

Dental students' knowledge about the risks of bleaching agents self-application

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Introduction: Changes in dental color is one of the most common aesthetic problems perceived by people. The desire of having white teeth puts dental bleaching as the cosmetic treatment most sought by patients. **Objective:** the present study analyzed the knowledge about bleaching, its contraindications and the risks of bleaching agents self-application without professional prescription, as well as the frequency of the treatment and the use of commercial products with whit-

ening action by undergraduates in dentistry. **Methods:** The sample of the study was divided into two groups: G1 - students in the first year of graduation; G2 - students attending the fourth year of graduation (n = 50). A quantitative objective questionnaire was applied in order to verify the knowledge about the techniques and risks of the bleaching treatment and the risks of the use of self-applicable bleaching products. **Results:** Most students, regardless of their undergraduate year, had

already undergone dental whitening. Both groups presented knowledge about the risks of self-administration of bleaching agents, including dentifrices and other commercial products with "bleaching action". **Conclusion:** It can be concluded that with increased knowledge about the administration and risks of dental whitening, both supervised and self-applied, the use of bleaching treatment was reduced. **Keywords:** Students. Tooth bleaching. Tooth bleaching agents.

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INTRODUCTION

A smile with whiter teeth is considered not only more esthetic but also a characteristic of youth; therefore, it is remarkable the increasing demand of patients wishing for dental bleaching treatment in dental offices.¹ Recent data from the Brazilian Society of Aesthetic Dentistry (SBOE) showed a growth of approximately 300% in the number of patients seeking dentistry esthetic procedures in the South and Southeast region of country.² Nearly 55% of individuals are dissatisfied with the color of their teeth. Thus, dental bleaching was turned into a very popular procedure, because of it is simple and non-invasive technique.^{3,4}

Bleaching products are commercially presented as gels, dentifrices and mouthwashes. Their use has been increased due to the emphatic action of the media and its easy access in pharmacies, supermarkets and on the internet.⁵ However, the use of bleaching products can be harmful if it is used without guidance and follow-up of a specialized professional.⁶

Bleaching agents are vehicles of oxygen radicals with low molecular weight that are capable of permeating through the interprismatic spaces of the dental tissue.⁷ They break down the pigmented molecules and organic compounds, into smaller molecular chains, thus reducing the color intensity and providing the bleaching effect.⁸

During the bleaching treatment, there is a moment when the maximum bleaching of the teeth tissues occurs. This fact is known as the bleaching saturation point. From this stage, no further bleaching action occurs in the pigments, and then the bleaching agent begins to act on teeth compounds that have carbon chains, such as enamel matrix proteins and dentin collagen components, consequently promoting the loss of tooth structure.⁹

In order to prevent the damages caused by dental bleaching, adequate knowledge of the den-

tal students about bleaching techniques and its adverse effects is extremely important. Only with the correct information, will the students be able to improve their professional practice and enhance the quality of the instructions prescribed to the patients in regards of dental bleaching in-office and self-administered products and techniques.⁵

Therefore, the aim of the present study was to evaluate dental bleaching treatment knowledge among undergraduate students of the first and the fourth years in a Dental School in the city of Maringá-PR. The analyzed information was the knowledge about dental bleaching adverse effects, its contraindications, the risks of self-application, as well as the frequency of bleaching treatment and use of commercial products with "bleaching action among the students.

MATERIALS AND METHOD

Initially, the present study was submitted for approval by the local ethics committee (Protocol number: 57308716.1.0000.5539).

After approval of the project, two different groups were proposed (n = 50):

G1) Dental students attending the 1st year of graduation.

G2) Dental students attending the 4th year of graduation.

Subsequent to the division of the groups, a questionnaire (APPENDIX A) was applied face-to-face with an objective and quantitative format. The same questions were applied for both groups (G1 and G2). The questionnaire was formulated with two complementary purposes, the first one was to verify the students' knowledge about dental bleaching treatment adverse effects, contraindications and the risks of its self-administration; secondly to investigate bleaching treatment frequency between those students and their use of commercial products with bleaching action.

Descriptive statistical analysis was done and the Chi-square test (Microsoft Excel) ($p = 0.05$) was used to test the association between the variables: tooth color satisfaction versus a previous bleaching treatment; satisfaction with tooth color versus the use of commercial products with “bleaching action”; knowledge of bleaching adverse effects versus previous bleaching treatment; knowledge about the risks of “bleaching action” products self-administration versus use of these products.

RESULTS

Sample characterization revealed that 96% of the students in G1 and 62% of the students in G2 were in the age group between 18 and 22 years. In addition, the majority of the students were female, G1 62% and G2 80%. It was observed that most students of both groups, G1: 60% and G2: 88%, had already been submitted to dental bleaching treatment. Between the different dental bleaching techniques, in office bleaching was the most commonly performed procedure (Fig 1). Considering the oral hygiene products with “bleaching action”, the dentifrices were the most used by students (Fig 2).

In order to test students’ knowledge about dental bleaching treatment adverse effects and contraindications and the risks of its self-administration; the questions were developed with more than one correct alternative and one wrong alternative (Appendix A). G2 students demonstrated an improved knowledge about all of these 3 topics (Table 1). The majority of G2 students (56%) answered correctly the adverse effects of dental bleaching treatment when compared to G1 (14%). Most of G2 students (84%) chose the corrected options for dental bleaching treatment contraindications, while a few of G1 students (34%) answered it right. Regarding the risks of dental bleaching self-administration, a large number of G2 students (48%) and a small number of G1 students (24%) selected the right alternatives.

Chi-square test revealed no association between the variables satisfaction with teeth color and a previous dental bleaching treatment for both groups, G1: $p=0.23$ (Table 2) and G2: $p=0.75$ (Table 3). In addition, there was no association between the variables satisfaction with teeth color and the use of oral hygiene products with “bleaching action”, in G1: $p=0.08$ (Table 4) and in G2: $p=0.70$ (Table 5).

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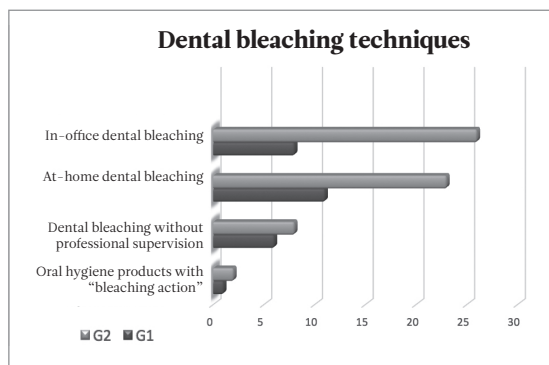


Figure 1: Different kinds of dental bleaching techniques which the students were submitted to.

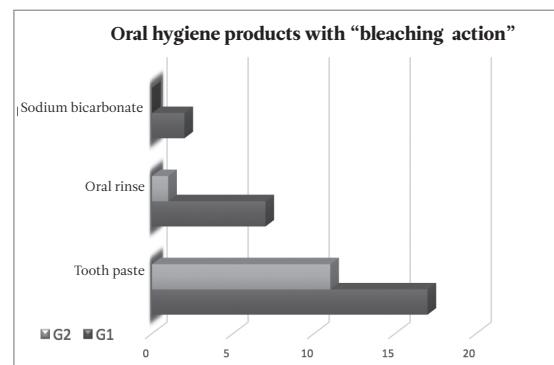


Figure 2: Use of oral hygiene products with ‘bleaching action’.

Table 1: Students knowledge about dental bleaching treatment.

DENTAL BLEACHING TREATMENT	G1		G2	
	n	%	n	%
Adverse effects	43	86	22	44
More than 2 correct answers	7	14	28	56
Contraindications	17	34	42	84
More than 2 correct answers	33	66	8	16
Self-administration risks	12	24	24	48
More than 2 correct answers	38	76	26	52

Table 2: Distribution of 1st year dental students regarding questions about teeth color satisfaction and previous bleaching treatment.

INTERVIEWED WHITENING TREATMENT	PREVIOUS BLEACHING TREATMENT		TOTAL
	YES	NO	
Yes	20	10	30
No	10	10	20
TOTAL	30	20	50

Chi-square test: $p=0,23$

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Table 3: Distribution of 4th year dental students regarding questions about teeth color satisfaction and previous bleaching treatment.

INTERVIEWED WHITENING TREATMENT	PREVIOUS BLEACHING TREATMENT		TOTAL
	YES	NO	
Yes	26	18	44
No	4	2	6
TOTAL	30	20	50

Chi-square test: $p=0,75$

Despite knowing dental bleaching adverse effects, it was observed that the search for bleaching treatment in G1 ($p=0.02$) did not decrease (Table 6). On the other side, for G2, the knowledge about dental bleaching disadvantages significantly decreased students search

for this treatment ($p=0.47$) (Table 7). Moreover, the knowledge about the risks of self-administration of products with “bleaching action” led the students to a lower consumption of these products for both G1 ($p=0.64$) (Table 8) and G2 ($p=0.48$) (Table 9).

Table 4: Distribution of 1st year dental students regarding questions about teeth color satisfaction and use of oral hygiene products with “bleaching action”.

INTERVIEWED	PREVIOUS BLEACHING TREATMENT		TOTAL
WHITENING TREATMENT	YES	NO	
YES	10	12	22
NO	20	8	28
TOTAL	30	20	50

Chi-square test: p=0,08

Table 5: Distribution of 4th year dental students regarding questions about teeth color satisfaction and use of oral hygiene products with “bleaching action”.

INTERVIEWED	PREVIOUS BLEACHING TREATMENT		TOTAL
WHITENING TREATMENT	YES	NO	
YES	9	5	14
NO	21	15	36
TOTAL	30	20	50

Chi-square test: p=0,70

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Table 6: Distribution of 1st year dental students regarding questions about the knowledge of dental bleaching treatment adverse effects and previous bleaching treatment.

INTERVIEWED	ADVERSE EFFECTS KNOWLEDGE		TOTAL
WHITENING TREATMENT	YES	NO	
YES	29	15	44
NO	1	5	6
TOTAL	30	20	50

Chi-square test: p=0,02

Table 7: Distribution of 4th year dental students regarding questions about the knowledge of dental bleaching treatment adverse effects and previous bleaching treatment.

INTERVIEWED	ADVERSE EFFECTS KNOWLEDGE		TOTAL
WHITENING TREATMENT	YES	NO	
YES	35	4	39
NO	9	2	11
TOTAL	44	6	50

Chi-square test: p= 0,47.

Table 8: Distribution of 1st year dental students regarding questions about the knowledge of bleaching products self-administration risks and the use of oral hygiene products with “bleaching action”.

INTERVIEWED WHITENING TREATMENT	ADVERSE EFFECTS KNOWLEDGE		TOTAL
	YES	NO	
YES	17	5	23
NO	23	5	28
TOTAL	40	10	50

Chi-square test: $p = 0,64$.

Table 9: Distribution of 4th year dental students regarding questions about the knowledge of bleaching products self-administration risks and the use of oral hygiene products with “bleaching action”.

INTERVIEWED WHITENING TREATMENT	ADVERSE EFFECTS KNOWLEDGE		TOTAL
	YES	NO	
YES	13	35	48
NO	1	1	2
TOTAL	14	36	50

Chi-square test: $p = 0,48$.

DISCUSSION

People desire for an esthetic smile has considerably increased the demand for dental bleaching treatments. Nevertheless, the indiscriminate use of bleaching products can be harmful if it is used without the guidance of a specialized professional.

Taking into account the results of the present research, it was possible to verify that the majority of the students, were in the age group between 18 and 22 years old (G1 = 96%, G2 = 62%); belonged to female gender (G1 = 62%, G2 = 80%) and have already been submitted to some type of bleaching treatment (G1 = 60%, G2 = 88%). There are many methods available to bleach and improve the teeth color, some of them are carried out by the dentist, such as in-office bleaching, at-home bleaching, while others consist of the use of commercial products that are easily found on the market, as toothpastes, mouthwashes and whitening

strips.^{5,10} In-office and at-home bleaching techniques were the most popular treatment among the interviewed students, and the toothpaste with “bleaching action” was the product they used the most. Contemporary media has emphatically advertised the use of oral hygiene products with “bleaching action” as a successful alternative to dental bleaching treatment. Nevertheless, current literature shows that oral hygiene products with “bleaching action” do not perform the bleaching effect itself, since it only removes superficial stains.⁵ When not neither prescribed nor guided by a professional, the use of those products can produce enamel wear, and thus might be harmful to oral health and present an adverse effect of teeth discoloration.¹⁰

In order to provide a complete treatment, dentists must know not only dental bleaching techniques, but also its adverse effects, contraindica-

tions and the risks of its self-administration. According to this Dental School program, dental bleaching subject is taught in the second semester of the 3rd year. That fact justified the results of the present research, since the 1st year students have not been exposed to dental bleaching topic, they demonstrated a lower knowledge about it. Besides that, all questionnaires were applied in the beginning of the year, less than 6 months after 4th year students had their dental bleaching classes. This short period of time between the classes ministrations and the knowledge evaluation might have influenced the higher knowledge of 4th year students because they should have recent memory about this subject. Although the 1st year students did not have any information about dental bleaching during their academic course so far, some of them correctly answered the questionnaire. This can be explained by the fact that nowadays people use the internet as a source of information to research about topics in which they are interested in. It is true that the internet acts as inexhaustible and effective learning tool, however, there are a lot of misunderstanding and wrong concepts in free websites. Therefore, students should be alerted to search only for online information in books and scientific publications.

Chi-square test revealed no association between the variables of teeth color satisfaction and previous dental bleaching treatment (G1: $p=0.23$, G2: $p=0.75$). Furthermore, no association was found when teeth color satisfaction variable was tested with the use of oral hygiene products with “bleaching action” (G1: $p=0.08$; G2: $p=0.70$). First-year dental students showed satisfaction with the color of their teeth even without any type of bleaching treatment. However, last-year students were not satisfied with the color of their teeth even after been submitted to dental bleaching treatment. Considering that during graduation dental students increase

their esthetic standards, the dissatisfaction the G2 with teeth color might be related with their esthetic knowledge and clinical experience.

Students’ knowledge about dental bleaching adverse effects did not reduce G1 search for this treatment ($p= 0.02$), on the other side, the interest of G2 on this procedure ($p=0.47$) decreased. In addition, the knowledge about the risks of self-administration of oral hygiene products with “bleaching action” decreased students’ consumption of these products (G1: $p=0.64$, G2: $p=0.48$).

The fact that most G2 students have already been submitted to dental bleaching treatment reflects the high pursuit of young population for esthetics dental treatments and it can be considered one limitation of the present student. Nevertheless, considering that there are few studies based on the knowledge of dental students about dental bleaching, this research highlighted the importance of this kind of study, especially as a background for the Dental Schools to compare students’ knowledge building during the graduation course.

CONCLUSION

Within the limitations of the present study, it was concluded that most of the students, regardless of their course year, have already been submitted to dental bleaching treatment. The fourth year students presented a higher knowledge about the use and the adverse effects of dental bleaching treatment, and both first and last year students presented significant knowledge about the risks of self-administration of oral hygiene products with “bleaching action”. In summary, the year of graduation predicted an increase of students’ knowledge about dental bleaching treatment adverse effects, contraindications, its self-application risks; and consequently, reduced students’ pursuit for this treatment.

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APPENDIX A - QUESTIONNAIRE**1) How old are you?**

- a) Between 18-22.
- b) Between 23-28.
- c) Between 29-33.
- d) Between 34-39.
- e) Between 40-44.
- f) Older than 45.

2) What gender do you belong to?

- a) Female.
- b) Male.

3) Are you satisfied with the color of your teeth?

- a) Yes.
- b) No.

4) Have you ever been submitted to any type of dental bleaching treatment?

- a) Yes.
- b) No.

5) What types of dental bleaching were you submitted to?

- a) Dental bleaching using oral hygiene products with “bleaching action”.
- b) Dental bleaching without professional prescription and/or supervision.
- c) At-home dental bleaching with professional supervision.
- d) In-office dental bleaching with professional supervision.

6) Do you use any oral hygiene products with “bleaching action”?

- a) Yes.
- b) No.

7) If you answered yes, what types of oral hygiene products with “bleaching action” do you use?

- a) Toothpaste.
- b) Mouthwash.
- c) Hydrogen peroxide.
- d) Sodium bicarbonate,
- e) Others: _____.

8) In your opinion, does the dental bleaching treatment have any negative effects?

- a) Yes.
- b) No.

9) If you answered yes, which of the following symptoms are considered negative effects of dental bleaching treatment?

- a) Burning gums.
- b) Stomach ache.
- c) Teeth pain or sensitivity.
- d) Allergy.
- e) Loss of mineral and organic teeth components.

10) Do you think there are any contraindications to dental bleaching treatment?

- a) Yes.
- b) No.

11) If you answered yes, which of the following statements are contraindications to dental bleaching treatment?

- a) Smoker patients.
- b) Patients with changes in tooth development.
- c) Patients with gingival recession.
- d) Pregnant women.
- e) Patients younger than 14 years old.
- f) Patients with a high degree of teeth sensitivity.

12) In your opinion, is there any adverse effect for dental bleaching treatment?

- a) Yes.
- b) No.

13) If you answered yes, which of the alternatives below are adverse effects of dental bleaching treatment?

- a) Tooth sensitivity.
- b) Gingival recession.
- c) Mucosa lesions.
- d) Tooth demineralization.
- e) Dental resorption.

14) In your opinion, is there any risk in bleaching products self-administration?

- a) Yes.
- b) No.

15) If you answered yes, which of the following statements are considered consequences of bleaching products self-administration by patients without professional supervision?

- a) Tooth weakening.
- b) Buccal tissues burning.
- c) Tooth sensitivity.
- d) Tooth darkening.
- e) Alteration in composite resin restorations color.