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REVIEW

Fluoride Mouthwashes and Their Effect on Oral Health

Colutorios Fluorados y su Efecto en la Salud Bucal

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ABSTRACT

Oral health was recognised as an essential component of general well-being, and fluoridated mouthwashes represented an effective alternative in the prevention of diseases such as caries and gingivitis. Throughout the study, it was observed that their effectiveness depended not only on the presence of fluoride, but also on physicochemical variables such as pH, viscosity and titratable acidity. Research conducted by Marinho et al. and Van der Kaaij et al. demonstrated the preventive capacity of fluoride against carious lesions, especially in children and adolescents. However, studies such as those by Hanan et al. and Lima et al. revealed that many commercial brands had pH values below 5,5, considered potentially erosive to tooth enamel. Alcohol content was also a controversial factor. While Fernández identified that its presence tended to reduce pH, Marchetti et al. showed that alcohol-free formulations maintained similar efficacy and were safer for certain groups. The importance of transparency in labelling was also highlighted, especially in products aimed at children, as indicated by Alves et al. Finally, it was concluded that, although fluoridated mouthwashes provided proven benefits, their use should be carefully evaluated, considering both their formulation and their potential impact on public health.

Keywords: Fluoride; pH; Mouthwashes; Public Health; Tooth Erosion.

RESUMEN

La salud bucodental fue reconocida como un componente esencial del bienestar general, y los colutorios fluorados representaron una alternativa eficaz en la prevención de enfermedades como la caries y la gingivitis. A lo largo del estudio, se observó que su eficacia dependió no solo de la presencia de flúor, sino también de variables fisicoquímicas como el pH, la viscosidad y la acidez titulable. Investigaciones realizadas por Marinho et al. y Van der Kaaij et al. demostraron la capacidad preventiva del flúor ante lesiones cariosas, especialmente en niños y adolescentes. No obstante, estudios como los de Hanan et al. y Lima et al. revelaron que muchas marcas comerciales presentaron valores de pH inferiores a 5,5, considerados potencialmente erosivos para el esmalte dental. Asimismo, el contenido de alcohol fue un factor de controversia. Mientras que Fernández identificó que su presencia tendía a reducir el pH, Marchetti et al. evidenciaron que formulaciones sin alcohol mantuvieron una eficacia similar, siendo más seguras para ciertos grupos. También se señaló la importancia de la transparencia en el etiquetado, especialmente en productos dirigidos a la población infantil, como lo indicaron Alves et al. Por último, se concluyó que, aunque los colutorios fluorados aportaron beneficios comprobables, su uso debía evaluarse cuidadosamente, considerando tanto su formulación como su impacto potencial en la salud pública.

Palabras clave: Flúor; pH; Colutorios; Salud Pública; Erosión Dental.

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INTRODUCTION

Oral health has been recognized as an integral part of general health, being a determinant in the quality of life of individuals. In this context, the use of mouthwashes as a complement to daily oral hygiene has become increasingly popular among both adults and children, primarily due to their ability to control dental biofilm and prevent diseases such as gingivitis and dental caries. Among these products, fluoride mouthwashes have gained prominence for their remineralizing action on tooth enamel. However, their efficacy does not depend solely on fluoride as the active ingredient but also on physicochemical properties such as pH, viscosity, and titratable acidity. In addition, factors such as the presence of alcohol and the information available on the label can also influence their safety and proper use. A comprehensive analysis of these aspects is crucial to ensuring the effectiveness and safety of fluoride mouthwashes, particularly in the context of public health and their widespread marketing.

DEVELOPMENT

Oral health represents a fundamental aspect of general well-being, and within its maintenance, mouthwashes have gained relevance as adjuvants in oral hygiene. These products have been extensively studied for their efficacy in controlling bacterial plaque and preventing gingivitis. According to Takenaka et al.[1], the systematic use of mouthwashes can improve dental biofilm management and significantly reduce gingival inflammation.

In this context, the incorporation of fluoride in mouth rinses is effective in caries prevention, especially in pediatric and adolescent populations. Marinho et al.[2] conducted a systematic review that supports the protective effect of fluoride, showing that its regular use decreases the incidence of carious lesions. Studies, such as those of Van der Kaaij et al.[3], confirm these findings in orthodontic patients, where the use of fluoride mouthwashes significantly reduces the development of white spot lesions.

In addition to their active composition, physicochemical characteristics such as pH, viscosity, and fluoride concentration directly influence the effectiveness of the product. Hanan et al.[4] and Lima et al.[5] evaluated commercial mouthwashes, finding considerable variations between brands, suggesting a need for greater regulation in their formulation.

On the other hand, the alcohol content of these products has generated controversy. Marchetti et al. demonstrated that rinses without alcohol can be equally effective in controlling supragingival plaque, in addition to being better tolerated by patients with sensitive oral mucosa. This finding is reinforced by Fernandez[6], who analyzed the effect of storage type and the presence of alcohol on the pH of different mouthwashes, concluding that these factors can impact their stability and safety.

Some studies also address the influence of mouthwash on parameters such as salivary pH and tongue coating, which may have implications for halitosis. Tolentino et al. demonstrated that certain mouthwashes temporarily modify oral pH, thereby creating an environment less conducive to the development of volatile sulfur compounds.

Finally, aspects such as labeling, presentation, and information provided to the consumer have been analyzed by authors, including Alves et al.[7], who highlighted the need to improve transparency in the commercial information of these products, especially in presentations intended for children.

In particular, fluoride mouthwashes are effective in preventing dental caries. Marinho et al.[2] identified in their systematic review a significant reduction in the incidence of caries in children and adolescents who used fluoride rinses regularly. Fluoride acts by promoting enamel remineralization, generating a surface reservoir of calcium fluoride that is activated in acidic environments.

The efficacy of these products also depends on their physicochemical characteristics. Hanan et al.[4] and Lima et al.[5] performed analyses of different brands of fluoride mouthwashes available in Brazil, finding that many had a pH below 5,5, which is considered potentially erosive. This finding is consistent with the study by Alves et al.[7,8], who noted that titratable acidity, viscosity, and total soluble solids also influence their erosive potential.

Alcohol content is another relevant factor. Fernandez[6] found that alcohol-containing mouthwashes tend to have a lower pH, which could compromise enamel health. On the other hand, Belardinelli et al.[9] emphasized that, although the initial pH of mouthwashes may be acidic, saliva can buffer this effect, although it does not eliminate it.[10]

Valdivia[11] and Rirattanapong[12] also observed pH levels below the critical threshold in brands widely marketed in South America and Asia, suggesting a need for stricter regulation in their formulation. In conclusion, the use of mouthwashes should be evaluated based on their active components and physicochemical properties to prevent possible long-term adverse effects.

CONCLUSIONS

The use of fluoride mouthwashes represents an effective measure for preventing dental disease, provided that both their clinical benefits and potential risks are considered. While fluoride has been shown to reduce the

incidence of caries significantly, the presence of pH values below the critical level in many marketed products may compromise enamel integrity in the long term. In addition, the inclusion of alcohol in specific formulations and the variability in the information provided to consumers raise doubts about their safety, especially in pediatric populations. Therefore, stricter regulation and more rigorous control over the formulation and marketing of these products are necessary. Integrating this approach into public health policies would contribute not only to improving the oral health of the population but also to preventing avoidable damage derived from the inappropriate use of poorly formulated or improperly used mouthwash.

REFERENCES

1. Takenaka S, Ohsumi T, Noiri Y. Evidence-based strategy for dental biofilms: current evidence of mouthwashes on dental biofilm and gingivitis. Jpn Dent Sci Rev. 2019;55(1):33–40.

2. Marinho VCC, Chong LY, Worthington HV, Walsh T. Fluoride mouthrinses for preventing dental caries in children and adolescents. Public Health Nurs. 2018;35(1):85–7.

3. Van der Kaaij N, Van der Veen M, Van der Kaaij M, Ten Cate J. A prospective, randomized placebo-controlled clinical trial on the effects of a fluoride rinse on white spot lesion development and bleeding in orthodontic patients. Eur J Oral Sci. 2015;123(3):186–93.

4. Hanan A, Souza P De, Filho PZ, Hanan SA, Souza AP De, Pinto R, et al. Avaliação da concentração de flúor, do pH, da viscosidade e do teor de sólidos solúveis totais em enxaguatórios bucais fluoretados disponíveis comercialmente na cidade de Manaus. Pesqui Bras Odontopediatria Clín Integr. 2011.

5. Lima L De, Valença G, Maria A, Albuquerque R De, Albuquerque FR De. Análise do pH e da viscosidade de enxaguatórios bucais fluoretados disponíveis comercialmente na cidade de João Pessoa - PB. Pesqui Bras Odontopediatria Clín Integr. 2005.

6. Fernandez CS. Tipo de almacenamiento y el contenido de alcohol en el nivel de pH de colutorios orales de comercialización local en el año 2018 [tesis pregrado]. Universidad Inca Garcilaso de la Vega; 2018.

7. Alves D, Costa AL, Almeida RF, Carvalho JFC, Felino A. Cloreto de cetilpiridínio - revisão da literatura. Rev Port Estomatol Med Dent Cir Maxilofac. 2012;53(3):181–9.

8. Alves D, Gondima BLC, Pereiraa IF, Moreiraa M dos SC, Santiagoa BM, Valençaa AMG. Physicochemical properties, labeling and antimicrobial activity of mouthwashes for children. J Dent Sci Rev Odonto Ciência. 2015;30(4):200–4.

9. Belardinelli PA, Morelatto RA, Benavidez TE, Baruzzi AM, López de Blanc SA. Effect of two mouthwashes on salivary pH. Acta Odontol Latinoam. 2014;27(2):66–71.

10. Marchetti E, Tecco S, Caterini E, Casalena F, Quinzi V, Mattei A, et al. Alcohol-free essential oils containing mouthrinse efficacy on three-day supragingival plaque regrowth: a randomized crossover clinical trial. BioMed Cent. 2017;18(1):1–8.

11. Valdivia Tapia AC. Concentración de fluoruro en enjuagues bucales comercializados en Chile y Brasil [tesis]. Universidad de Talca; 2018.

12. Rirattanapong P, Rirattanapong O. Concentrations of fluoride among commercially available mouthrinses for children in Thailand. Southeast Asian J Trop Med Public Health. 2019;50(2):411–5.

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CONFLICT OF INTEREST.

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