty in questions related to inactive non-cavitated lesions (white, shiny and smooth spots) and to the management and clinical approach of the disease (76.6% of errors).

Thus, it is necessary to discuss preventive and conservative methods for the treatment of caries lesions in a longitudinal way and integrated to the syllabus components of Restorative Dentistry. However, overcoming dogmas and paradigms incorporated for decades on this theme is a challenge, considering that even nowadays, teaching in Dentistry prioritizes curative techniques^{4,14}.

CONCLUSION

Despite the advances achieved after the implementation of the DCN in Dentistry and the PNSB, there are still challenges regarding professional training in dentistry. Among these challenges, there is the structure of the Dentistry syllabus, which continue to establish a division between basic, restorative and preventive/social disciplines, hindering training based on comprehensive health care. Also, there are great paradigms to overcome, specifically in relation to the area of Cariology, as well as the historical separation between Restorative Dentistry and Preventive Dentistry in the approach to caries disease.

As limitations, it is possible to say generalization is impossible, because of the study's cross-sectional nature, for which a cause and effect relationship cannot be established between the findings, and because it had only one educational institution as its setting.

On the other hand, the historical factor of the teaching of Cariology and the results found suggest the adequacy of the syllabus matrix so that the contents related to the diagnosis, clinical approach and treatment of dental caries are approached and worked on in a longitudinal manner, integrating the Basic Sciences axes Applied to Dentistry, Dental Sciences and Public Health Dentistry.

REFERENCES

1. Machiulskiene V, Campus G, Carvalho JC, Dige I, Ekstrand KR, Jablonski-Momeni A, et al. Terminology of dental caries and dental caries management: consensus report of a workshop organized by ORCA and Cariology Research Group of IADR. *Caries Res.* [Internet]. 2020 [cited in 15 Sep 2020]; 54:7-14. Available from: <https://www.karger.com/Article/FullText/503309>. DOI: 10.1159/000503309
2. Ferreira-Nóbilo NP, Sousa MLR, Cury JA. Conceptualization of dental caries by undergraduate dental students from the first to the last year. *Braz Dent J.* [Internet]. 2014 [cited in 15 Sep 2020]; 25(1):59-62. Available from: <https://www.scielo.br/j/bdj/a/ZM9ntZmLcNfnyXxfscCJG5G/?lang=en#>. DOI: 10.1590/0103-6440201302359
3. Kassebaum, NJ, Bernabé, E, Dahiya, M, Bhandari, B, Murray, CJL, Marcenes, W. Global burden of untreated caries: a systematic review and metaregression. *J Dent Res.* [Internet]. 2015 [cited in 15 Sep 2020]; 94(5):650-8. Available from: <https://pubmed.ncbi.nlm.nih.gov/25740856/>. DOI: 10.1177/0022034515573272
4. Cury JA, Tenuta LMA, Serra MC. Paradigmas no ensino da cariologia. In: Fernandes CP, organizador. *Uma odontologia de classe mundial Brasil*. São Paulo: Santos; 2010. p. 92-110.
5. Santos-Daroz CB, Santos GF, Silva Junior MF, Gavi RS, Gomes MJ, Daroz LGD. Avaliação do conhecimento prévio e adquirido sobre cárie dentária em graduandos de Odontologia da Universidade Federal do Espírito Santo. *Arq Odontol.* [Internet]. 2016 [cited in 13 June 2020];

- 52(1):23-31. Available from: <https://periodicos.ufmg.br/index.php/arquiosemodontologia/article/view/3687>
6. Grande I, Prochnow R, Saab R, Pizzatto E. Desafios na formação do cirurgião-dentista para o SUS. Rev ABENO [Internet]. 2016 [cited in 28 Sep 2020]; 16(2):2-6. Available from: <https://revabeno.emnuvens.com.br/revabeno/article/view/256>. DOI: 10.30979/rev.abeno.v16i3.256
7. Brennan DS, Spencer AJ. Longitudinal comparison of factors influencing choice of dental treatment by private general practitioners. Aust Dent J. [Internet]. 2006 [cited in 28 Sep 2020]; 51:117-23. Available from: <https://pubmed.ncbi.nlm.nih.gov/16848258/>. DOI: 10.1111/j.1834-7819.2006.tb00414.x
8. Tognetti VM, Ferreira-Nobilo NP, Sousa MLR. Clinical management of caries by public and private university dental students. Rev Odontol UNESP [Internet]. 2013 [cited in 15 Sep 2020]; 42(6):401-7. Available from: https://www.scielo.br/scielo.php?script=sci_arttext&pid=S1807-25772013000600002&lang=en
9. Conselho Nacional de Educação (Brasil), Câmara de Educação Superior. Resolução CNE/CES 3, de 19 de fevereiro de 2002. Institui Diretrizes Curriculares Nacionais do curso de graduação em Odontologia [Internet]. Brasília, DF: CNE/CES; 2002 [cited in 13 June 2020]. Available from: <http://portal.mec.gov.br/cne/arquivos/pdf/CES032002.pdf>
10. Ministério da Saúde (Brasil), Secretaria de Atenção à Saúde, Departamento de Atenção Básica, Coordenação Nacional de Saúde Bucal. Diretrizes da Política Nacional de Saúde Bucal [Internet]. Brasília, DF: MS; 2004 [cited in 15 Sep 2020]. Available from: https://bvsms.saude.gov.br/bvs/publicacoes/politica_nacional_brasil_sorridente.htm
11. Rodrigues MJ, Silva ATVO, Pereira C, Gomes Nascimento M. Estudo para avaliar o conhecimento dos alunos do curso de odontologia sobre a transmissibilidade da cárie dentária. Rev Fac Odontol Pernamb. 1997; 15(1/2):37-43.
12. Ferreira-Nóbilo NP, Tabchoury CPM, Sousa MLR, Cury JA. Knowledge of dental caries and salivary factors related to the disease: influence of the teaching-learning process. Braz Oral Res. [Internet]. 2015 [cited in 28 Sep 2020]; 29(1):1-7. DOI: 10.1590/1807-3107BOR-2015.vol29.0061
13. Leal SD, Carvalho FS, Carvalho CAP. Conhecimento de alunos do curso de odontologia sobre o uso racional do flúor. Rev Odontol UNESP [Internet]. 2015 [cited in 15 Sep 2020]; 44(1):51-8. DOI: 10.1590/1807-2577.1058
14. Nyvad B, Fejerskov O, Baelum V. Diagnóstico tátil-visual da cárie. In: Fejerskov O, Kidd E, organizadores. Cárie dentária: a doença e seu tratamento clínico. 2ed. São Paulo: Santos; 2011. p.49-68.
15. Caldarelli PG. Diretrizes de uso de fluoretos em cursos de odontologia e na prática dos serviços públicos de saúde bucal do Paraná: um estudo qualiquantitativo [Internet]. [thesis]. Piracicaba, SP: Universidade Estadual de Campinas; 2017 [cited in 15 Sep 2020]. 70p. Available from: <http://repositorio.unicamp.br/jspui/handle/REPOSIP/325618>
16. Bitencourt RR, Buchmann MG, Ruiz ENF, Mengatto CM, Bernardi JR, Silva VL, et al. O processo de formação em saúde: uma análise dos planos de ensino das atividades curriculares obrigatórias. Saberes Plurais [Internet]. 2020 [cited in 12 Sep 2020]; 41(11):62-78. Available from: <https://seer.ufrgs.br/saberesplurais/article/view/102022/57926>
17. Noro LRA, Roncalli AG, Medeiros MCS, Farias-Santos BCS, Pinheiro IAG. Relação entre conteúdos das disciplinas de curso de odontologia e os ENADE 2004/2010. Avaliação (Campinas) [Internet]. 2017 [cited in 15 Sep 2020]; 22(1):125-39. DOI: 10.1590/S1414-40772017000100007
18. Mialhe FL, Silva RP, Pereira AC, Ambrosano GMB, Alves WF. Variabilidade na detecção de lesões cáries e planos de tratamento entre graduandos de odontologia. Rev Odontol UNESP [Internet]. 2008 [cited in 15 Sep 2020]; 37(4):345-50. Available from: <https://www.revodontolunesp.com.br/article/5880184b7f8c9d0a098b4b65>

19. Schulte AG, Pitts NB, Huysmans MCDNJM, Splieth C, Buchalla W. European Core Curriculum in Cariology for undergraduate dental students: European Cariology Core Curriculum. *Eur J Dent Educ*. [Internet]. 2011 [cited in 15 Sep 2020]; 15:9-17. DOI: 10.1159/000330006
20. Martins IM, Pereira PZ, De-Carli AD. Cariologia baseada em evidências e o processo de ensino-aprendizagem. *Rev Bras Educ Med*. [Internet]. 2015 [cited in 13 June 2020]; 39(1):50-9. DOI: 10.1590/1981-52712015v39n1e02252013

Associated Published: Vania Del Arco Paschoal

CONTRIBUTIONS

Caroline Pagani Martins collaborated in data collection and analysis, writing and review. **Ana Paula Thomas** and **Pablo Guilherme Caldarelli** contributed to the design, collection and analysis of data, writing and review. **Talita Roberta Scaraboto** participated in data collection and analysis, writing. **João Felipe Besegato** worked on the collection and analysis of data and review.

How to cite this article (Vancouver)

Martins CP, Thomas AP, Scaraboto TR, Besegato JF, Caldarelli PG. Dentistry undergraduates' knowledge of dental caries diagnosis and treatment. *REFACS* [Internet]. 2021 [cited in *insert day, month and year of access*]; 9(4):894-901. Available from: *insert access link*. DOI: *insert DOI link*.

How to cite this article (ABNT)

MARTINS, C. P.; THOMAS, A. P.; SCARABOTO, T. R.; BESEGATO, J. F.; CALDARELLI, P. G. Dentistry undergraduates' knowledge of dental caries diagnosis and treatment. **REFACS**, Uberaba, MG, v. 9, n. 4, p. 894-901, 2021. Available from: *insert access link*. Access in: *insert day, month and year of access*. DOI: *insert DOI link*.

How to cite this article (APA)

Martins, C.P., Thomas, A.P., Scaraboto, T.R., Besegato, J.F., & Caldarelli PG. (2021). Dentistry undergraduates' knowledge of dental caries diagnosis and treatment. *REFACS*, 9(4), 894-901. Retrieved in: *insert day, month and year of access* from *insert access link*. DOI: *insert DOI link*.

