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Research Article

Prescribing Chlorhexidine-Based Mouthwashes: Assessment of the Level of Knowledge of Undergraduate Dentistry Students

Lidiane Fumiko Takeda[1], Flavia Nicolle Stefani Vassallo[2], Alexandre do Valle Wuo[3], Leopoldo Penteado Nucci da Silva[4] and Irineu Gregnanin Pedron[5]*

[1]Post-graduation Student, University of California, Los Angeles, USA.

[2]Professor, Department of Endodontics, Social and Forensic Dentistry, Universidade Braz Cubas, Mogi das Cruzes, Brazil.

[3]Professor, Department of Periodontology and Oral Surgery, Universidade Braz Cubas, Mogi das Cruzes, Brazil.

[4]Researcher, Hospital Israelita Albert Einstein, São Paulo, Brazil; Dental Surgeon, Hospital Universitário Prof. Alberto Antunes, Alagoas, Brazil; Professor, Centro Universitário Afya Maceió, Alagoas, Brazil.

[5]Professor, Department of Periodontology and Integrated Clinic, Universidade Braz Cubas, Mogi das Cruzes, Brazil.

***Corresponding Author**: Irineu Gregnanin Pedron, Professor, Department of Periodontology and Integrated Clinic, Universidade Braz Cubas, Mogi das Cruzes, Brazil.

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Abstract

Chlorhexidine is a potent oral antiseptic used in periodontics and prior to dental surgery. However, chlorhexidine antagonises some substances present in toothpaste. If these antagonistic relationships are not taken into account, the use of chlorhexidine-based mouthwashes will not be effective for their intended purposes. The knowledge of undergraduate Dentistry students about the correct prescription of chlorhexidine-based mouthwashes is, usually, poor. Development: This study consisted of a descriptive and cross-sectional approach, using as a data collection instrument a structured online questionnaire, with an open formulation of a dental prescription. Students of the Integrated Clinic course unit who had already taken Periodontology courses were invited to participate in this study. The undergraduate students prepared a prescription for chlorhexidine-based mouthwash to a fictitious patient with periodontal disease. In this sense, undergraduate students (n = 271) from the School of Dentistry of the University of São Paulo volunteered for this study. Of these, 35.05% (n = 95) answered the questionnaire correctly and 64.95% (n = 176; p = 0.021; x^2 = 22.46) answered the prescription incorrectly. Conclusion: The data obtained allowed us to demonstrate a weak appropriation of knowledge by dental students regarding the prescription of chlorhexidine-based mouthwashes for their effective use.

Keywords: *Chlorhexidine; Chlorhexidine/Antagonists and Inhibitors; Dental Plaque; Dentifrices; Periodontal Diseases*

Introduction

One of the functions of the dental surgeon is therapeutic and preventive intervention through the appropriate prescription of oral antiseptics. This practice complies with the guidelines of Preventive Dentistry, with the main purposes being the prevention of periodontal disease and caries through the reduction and control of dental biofilm[1].

Since 1890, mouthwashes have been recommended as antimicrobial agents to assist in periodontal treatment[2]. Chlorhexidine was developed in the 1940s in the United Kingdom and was marketed as a general disinfectant. In the 1970s, its anti-dental biofilm activity was discovered, and it was then marketed as a mouthwash[3].

Chlorhexidine is a bisbiguanide, a cationic antiseptic that has an affinity for anionic surfaces and substances, such as hydroxyapatite and dental biofilm[4-6].

Currently, chlorhexidine is widely used in Dentistry due to its high effectiveness and substantivity[1,4-14]. However, the action of chlorhexidine can be neutralised by the action of other substances present in other mouthwashes and toothpastes, caused by antagonism between the components. Among these substances, sodium lauryl sulphate and fluoride (sodium fluoride or monofluorophosphate) stand out[1]. Present in most toothpastes, fluoride has an average substantivity of 30 minutes[1,4]. From this perspective, chlorhexidine-based mouthwash should be used 30 minutes after brushing with fluoride toothpaste[1,15].

Unfortunately, few professionals are aware of the duration of effectiveness and the possibility of neutralisation due to antagonism between substances presents in mouthwashes and toothpastes. It is important to note that, from the early semesters of their Dentistry degree, students are informed and exposed to real situations where the appropriate prescription of chlorhexidine-based mouthwashes is necessary for their effective antiseptic and plaque control function. In this perspective, the purpose of this research was to assess the level of knowledge of undergraduate students by analysing prescriptions of chlorhexidine-based mouthwashes for patients with chronic periodontitis.

Materials and Methods

A cross-sectional study using intermethod triangulation[16] was conducted with undergraduate Dentistry students from the University of São Paulo in their 9th and 10th semesters (day class) and 11th and 12th semesters (evening class). All students had previously taken courses in Biochemistry, Pharmacology, Drug Therapy, and Periodontology. Undergraduate students who had not yet taken the Periodontology course were excluded.

After reading, agreeing to and signing the Free and Informed Consent Form, undergraduate students were asked to prescribe a chlorhexidine-based mouthwash, associated with the presentation of a fictitious clinical case involving a patient with chronic periodontitis (Figure 1). The prescriptions obtained were not identified. Subsequently, the questionnaires collected were divided into two groups, according to the answers stipulated below:

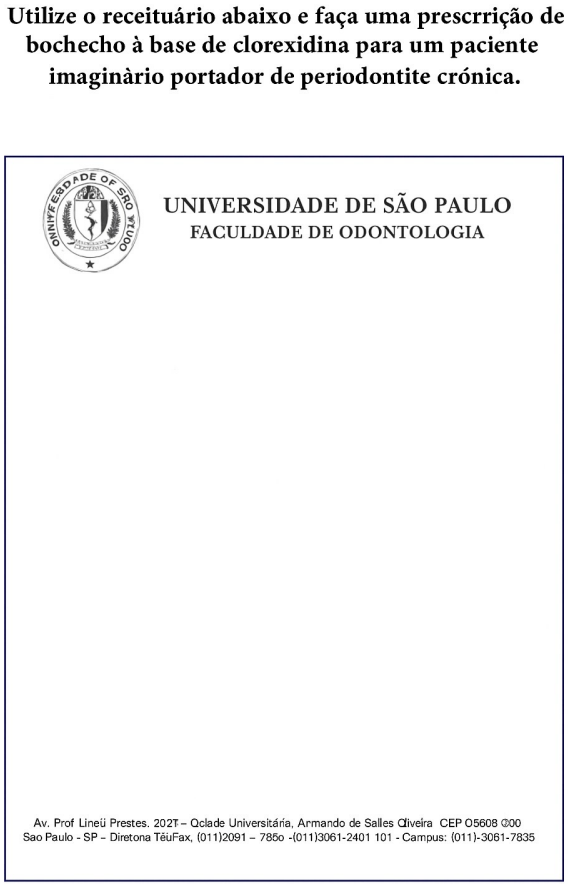
Utilize o receituário abaixo e faça uma prescrrição de bochecho à base de clorexidina para um paciente imaginàrio portador de periodontite crónica.

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Figure 1. *Open questionnaire in prescription format.*

Group I: The student prescribed the need for an interval of 30 minutes or more between brushing and rinsing with chlorhexidine-based mouthwash.

Group II: The student did not prescribe the need for an interval between brushing and rinsing with chlorhexidine-based mouthwash.

The data were submitted to prescription analysis by a researcher in the field, and and bivariate descriptive statistics were Applied, using Pearson's chi-square test ($\chi 2$). Subsequently, the variables that obtained a p-value < 0.25 in the bivariate analysis were corrected using Bonferroni's method.

The research was registered with the Human Research Ethics Committee of the School of Dentistry of the University of São Paulo under protocol CEP FOUSP 025/2007.

Results

A total of 271 questionnaires were collected from undergraduate students at the University of São Paulo School of Dentistry (FOUSP). All questionnaires were legible, and their contents were classified and statistically analysed in two groups using the chi-square test. Of these, 35.05% (n = 95) were classified in Group I, which correctly prescribed the use of chlorhexidine-based mouthwash. Group II consisted of 176 undergraduate students (64.95%) who prescribed the use of chlorhexidine mouthwash without mentioning the waiting time. Applying the chi-square test, a significance level of 0.021 (x2= 7.374) was observed, showing that there was a statistical difference between the above-mentioned groups.

Discussion

The antagonistic relationship between chlorhexidine and the components of toothpaste formulas has been presented in several studies. Reduction in the antimicrobial efficacy of mouthwashes has been demonstrated[1-5].

The adsorption of antiseptics to dental surfaces and biofilm predisposes to the exposure of cationic charges, making them susceptible to interactions with phosphate and sulphate charges, altering their antimicrobial effect[4,13]. Insoluble salts formed decrease the availability of chlorhexidine molecules, reducing their effectiveness[4,5]. Chlorhexidine, being bivalent, increases susceptibility to interactions. The interaction of chlorhexidine is potentially greater compared to cetylpyridinium chloride, which is monovalent. However, regardless of the ionic potential and different clinical concentrations of both chlorhexidine and cetylpyridinium chloride, the antiseptics have their activities altered by components of toothpastes[13]. From this perspective, monofluorophosphate and sodium lauryl sulphate, anionic substances presents in mouthwashes and toothpastes, can reduce the effect of chlorhexidine on dental biofilm[4,5,12].

Some studies, from a complementary perspective, have demonstrated synergistic effects from the simultaneous combination of fluoride and chlorhexidine. The combination of these substances, at pH 5.8, was effective against the metabolism of *Streptococcus mutans*[9]. Another study demonstrated that chlorhexidine was more effective when close to basic pH[7]. It was postulated that the combination could reach places inaccessible to chlorhexidine, since fluorides have low molecular weight molecules. This characteristic would contribute to the control of dental biofilm and reduction in the progression of caries[6,8,14]. However, this hypothesis was refuted in the study by Melo et al.[11] The authors proved that the combination of chlorhexidine and fluoride decreased the concentration of chlorhexidine due to the antagonism of ionic interactions, as well as competition for substrate binding sites. From this perspective, this therapeutic combination was unsatisfactory for controlling periodontopathogenic microorganisms.

The minimum time interval to be considered between brushing and rinsing with chlorhexidine-based mouthwash is 30 minutes, which is sufficient to ensure the action of both compounds (chlorhexidine and fluoride)[4].

From an educational perspective, it is important to emphasise that, once deficiencies in the learning process of undergraduate Dentistry students and future dental surgeons have been diagnosed, attention should be paid to optimising the prescription and antimicrobial action of drugs in an appropriate and satisfactory manner.

In a survey conducted in southern Brazil[17] on legislation and drug prescription, it was observed that only 19% of students were aware of their responsibility for the prescription document. In addition, 57% of students identified the mandatory items on a prescription.

Other studies have also demonstrated poor and fragile knowledge among undergraduate students regarding issues related to the indication and prescription of medicines, both in acute and chronic conditions in Dentistry[17-19]. This observation implies the need for effective integration of theoretical and practical content in the teaching of pharmacotherapy. In summary, the results suggest vertical and longitudinal matrix support for the Pharmacology course unit, with the aim of filling the gaps in skills and competence regarding drug prescription.

Conclusions

It was observed that most undergraduate Dentistry students did not consider the waiting time in their prescriptions. Thus, it is imperative to reflect on the matrixing of the Pharmacology curriculum and the direction of more integrated learning for students, so that the antiseptic function of mouthwashes with chlorhexidine-based mouthwashes is achieved and effective. It is recommended to wait 30 minutes after brushing your teeth with toothpaste before rinsing with chlorhexidine-based mouthwashes.

Conflicts of Interest

The authors declares that there is no conflict of interest.

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