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Antiseptic mouthwashes are available nationwide at drugstore chains.

Enxaguatórios bucais com antissépticos disponíveis nacionalmente nas redes de drogarias

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RESUMO

Introdução: os antissépticos bucais configuram-se como uma estratégia farmacológica essencial para a manutenção da higiene oral e complementação dos procedimentos mecânicos de escovação. Além da profilaxia pelo íon fluoreto e a terapêutica no controle de afecções bucais, têm sido amplamente indicados para atender demandas estéticas, com a incorporação de agentes branqueadores. Visam eliminar microrganismos patogênicos e inibir a biossíntese da placa dental servindo como veículos para quimiofármacos tais como clorexidina, triclosan, cloreto de cetilpiridínio, óleos essenciais e iodopovidona. **Objetivo:** este estudo teve como objetivo identificar e analisar os enxaguatórios bucais disponíveis no mercado nacional, com ênfase na composição e concentração dos agentes antissépticos presentes em suas formulações. **Metodologia:** a coleta de dados foi realizada presencialmente em unidades das três principais redes de drogarias localizadas em três Regiões Administrativas (RAs) de Salvador, Bahia, Brasil. Foram sistematicamente reunidas informações técnicas relativas aos princípios ativos antissépticos, suas concentrações e formulações nos produtos comercializados. Para garantir a integridade e confiabilidade das informações, os dados coletados nas drogarias foram complementados e validados por meio das informações disponibilizadas nos sites institucionais dos fabricantes. A análise contemplou a rotulagem dos produtos e sua confrontação com as fontes online oficiais, assegurando rigor e precisão nos dados apresentados. **Resultados:** os enxaguatórios Colgate Plax Fresh Mint e Listerine Cool Mint foram encontrados nas três redes na região administrativa I, enquanto que Colgate Luminous White e Listerine Cool Mint foram encontrados nas três redes na Região RA V e Close Up 360 Fresh, Colgate Plax Fresh Mint e Listerine Cool Mint foram também encontrados nas três redes, só que na Região RA VI. Os seguintes enxaguatórios não encontrados nas três redes de drogarias de cada região foram: Região RA I – Cepacol, Colgate Luminous White, Colgate Plax Odor Control, Colgate Plax Total Prevenção, NEEDS multibenefícios sem álcool e Oral B Complete; Região RA V – Água Rabelo, Colgate Plax Total Prevenção e Listerine Cuidado total; Região RA VI – Água Rabelo, Listerine antitártaro, Listerine Cuidado total e Oral B Complete. **Conclusão:** os achados deste estudo revelam uma predominância de enxaguatórios bucais contendo óleos essenciais e cloreto de cetilpiridínio, além de uma distribuição geográfica heterogênea dos enxaguatórios em geral entre as três Regiões Administrativas analisadas na cidade de Salvador, Bahia, Brasil. Observou-se ainda que os produtos formulados com digluconato de clorexidina e triclosan/gantrez apresentam procedência limitada, o que restringe o acesso da população a uma oferta mais ampla e diversificada de antissépticos bucais. Esses resultados evidenciam a necessidade de regulamentações mais rigorosas quanto à padronização da rotulagem, especialmente no que diz respeito à identificação clara das concentrações e dos princípios ativos, de modo a garantir maior transparência e segurança para o consumidor.

Palavras-chave: Saúde Bucal; Enxaguatório; Antisséptico; Drogaria; Regiões Administrativas

ABSTRACT

Introduction: *Mouthwashes are an essential pharmacological strategy for maintaining oral hygiene and complementing mechanical toothbrushing procedures. In addition to fluoride ion prophylaxis and therapeutic use in controlling oral conditions, they have been widely recommended for aesthetic purposes, incorporating whitening agents. They aim to eliminate pathogenic microorganisms and inhibit plaque biosynthesis, serving as carriers for chemopharmaceuticals such as chlorhexidine, triclosan, cetylpyridinium chloride, essential oils, and povidone-iodine.* **Objective:** *This study aimed to identify and analyze mouthwashes available on the national market, with an emphasis on the composition and concentration of antiseptic agents present in their formulations.* **Methodology:** *Data collection was conducted in person at three major drugstore chains located in three Administrative Regions (ARs) of Salvador, Bahia, Brazil. Technical information regarding the antiseptic active ingredients, their concentrations, and formulations in the products sold was systematically gathered. To ensure the integrity and reliability of the information, the data collected from drugstores was supplemented and validated using information available on the manufacturers' websites. The analysis included product labeling and its comparison with official online sources, ensuring accuracy and precision in the data presented.* **Results:** *Colgate Plax Fresh Mint and Listerine*

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Cool Mint mouthwashes were found in the three chains in Administrative Region I, while Colgate Luminous White and Listerine Cool Mint were found in the three chains in Region RA V, and Close Up 360 Fresh, Colgate Plax Fresh Mint, and Listerine Cool Mint were also found in the three chains, but in Region RA VI. The following mouthwashes not found in the three drugstore chains in each region were: Region RA I – Cepacol, Colgate Luminous White, Colgate Plax Odor Control, Colgate Plax Total Prevention, NEEDS multi-benefit alcohol-free, and Oral B Complete; Region RA V – Água Rabelo, Colgate Plax Total Prevention, and Listerine Total Care; Region RA VI – Água Rabelo, Listerine Tartar Remover, Listerine Total Care, and Oral B Complete. **Conclusion:** *The findings of this study reveal a predominance of mouthwashes containing essential oils and cetylpyridinium chloride, as well as a heterogeneous geographic distribution of mouthwashes in general among the three Administrative Regions analyzed in the city of Salvador, Bahia, Brazil. It was also observed that products formulated with chlorhexidine digluconate and triclosan/gantrez have limited provenance, which restricts access to a broader and more diverse range of mouthwashes for the population. These results underscore the need for stricter regulations regarding labeling standardization, particularly in ensuring the clear identification of concentrations and active ingredients, to promote greater transparency and consumer safety.*
Keywords: *Oral Health; Mouthwash; Antiseptic; Drugstore; Administrative Regions*

INTRODUCTION

Mouthwashes, as carriers of antiseptic agents, play a fundamental role in maintaining oral hygiene by chemically controlling bacterial plaque – a dense, non-mineralized biofilm composed of organized microbial communities.[1] *This structure adheres to tooth surfaces, acquired pellicle, and other structures in the oral cavity.*[2,3] *In this context, mouthwashes function as efficient delivery systems for therapeutic active ingredients, facilitating their distribution in hard-to-reach areas and enhancing their action on specific pathologies, such as tooth decay and periodontal disease. Furthermore, they are important adjuncts to mechanical hygiene practices, such as brushing one's teeth.*[4]

Mouthwash formulations are composed of active ingredients, predominantly antimicrobial, combined with auxiliary substances that perform specific functions, such as surfactants, humectants, and flavoring agents.[4] *These components not only promote the stability and palatability of the product but also enhance its therapeutic action. Furthermore, some formulations incorporate whitening agents—such as hydrogen peroxide and carbamide peroxide in aqueous solution—to promote the aesthetic restoration of the smile through tooth whitening.*[5,6]

Among the pharmacological agents with antimicrobial action commonly used in mouthwashes are chlorhexidine, cetylpyridinium chloride, triclosan, and essential oils.[3,4] *These compounds exert their antimicrobial activity through different mechanisms, most notably the ability to destabilize the integrity of the bacterial cell wall. This action compromises the enzyme systems essential for microbial viability, resulting in the inhibition of metabolic processes and, consequently, the suppression or death of bacterial growth.*[1,4,7,8]

Figure 1 shows the structural formulas of the antiseptics chlorhexidine (A), cetylpyridinium chloride (B), triclosan (C), povidone-iodine (D), and the essential oils thymol (E), eucalyptol (F), menthol (G), and methyl salicylate (H).

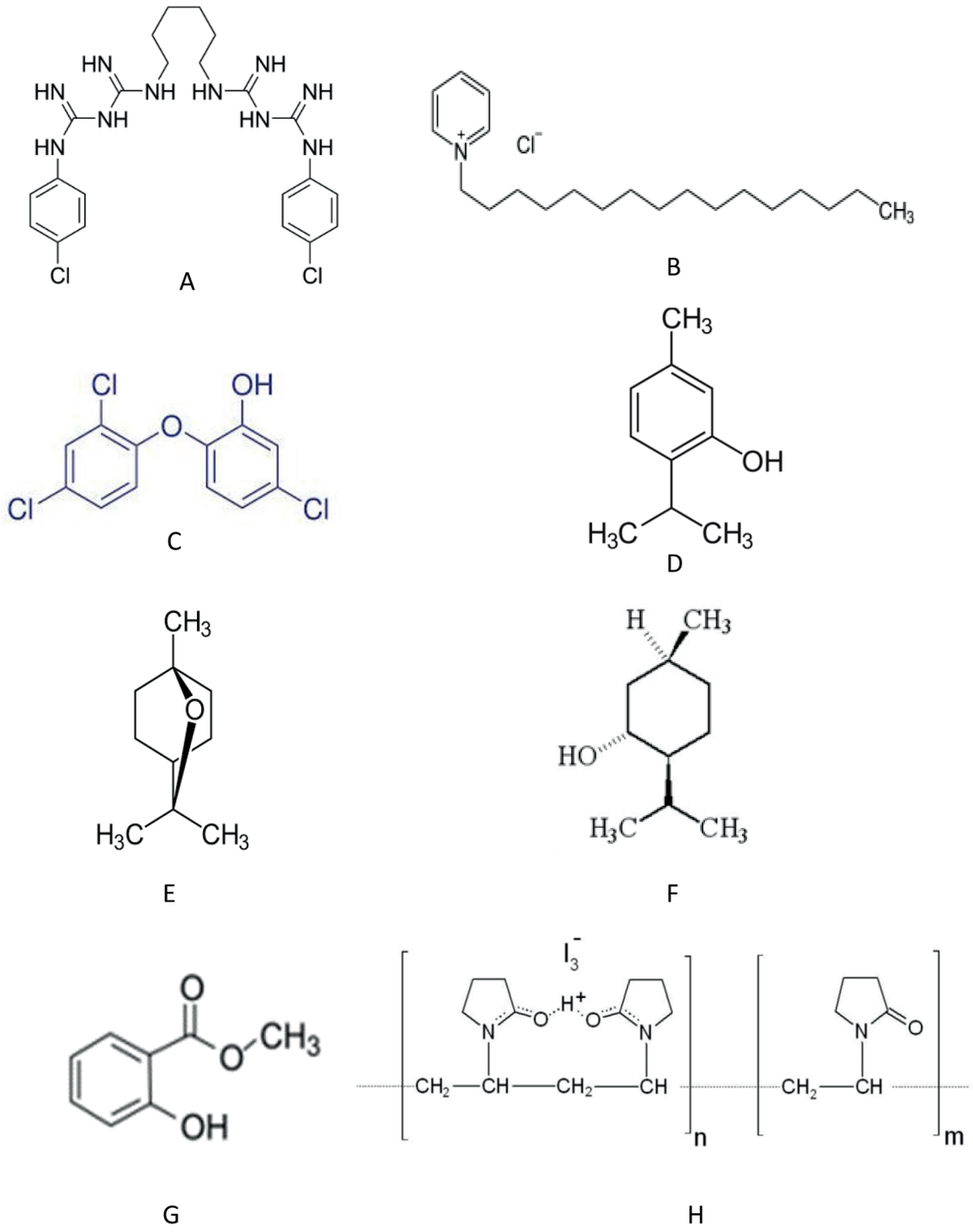
Chlorhexidine (CHX) is a broad-spectrum antiseptic recognized for its antifungal and bacteriostatic properties, acting primarily to inhibit microbial growth and multiplication. [7,8,9] *In higher concentrations or with prolonged exposure, it can also exert a bactericidal effect, promoting cell lysis and the elimination of both Gram-positive and Gram-negative bacteria. This versatility makes chlorhexidine one of the most effective and widely used agents in oral therapy.*[7,8,9]

This drug is a synthetic antimicrobial agent belonging to the bisbiguanide class, whose efficacy is closely related to its distinctive molecular structure. To optimize its solubility in aqueous media, it is commonly used in salt form, with chlorhexidine digluconate being the most widely used formulation in topical solutions.[10] *According to Figure 1-A, structurally, the molecule is composed of two benzene rings linked by a six-carbon aliphatic chain, with biguanide groups at the ends – responsible for its biological activity. This conformation gives chlorhexidine a high affinity for bacterial surfaces and oral tissues, favoring its prolonged antimicrobial action.*[10]

Chlorhexidine has broad clinical applicability and is especially valued in mouthwash form as an adjunct to oral hygiene maintenance. Their effectiveness is particularly evident in short-term periods, especially when mechanical prophylaxis is limited or unfeasible, such as in the prevention of gingivitis and plaque control. Chlorhexidine-based products are widely used in periodontics, in the postoperative management of oral surgeries, and as a prophylactic measure in various invasive procedures, thanks to their high antimicrobial efficacy and low incidence of systemic adverse effects.[11] *However, tooth darkening – resulting from pigment precipitation – is the most frequently reported side effect by patients, potentially compromising the aesthetic acceptability of the treatment.*

As shown in Figure 1-B, cetylpyridinium chloride is a cationic quaternary ammonium chemotherapeutic agent found in certain mouthwashes. It is composed of 1-hexadecylpyridinium chloride, which is composed of the cetylpyridinium cation and the chloride anion. It has the ability to help reduce gingivitis, as it has the pharmacological property of preventing the formation of dental plaque. [3,4,9]

Figure 1 – *chlorhexidine (A), cetylpyridinium chloride (B), triclosan (C), essential oils: thymol (D), eucalyptol (E), menthol (F), and methyl salicylate (G) and povidone-iodine (H)*



Cetylpyridinium chloride (CPC) is among the most widely used antiseptics in oral hygiene products and is present in several over-the-counter formulations, such as mouthwashes and toothpastes. Scientific evidence shows that mouthwashes containing cetylpyridinium chloride promote a modest but statistically significant reduction in plaque formation and gingival inflammation, especially when used as an adjunct to oral Hygiene – supervised or unsupervised – compared to brushing alone or accompanied by a placebo rinse.[12] *The efficacy of cetylpyridinium chloride in inhibiting dental plaque and, consequently, mitigating gingivitis has been recognized in several studies. Compared to chlorhexidine, cetylpyridinium chloride has a lower residual effect, resulting in less pronounced antimicrobial and antiplaque activity. Despite this, it stands out for its proven effectiveness against fungal infections,*

such as oropharyngeal candidiasis.[13] *In dental practice, solutions containing cetylpyridinium chloride have been shown to significantly reduce the microbial load of aerosols generated during clinical procedures, contributing to the protection of both patients and staff. Furthermore, specific studies indicate that the use of cetylpyridinium chloride for periods of up to six weeks does not promote significant imbalances in the oral microbiota, thus preserving the physiological microbial ecosystem. Given these properties, cetylpyridinium chloride can be considered a viable alternative in cases of chlorhexidine intolerance, effectively preventing and treating bacterial and fungal conditions in the oropharyngeal cavity. Furthermore, its pharmacological versatility makes it a promising component for innovative oropharyngeal antiseptic formulations.*[12,13]

Triclosan is a chemotherapeutic agent belonging to the group of polychlorinated phenoxyphenols, as shown in Figure 1 – C. Because of its antimicrobial action, due to its ability to inhibit plaque formation, it is included in certain oral hygiene products. Therefore, it helps reduce gingival inflammation, becoming an adjunct to periodontal treatments. Added to Triclosan, Gantrez is an alternating copolymer of vinyl methyl ether and maleic anhydride that enhances the chemotherapeutic action of the active ingredient.[9]

The evaluation of the clinical efficacy of the combination of triclosan-containing mouthwash and toothpaste demonstrated that only the combination of triclosan-containing toothpaste and triclosan-containing mouthwash promoted a statistically significant reduction in plaque index, when compared to the control group. However, the authors emphasize that, although the results indicate a potential additional benefit in controlling gingivitis, further studies are needed to confirm these findings and elucidate the underlying mechanisms.[14] *In the comparison between mouthwashes containing sodium fluoride (0.05%), chlorhexidine (0.12%), and triclosan (0.3%), it was observed that the formulations with chlorhexidine were more effective in reducing the salivary count of Streptococcus mutans, when compared to the other solutions tested.*[15] *On the other hand, a specific investigation with triclosan-based mouthwash showed a reduction*

Significant reductions in both the plaque index and the supragingival bleeding index were observed. The bacterial count after use of the product was substantially lower compared to baseline values. Furthermore, the minimum inhibitory concentrations of triclosan against S. mutans were considerably lower than those observed for chlorhexidine, suggesting greater antimicrobial potency. It was also found that the biofilms formed in the presence of triclosan were less adhesive and were more easily removed from the tooth surface, reinforcing its superior anti-adhesion effect compared to other agents tested. In summary, the aforementioned research concluded that triclosan exerts prolonged antimicrobial action and effectively contributes to controlling the formation and adhesion of dental biofilm.[16]

Mouthwashes containing essential oils, particularly thymol, eucalyptol, menthol, and methyl salicylate (Figure 1 – D, E, F, and G), are complementary alternatives that contribute to maintaining oral health due to their antiplaque action on teeth, in addition to promoting interdental hygiene.[9]

Eucalyptol is a naturally occurring cyclic monoterpenoid ether, while menthol is an organic chemical compound obtained synthetically or by extraction from Mentha piperita oil or other essential oils. It is a white, waxy substance. At room temperature, it occurs in a solid state and can melt with increasing temperature. Methyl salicylate is an organic substance with anti-inflammatory and analgesic properties, indicated for painful events originating from muscles and joints. It can be found naturally in various plants or produced synthetically in the laboratory.[9]

The use of essential oil-based mouthwashes demonstrates potential efficacy in reducing subgingival bacterial counts, both in shallow and deep periodontal pockets.[17] *A recent clinical trial aimed to evaluate the clinical efficacy of five different mouthwash formulations, each containing different active substances: essential oils, a combination of essential oils with 0.12% chlorhexidine, 0.8% hydrogen peroxide, a prebiotic, 0.2% chlorhexidine, and a placebo. The results showed that all tested formulations showed significant clinical efficacy, albeit to varying degrees, in reducing signs of gingivitis. The authors highlighted, however, the promising potential of formulations containing prebiotics and those combining essential oils with chlorhexidine, recommending further research exploring such combinations to optimize therapeutic effects and expand chemical control strategies for dental biofilm.*[18]

It is important to note that angiotensin-converting enzyme 2 (ACE2), the main cellular receptor used by SARS-CoV-2 to enter host cells, is expressed in various tissues of the oral cavity. This characteristic makes the oral environment a potential viral reservoir, contributing to the pathogenicity and spread of COVID-19.[19,20] *In this context, povidone-iodine—an antiseptic agent used in mouthwashes – has been shown to be effective in reducing the viral load of the novel coronavirus in the oral mucosa.* [20] *It is a water-soluble complex formed by the association of molecular iodine with polyvinylpyrrolidone (PVP) (Figure 1H), which allows for the gradual release of active iodine and enhances its antimicrobial action.*

The use of povidone-iodine (PVP-I) mouthwashes has been widely used for decades in countries such as Japan and is recognized for its antimicrobial efficacy. However, frequent or prolonged use requires caution, as it may be associated with the induction of transient hypothyroidism, especially in susceptible individuals.[19,20] *It is estimated that a single mouthwash with this antiseptic can introduce approximately 5 mg of iodine into the body – a value that exceeds the tolerable upper daily intake limit for adults,*

according to international guidelines.[20] *Therefore, the administration of products containing PVP-I should be judicious, following well-founded clinical indications and with appropriate monitoring.*

Thus, the use of mouthwashes as a pre-dental care measure has been widely incorporated into clinical routines by several healthcare institutions, with the aim of reducing the microbial load in the oral cavity. Among the agents commonly used in this context are chlorhexidine, cetylpyridinium chloride, triclosan, as well as povidone-iodine and hydrogen peroxide – all of which have proven antiseptic action and are widely supported by the scientific literature regarding their effectiveness in reducing oral microbial load.[19]

METHODOLOGY

This project was approved by the Research Ethics Committee of the Institute of Health Sciences of the Federal University of Bahia under Opinion No. 1,043,946, CAAE 43685815.3.0000.5662.

As a reference for this research, the Salvador Urban Development Master Plan (PDDU) was adopted, a strategic instrument that guides the city's planned and sustainable growth. [21]*The PDDU covers aspects such as zoning, land use and occupation, urban mobility, infrastructure, and environmental preservation, and was developed with broad public participation to ensure the population's quality of life and balanced development of the Bahia capital.*

The city is divided into eight Administrative Regions (ARs), six of which have unique characteristics reflecting their urban functions and socioeconomic composition. For this study, three of these regions were selected, chosen for their relevance and urban diversity:

Region I – Downtown

Located in the heart of Salvador, the Downtown Region is a dynamic hub of commercial, cultural, and administrative activities. With diverse land uses, the area is home to historic buildings, shopping centres, and government headquarters. The population is heterogeneous, composed of longtime residents, workers, and tourists. The preservation and revitalisation of older towns are fundamental to enhancing the city's urban heritage and cultural identity.[21]

Region V – Brotas

Marked by significant social diversity, the Brotas region requires specific guidelines for its urban development. High-rise buildings coexist with more modest residential areas, distributed along cross streets. This heterogeneity poses planning challenges, especially in the areas of infrastructure, mobility, and land use.[21]

Region VI – Barra

Strategically located and with a strong tourist appeal, Barra stands out for its historical heritage, natural landscapes, and vibrant urban life. The region is home to well-structured neighbourhoods with a wide range of services – hospitals, schools, shopping centres, and hotels – as well as high-end residences. It is a hub for leisure and culture, boasting beaches, bars, restaurants, and cultural venues.[21]

STUDY PROTOCOL

This study was structured in three main stages:

1. Selection and Characterisation of the Study Regions

The research focused on three Administrative Regions (ARs) of the city of Salvador, Bahia: AR I, AR V, and AR VI.[21] *These areas were chosen due to their distinct socio-spatial characteristics: AR I: encompasses historic neighbourhoods with intense tourist, residential, and commercial circulation; AR V: predominantly composed of middle-class communities, with a greater demand for infrastructure and public services; and AR VI: comprises upscale, high-end residential areas, whose infrastructure is well-established, requiring only occasional maintenance and improvements. This selection allowed for a comparative analysis of diverse population profiles, representing the diverse urban realities of Salvador.*

2. Product Identification and Composition Analysis

Samples of mouthwashes, widely distributed nationwide and containing antiseptic agents, fluoride ions, and "other components", were analysed. The collection took place at three different locations of the Drogasil, São Paulo, and Pague Menos chains, present in the selected regions of the ARs. These chains operate in the capitals of 26 states and the Federal District, ensuring the representativeness of the analysed products. The mouthwashes were evaluated based on the presence of active ingredients, concentration, formulations, and "other components". Product selection considered criteria such as shelf availability, local consumption, and market interest from pharmaceutical companies.

3. In–Person Survey and Online Data Complementation

This study focused on the "other components" of mouthwashes, considering the diversity of substances present in the formulations, regardless of the active ingredients. To this end, a systematic, in-person survey of the products available in the pharmacies visited was conducted. The following information was collected: manufacturer, trade name, active ingredients and their respective concentrations, recommended dosage, excipients, and availability. To ensure data completeness and accuracy, the information extracted from the labels was supplemented by consultations with the manufacturers' official websites.

DATA ANALYSIS

The collected information was processed and analysed using R software (R Core Team, 2025).[22] *A descriptive analysis with absolute and relative frequencies was*

applied. Each product was characterised according to its availability in the three pharmacy chains in each region, allowing for an estimate of the proportion of presence by location. The results are presented in tables stratified by Administrative Region, allowing for comparative views and consistent interpretations.

RESULTS

Based on the analysis of data obtained from the labels of mouthwashes available in three drugstore chains located in Administrative Regions AR I, AR V, and AR VI of the city of Salvador, Bahia, Brazil – duly confirmed on the manufacturers' official websites and supported by scientific literature – 16 distinct products were identified. A distribuição da frequência de enxaguatórios bucais comercializados nas redes de farmácias, considerando os 16 produtos distintos por região administrativa do município de Salvador, Bahia, Brasil, está sistematizada na Tabela 1e representada graficamente na Figura 1.

Table 1 – *Frequency (%) of pharmacy chains that sell each type of mouthwash, by administrative region in the city of Salvador, Bahia, Brazil*

Mouthwash (trade name)	*Region AR I*	*Region AR V*	*Region AR VI*	*Frequency (%) of places that sell*
	Frequency (%) of drugstore chains selling			
	n=3 chains evaluated			*n=9 locations evaluated*
Água Rabelo	*1 (33,3%)*	*0 (0,0%)*	*0 (0,0%)*	*1 (11,1%)*
Cepacol	*0 (0,0%)*	*1 (33,3%)*	*1 (33,3%)*	*2 (22,2%)*
Close Up 360 Fresh	*1 (33,3%)*	*1 (33,3%)*	*3 (100,0%)*	*5 (55,6%)*
Colgate Luminous White	*0 (0,0%)*	*3 (100,0%)*	*1 (33,3%)*	*4 (44,4%)*
Colgate Natural Extracts	*1 (33,3%)*	*1 (33,3%)*	*1 (33,3%)*	*3 (33,3%)*
Colgate Plax Fresh Mint	*3 (100,0%)*	*2 (66,7%)*	*3 (100,0%)*	*8 (88,9%)*
Colgate Plax Odor Control	*0 (0,0%)*	*2 (66,7%)*	*2 (66,7%)*	*4 (44,4%)*
Colgate Plax Total Prevenção	*0 (0,0%)*	*0 (0,0%)*	*1 (33,3%)*	*1 (11,1%)*
Colgate total 12	*2 (66,7%)*	*2 (66,7%)*	*2 (66,7%)*	*6 (66,7%)*
DAUF Oral Care	*1 (33,3%)*	*1 (33,3%)*	*1 (33,3%)*	*3 (33,3%)*
Listerine antitartaro	*2 (66,7%)*	*1 (33,3%)*	*0 (0,0%)*	*3 (33,3%)*
Listerine Cool Mint	*3 (100,0%)*	*3 (100,0%)*	*3 (100,0%)*	*9 (100,0%)*
Listerine Cuidado total	*1 (33,3%)*	*0 (0,0%)*	*0 (0,0%)*	*1 (11,1%)*
NEEDS multibeneficios sem álcool	*0 (0,0%)*	*1 (33,3%)*	*1 (33,3%)*	*2 (22,2%)*
Oral – B 100% de sua boca cuidada	*1 (33,3%)*	*2 (66,7%)*	*2 (66,7%)*	*5 (55,6%)*
Oral B Complete	*0 (0,0%)*	*1 (33,3%)*	*0 (0,0%)*	*1 (11,0%)*
Total products sold	*10 (62,5%)*	*13 (81,2%)*	*12 (75,0%)*	-

Figure 2 – Percentage of locations selling each mouthwash among the nine establishments (three chains in three regions) evaluated in the municipality of Salvador, Bahia, Brazil.

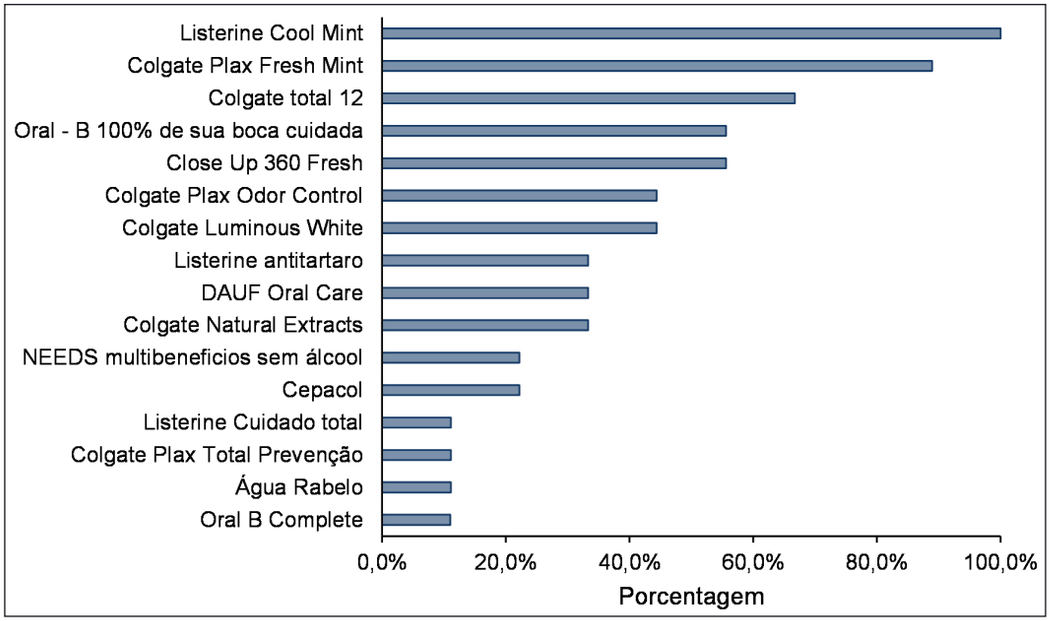
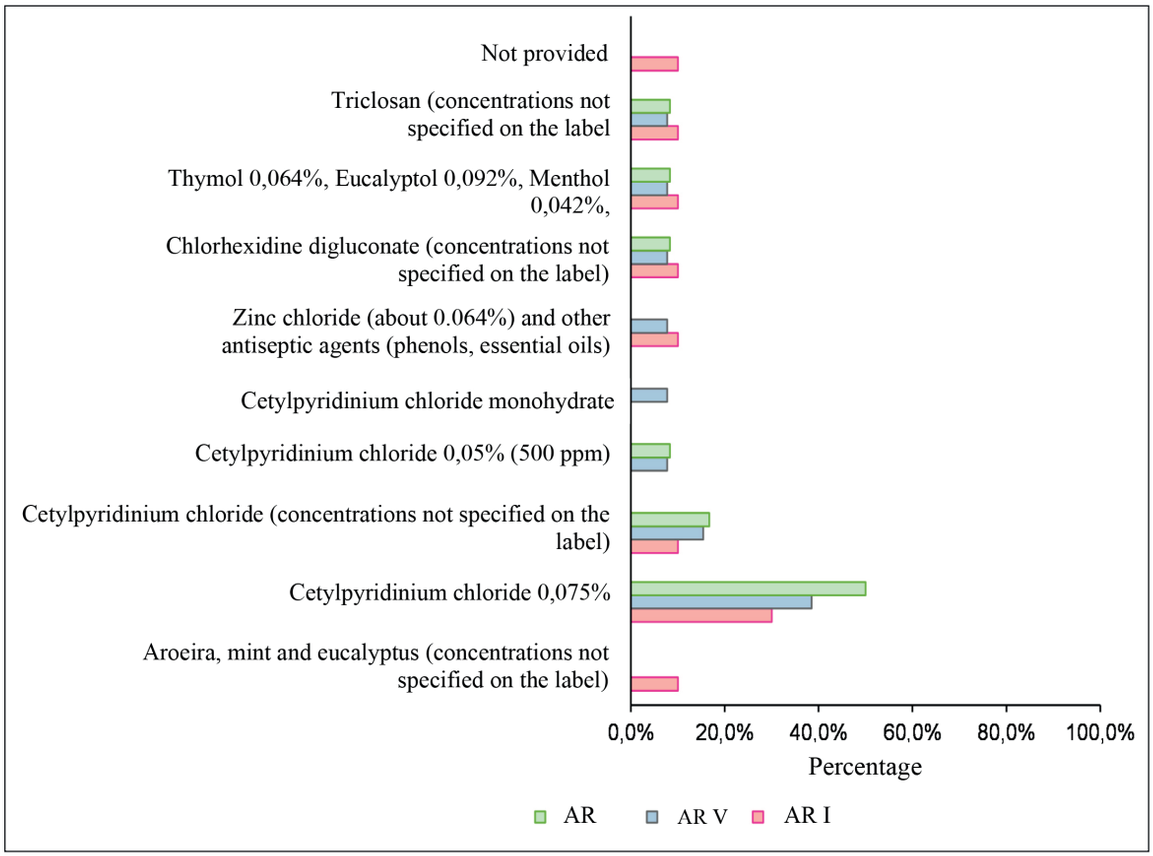


Table 2 and Figure 3 demonstrate the distribution of mouthwashes listed on the labels of mouthwashes sold in the three different administrative regions of the municipality of Salvador, Bahia, Brazil

Table 2 – *Distribution of antiseptics in mouthwashes sold in the different administrative regions of the municipality of Salvador, Bahia, Brazil according to the information on the product labels*

Antiseptics	Administrative region			Total
	AR I	AR V	AR VI	
Número de produtos comercializados	10 (100,0%)	13 (100,0%)	12 (100,0%)	16 (100,0%)
Aroeira, mint and eucalyptus (concentrations not specified on the label)	1 (10,0%)	0 (0,0%)	0 (0,0%)	1 (6,3%)
Cetylpyridinium chloride 0,075%	3 (30,0%)	5 (38,5%)	6 (50,0%)	6 (37,5%)
Cetylpyridinium chloride (concentrations not specified on the label)	1 (10,0%)	2 (15,4%)	2 (16,7%)	2 (12,5%)
Cetylpyridinium chloride 0,05% (500 ppm)	0 (0,0%)	1 (7,7%)	1 (8,3%)	1 (6,3%)
Cetylpyridinium chloride monohydrate	0 (0,0%)	1 (7,7%)	0 (0,0%)	1 (6,3%)
Zinc chloride (about 0.064%) and other antiseptic agents (phenols, essential oils)	1 (10,0%)	1 (7,7%)	0 (0,0%)	1 (6,3%)
Chlorhexidine digluconate (concentrations not specified on the label)	1 (10,0%)	1 (7,7%)	1 (8,3%)	1 (6,3%)
Thymol 0,064%, Eucalyptol 0,092%, Menthol 0,042%, Methyl Salicylate 0,060%	1 (10,0%)	1 (7,7%)	1 (8,3%)	1 (6,3%)
Triclosan (concentrations not specified on the label)	1 (10,0%)	1 (7,7%)	1 (8,3%)	1 (6,3%)
Not provided	1 (10,0%)	0 (0,0%)	0 (0,0%)	1 (6,3%)

Figure 3 – *Percentage of mouthwashes sold in each administrative region of the municipality of Salvador, Bahia, Brazil, according to the antiseptics described on the product labels.*



DISCUSSION

The ideal antimicrobial agent should combine a set of properties that make it effective in controlling the oral microbiota. Among these, its antiplaque potential stands out, with the ability not only to reduce bacterial adhesion to tooth surfaces and oral mucosa, but also to inhibit the growth and multiplication of microorganisms. Furthermore, it is desirable that this agent be able to interfere with the formation of the intercellular matrix of dental plaque, modulate bacterial metabolism—reducing the production of cytotoxic substances—and alter the ecology of the biofilm, favoring the establishment of a less pathogenic oral microbiota that is more compatible with oral health.[10,11,12]

It is important to note, first of all, that mouthwashes containing povidone-iodine are not available in drugstore chains located in Administrative Regions I, V, and VI of the municipality of Salvador, Bahia. This lack of availability is worrying, especially in light of scientific evidence that confirms the efficacy of povidone-iodine as a broad-spectrum antiseptic agent with remarkable antiviral activity. Recent studies demonstrate its ability to significantly reduce the SARS-CoV-2 viral load in the oral cavity, a recognized important site in the virus's transmission chain.

The scarcity of this therapeutic resource in pharmaceutical units therefore, compromises a remarkably important adjuvant measure in combating the pandemic, especially in contexts of high infection prevalence.

According to the data presented in Tables 1 and 2 and graphically represented in Figures 2 and 3, Listerine Cool Mint mouthwash stood out as the most widely available product among the establishments analyzed, being found in the three main pharmacy chains in the three administrative regions of the municipality of Salvador. It is important to emphasize that this formulation is composed of essential oils – notably thymol, eucalyptol, menthol, and methyl Salicylate – substances that act as complementary therapeutic agents in maintaining oral health, as widely documented in the scientific literature.[9] *These compounds have recognized antiplaque activity on tooth surfaces and contribute to the hygiene of interdental spaces, as reaffirmed by Mao et al. (2020).*[12]

The essential oils eucalyptol, thymol, menthol, and methyl salicylate, although possessing beneficial and diverse pharmacological properties, require caution in their use due to potential adverse effects dependent on the dose, route of administration, and individual susceptibility.[9] *Methyl salicylate, for example, is an anti-inflammatory and analgesic agent with proven therapeutic efficacy; however, its narrow safety margin requires strict dosage control to balance its clinical benefits with the prevention of systemic toxic risks. Thymol stands out for its antimicrobial, antifungal, antioxidant, and anti-inflammatory properties. However, both thymol and methyl salicylate require special attention regarding their toxicological profile, as inappropriate use can result in clinically relevant adverse reactions. Menthol, in turn, has a largely satisfactory safety profile at low concentrations; However, excessive or improper use can trigger undesirable clinical and toxicological effects. Eucalyptol, recognized for its anti-inflammatory, expectorant, and antioxidant properties, also requires caution in the therapeutic context, considering that the occurrence of adverse effects is directly related to the dose administered, the route of exposure, and individual variability.*

Therefore, the safe use of formulations containing these essential oils presupposes strict attention to dosage, the purity of the substances used, and the clinical conditions of each patient. This approach aims to maximize pharmacological and therapeutic benefits while minimizing the likelihood of potentially undesirable side effects and toxic reactions. The antiseptic agents identified on the labels of mouthwashes sold in the different regions analyzed are detailed in Table 2 and graphically represented in Figures 2 and 3. Among the listed compounds, cetylpyridinium chloride at a concentration of 0.075% stood out as the most prevalent, being identified in 30.0%, 38.5%, and 50.0% of the products sold in Administrative Regions I, V, and VI, respectively. This distribution reveals an upward trend in the presence of this active ingredient across the regions evaluated.

Based on the other components present in the mouthwashes, as indicated on the product labels, it can be seen that water and flavoring constitute universal elements in all the formulations analyzed. Furthermore, sodium saccharin is present in 90.0%, 92.3%, and 91.7% of the products from Administrative Regions I, V, and VI, respectively. As for colorants, their inclusion is observed in 80.0%, 92.3% and 91.7% of the formulations in the same regions. Additionally, sorbitol makes up 90.0%, 84.6% and 91.7% of the products in Administrative Regions (ARs) I, V, and VI, respectively. These data demonstrate the consistency and predominance of these excipients in the commercial formulations of the regions studied.

The second most frequently identified mouthwash was Colgate Plax Fresh Mint, whose formulation contains cetylpyridinium chloride (CPC) as its active ingredient at a concentration of 0.075%. This product was found in the three main pharmacy chains in Administrative Regions (ARs) I and VI, and in two chains in Region V. Ten, 13, and 12 different mouthwashes were identified as being sold in Regions AR I, AR V, and AR VI, corresponding to 62.5%, 81.2%, and 75.0% of the 16 products analyzed, respectively. (Table 1, Figures 2 and 3).

In the context of this investigation, Colgate Plax Fresh Mint emerged as the second most widely available mouthwash in the pharmacy chains evaluated. Therefore, this finding suggests that its significant market presence may be due to both its established preference among dental professionals and the effectiveness of the brand's marketing and commercial positioning strategies.

Thus, as shown in Figure 2, the most prevalent products in the regions investigated are Listerine Cool Mint,

Colgate Plax Fresh Mint, Colgate Total 12, Oral-B 100% de sua boca cuidada, and Close Up 360 Fresh.

The pharmacological relevance of cetylpyridinium chloride lies in the fact that this compound is among the most widely used antiseptic agents in oral hygiene products, present in a variety of over-the-counter formulations, such as mouthwashes and some toothpastes. Like essential oil-based products, mouthwashes containing cetylpyridinium chloride have demonstrated, in various clinical trials, the ability to significantly interfere with dental biofilm formation and gingival inflammation, thus playing an important role in maintaining oral health. Recent studies, including those conducted by Mao et al. (2020), corroborate this evidence.[12,13]

Although cetylpyridinium chloride is widely used as an antimicrobial agent in oral formulations, its use is not free from potential adverse effects. Such reactions can manifest depending on the concentration used, the frequency of use, and individual physiological characteristics. Considering these aspects and respecting the compound's pharmacological limitations, cetylpyridinium chloride may constitute a suitable therapeutic alternative in cases of intolerance to more potent antiseptics, such as chlorhexidine, traditionally indicated for the management of bacterial and fungal conditions of the oropharyngeal cavity.

Additionally, it was found that Água Rabelo and Listerine Cuidado Total mouthwashes were identified exclusively in a single retail chain and restricted to the administrative region RA I (Table 1 and Figure 2). Conversely, Cepacol, Colgate Luminous White, Colgate Plax Odor Control, and NEEDS Multibenefícios Sem Álcool were present in all other regions analyzed, with the exception of RA I, where they were not recorded (Table 1 and Figure 2).

Colgate Plax Fresh Mint and Listerine Cool Mint showed widespread commercial distribution, being identified in all three chains evaluated in Administrative Region I (RA I). In contrast, Cepacol, Colgate Luminous White, Colgate Plax Odor Control, Colgate Plax Total Prevenção, NEEDS Multibenefícios Sem Álcool, and Oral-B Complete mouthwashes were not found in this location. (Table 1 and Figure 2)

In Administrative Region V (RA V), a similar pattern was observed: Colgate Luminous White and Listerine Cool Mint were identified in all three drugstore chains analyzed, while Água Rabelo, Colgate Plax Total Prevention, and Listerine Cuidado Total were absent. (Table 1 and Figure 2)

It was also observed that in Administrative Region VI (AR VI), Close Up 360 Fresh, Colgate Plax Fresh Mint, and Listerine Cool Mint had a consistent presence, being identified in all retail chains evaluated. In contrast, Água Rabelo, Listerine Antitártaro, Listerine Cuidado Total, and Oral-B Complete were not registered in this location, indicating restricted distribution or low commercial representation in that region. (Table 1 and Figure 2)

It was found that the only mouthwash formulated exclusively with components of natural origin – aroeira, mint, and eucalyptus – is the commercial product Água Rabelo, whose labeling does not specify the concentrations of these active ingredients. It is also worth noting that this product was identified exclusively at the Drogasil pharmacy located in Administrative Region I (AR I), with no record of its availability at the same chain's units located in Administrative Regions V and VI, nor at the other drugstore chains evaluated. Considering that the manufacturer of Água Rabelo also produces other drugs and antiseptic formulations, it is plausible to assume that this option was developed for individuals with restrictions on the use of synthetic compounds or substances with well-defined chemical structures and pharmacological properties. Additionally, chlorhexidine digluconate, recognized for its broad-spectrum antimicrobial efficacy, was found in the Drogasil chain in Administrative Regions V and VI, in the São Paulo chain also in Regions V and VI, and in the Pague Menos chain in Regions I and V. (Table 2, Figures 2 and 3). It is worth noting that, in these same drugstores, the only mouthwash available was Oral-B 100% de Sua Boca Cuidada, demonstrating uniformity in the commercial offering of this item across the chains evaluated, with the added drawback of not including the concentration on the label. Given its proven clinical efficacy, chlorhexidine stands out as a valuable resource for maintaining oral prophylaxis, especially in short-term contexts where mechanical hygiene is temporarily compromised due to invasive procedures.[11] *From this perspective, it is recommended to expand access to mouthwashes formulated with chlorhexidine digluconate, preferably from different manufacturers, provided they are properly registered and clearly indicate the active ingredient concentration.*

According to the scientific literature, triclosan and gantrez suggest the possibility of reducing plaque and supragingival bleeding rates, findings frequently observed in periodontal inflammatory and infectious processes, particularly those involving S. mutans. This antiseptic appears to have the ability to exert prolonged antimicrobial action, contributing to the control of biofilm formation and adhesion, as reported by Wu, Zhang, and Zhang.[16]

The combination of triclosan and gantrez, widely recognized for its antimicrobial efficacy in mouthwash formulations, requires careful analysis from a toxicological safety perspective, especially in contexts of prolonged use. Recent studies have raised concerns about potential adverse biological outcomes, including imbalances in the oral microbiota, cytotoxic effects on epithelial tissues, and the possibility of stimulating the emergence of resistant bacterial strains.[23] *Given this scenario, a critical reevaluation of the continued use of this combination is required, along with the promotion of robust investigations that more accurately elucidate its toxicological profile and its impacts on oral and systemic health.*[24]

In the context of the commercial availability of these antiseptics, the relevance of data obtained from a survey conducted in three drugstores located in different administrative regions of Salvador, Bahia, Brazil, stands out. It was found that only the Pague Menos chain –present in

regions I, V, and VI – had the DAUF Oral Care product, whose formulation contains triclosan and Gantrez, and showed uniformity regarding the manufacturer's origin. (Table 2, Figures 2 and 3) However, the absence of crucial information on the labels of these products, such as the concentration of active ingredients, was noted, representing a significant gap from a regulatory and health surveillance perspective. In this sense, it is recommended not only to expand access to mouthwashes containing triclosan-gantrez, but also to diversify the offerings from different manufacturers, along with greater transparency in labeling, in accordance with safety principles and the consumer's right to information.

Although the active ingredients present in mouthwashes have bactericidal and bacteriostatic properties to varying degrees, it is frequently observed that a significant portion of the population believes that the isolated use of these products is sufficient to ensure technically effective oral hygiene. This mistaken perception reinforces the pressing need for dental professionals to play an educational role, guiding their patients on the importance of complete oral hygiene, based on sound and evidence-based clinical practices.

CONCLUSION

The data obtained demonstrate an uneven distribution of mouthwashes among Administrative Regions I, V, and VI of the city of Salvador, Bahia, Brazil, reflecting variations in access and availability of these products. Among the antiseptics analyzed, those formulated with essential oils and cetylpyridinium chloride, widely available in the local market, stand out in terms of frequency and accessibility. In contrast, mouthwashes based on chlorhexidine digluconate are in limited supply, being produced by a single manufacturer, which can compromise both access and rational use of this substance. A similar situation is observed with formulations containing triclosan combined with the Gantrez copolymer, whose presence on pharmaceutical shelves is equally limited. These findings reinforce the need for regulatory actions that promote the standardization and clear labeling of active ingredients and their respective concentrations in mouthwashes, as an essential measure to ensure their therapeutic efficacy and safe use. Furthermore, the importance of educational strategies aimed at the population is emphasized, focusing on promoting the conscious use of these products, preventing self-medication, and mitigating potential health risks arising from their indiscriminate use.

REFERÊNCIAS

1 Bugno A, Nicolleti MA, Almódovar MAB, Pereira, TC. Enxaguatórios bucais: avaliação da eficácia antimicrobiana de produtos comercialmente disponíveis. Rev. Inst. Adolfo Lutz, São Paulo. 2006; 65(1):40-45 Available from:10.53393/rial.2006.65.32967

2 Gomes EF, Passos IA, Veras Neto L, Padilha WWN. Atuação de três colutórios na condição de higiene e saúde bucal: estudo comparativo. Internet Health Company do Brasil S/A, São Paulo. 2004.

3 Marinho, BVS; Araújo, ACS. O uso dos enxaguatórios bucais sobre a gengivite e o biofilme dental. International Journal of Dentistry, Recife. 2007; 6(4): 124-131 Available from: https://scispace.com/pdf/uso-dos-enxaguatorios-bucais-sobre-a-gengivite-e-biofilme-4lcyx-23lod.pdf

4 Torres CRG, Kubo CH, Anido AA, Rodrigues JB. Agentes antimicrobianos e seu potencial de uso na odontologia. PGR: Pós-Grad. Rev. Fac. Odontol. São José dos Campos, São José dos Campos. 2000; 3(2): 43-52 Available from: https://doi.org/10.14295/bds.2000.v3i2.87

5 Pontefract H, Courtney M, Smith S, Newcombe RG, Addy M. Development of methods to enhance extrinsic tooth discoloration for comparison of toothpaste. J Clin Periodontol. Copenhagen, 2002; 31(1):1-6 Available from: 10.1111/j.0303-6979.2004.00423.x

6 Gomes LO. Avaliação de alterações cromáticas do esmalte bovino submetido a procedimento de clareamento dental após descolagem de bráquetes ortodônticos. 2005. Dissertação (Mestrado em Odontologia), Universidade Federal da Bahia

7 Gomes, G. da C., Mendes, S. P. L., & Pains, M. B. Chlorhexidine and prevention of ventilator-associated pneumonia: An integrative review of VAP incidence and mortality. Seven Editora. 2024; 953-965. Available from: https://sevenpubl.com.br/editora/article/view/3771

8 de Jesus AB, Silva DARR, Farias JS, Freitas JE, Souza AF. Avaliação da eficiência de enxaguatórios bucais sobre a inativação de streptococcus sp e candida albicans in vitro. Revista Univap. São José dos Campos. 2017; 22(40), 821. Available from: https://doi.org/10.18066/revistaunivap.v22i40.1648

9 National Library of Medicine. Available from: https://pubchem.ncbi.nlm.nih.gov

10 Łukomska-Szymańska M, Sokołowski J, Łapińska B. Chlorhexidine – mechanism of action and its application to dentistry. J Stomatol. 2017; 70(4): 405–417 Available from: https://doi.org/10.5604/01.3001.0010.5698

11 Chye RML, Perrotti V, Piattelli A, Iaculli F, Quaranta A. Effectiveness of Different Commercial Chlorhexidine-Based Mouthwashes After Periodontal and Implant Surgery: A Systematic Review. Implant Dent. 2019 Feb; 28(1): 74-85 Available from: 10.1097/ID.0000000000000854

12Mao X, Auer DL, Buchalla W, Hiller K, Maisch T, Hellwig E, AlAhmad A, Cieplik F. Cetylpyridinium Chloride: Mechanism of Action, Antimicrobial Efficacy in Biofilms, and Potential Risks of Resistance. Antimicrob Agents Chemotherapy. 2020; 64(8): Available from: https://doi.org/10.1128/aac.00576-20

13 – Pitten FA, Kramer A. Efficacy of cetylpyridinium chloride used as oropharyngeal antiseptic. Arzneimittelforschung. 2001; 51(7): 588-95. Available from: 10.1055/s-0031-1300084

14 – Almerich JM, Cabedo B, Ortolá JC, Poblet J. Influence of alcohol in mouthwashes containing triclosan and zinc: an experimental gingivitis study. J Clin Periodontol. 2005 Jun; 32(6): 539-44 Available from: 10.1111/j.1600-051X.2005.00675.x

15 – Kulkarni VV, Damle SG. Comparative evaluation of efficacy of sodium fluoride, chlorhexidine and triclosan mouth rinses in reducing the mutans streptococci count in saliva: an in vivo study. J Indian Soc Pedod Prev Dent. 2003 Sep; 21(3): 98-104. PMID: 14703215

16 – Wu X, Zhang T, Zhang Y. [Effect of a new triclosan-containing mouth rinse on oral infection]. Zhonghua Kou Qiang Yi Xue Za Zhi. 2001 Jul; 36(4): 301-3. Chinese. PMID: 11718017

17 Morozumi T, Kubota T, Abe D, Shimizu T, Nohno K, Yoshie H. Microbio-

logical effect of essential oils in combination with subgingival ultrasonic instrumentation and mouth rinsing in chronic periodontitis patients. Int J Dent. 2013; 2013: 146479 Available from: 10.1155/2013/146479

18 Yaneva BK, Dermendzhieva YB, Mutafchieva MZ, Stamenov NV, Kavlakova LB, Tanev MZ, Karaslavova E, Tomov GT. Randomised controlled trial comparing the clinical effectiveness of mouthwashes based on essential oils, chlorhexidine, hydrogen peroxide and prebiotic in gingivitis treatment. Folia Med (Plovdiv). 2022 Aug 31; 64(4): 588-59 Available from: 10.3897/folmed.64.e63528 Parte inferior do formulário

19 Campanelli AJS, Nunes MAL, Scheffel DLS, Terada RSS, Goya S, Bispo CGC. Use of preoperative mouthwash during the pandemic: report of the Dental Clinic. Revista Uningá. 2022; 59, eUJ4327 Available from: doi.org/10.46311/2318-0579.59.eUJ4327

20 Fuse Y, Ito Y, Yamaguchi M, Tsukada N. High Ingestion Rate of Iodine from Povidone-Iodine Mouthwash. Biol Trace Elem Res. 2021; 200(8): 3902–3909 Available from: 10.1007/s12011-021-02978-7

21 LEI Nº 9.069 /2016 Dispõe sobre o Plano Diretor de Desenvolvimento Urbano do Município de Salvador – PDDU 2016 e dá outras providências. Available from: https://sedur.salvador.ba.gov.br/images/arquivos_processos/2016/07/LEI-n.-9.069-PDDU-2016.pdf

22 R Core Team. 2025; 3893p. R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria. Available from: https://cran.r-project.org/doc/manuals/r-release/fullrefman.pdf

23 Tartaglia GM, Tadakamadla SK, Connelly ST, Sforza C, Martín C. Adverse events associated with home use of mouthrinses: a systematic review. Therapeutic Advances in Drug Safety. 2019;10 Available from:10.1177/2042098619854881

24 Marsh PD. Dental plaque as a biofilm and a microbial community – implications for health and disease. BMC Oral Health. 2006 Jun 15; 6 Suppl 1: S14 Available from: 10.1186/1472-6831-6-S1-S14]

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