




THERAPEUTIC MANAGEMENT OF CHILDHOOD GINGIVITIS: MECHANICAL BIOFILM CONTROL PROTOCOLS AND ORAL HYGIENE

MANEJO TERAPÊUTICO DA GENGIVITE INFANTIL: PROTOCOLOS DE CONTROLE MECÂNICO DO BIOFILME E HIGIENE ORAL

MANEJO TERAPÉUTICO DE LA GINGIVITIS INFANTIL: PROTOCOLOS DE CONTROL MECÁNICO DEL BIOFILM E HIGIENE ORAL

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ABSTRACT

Biofilm-induced gingivitis is a common inflammatory condition in childhood, characterized by a reversible gingival response to the accumulation of bacterial plaque. Although it presents a local character, recent evidence indicates that childhood oral health may influence future systemic outcomes, reinforcing the importance of early preventive strategies. The present study aimed to discuss the main therapeutic management protocols for childhood gingivitis, with emphasis on mechanical biofilm control, oral hygiene interventions, and modulating factors associated with diet and socioeconomic context. This is a narrative literature review conducted in the PubMed database, including studies published over the last five years. The results demonstrate that interactive educational approaches, especially those mediated by digital tools and playful models, show greater effectiveness in reducing plaque and gingival bleeding indices compared to conventional verbal instructions. It was also observed that periodic professional follow-up and continuous motivation favor rapid clinical responses, with a significant reduction in inflammatory signs. Furthermore, appropriate dietary habits, with lower sugar consumption and higher intake of dairy proteins, contribute to the control of gingival inflammation. Family and socioeconomic factors also exert a relevant influence on adherence to preventive practices. It is concluded that the therapeutic management of childhood gingivitis should be multidimensional, integrating mechanical biofilm control, health education, nutritional guidance, and family involvement in order to promote oral health throughout childhood.

Keywords: Gingivitis. Child. Oral Hygiene.

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RESUMO

A gengivite induzida pelo biofilme é uma condição inflamatória frequente na infância, caracterizada por resposta gengival reversível à acumulação de placa bacteriana. Embora apresente caráter local, evidências recentes indicam que a saúde bucal infantil pode influenciar desfechos sistêmicos futuros, reforçando a importância de estratégias preventivas precoces. O presente estudo teve como objetivo discutir os principais protocolos de manejo terapêutico da gengivite infantil, com ênfase no controle mecânico do biofilme, nas intervenções de higiene oral e nos fatores moduladores associados à dieta e ao contexto socioeconômico. Trata-se de uma revisão bibliográfica narrativa, realizada na base de dados PubMed, incluindo estudos publicados nos últimos cinco anos. Os resultados demonstram que abordagens educativas interativas, especialmente aquelas mediadas por ferramentas digitais e modelos lúdicos, apresentam maior eficácia na redução dos índices de placa e sangramento gengival quando comparadas às orientações verbais convencionais. Observou-se ainda que o acompanhamento profissional periódico e a motivação contínua favorecem respostas clínicas rápidas, com redução significativa dos sinais inflamatórios. Além disso, hábitos alimentares adequados, com menor consumo de açúcares e maior ingestão de proteínas lácteas, contribuem para o controle da inflamação gengival. Fatores familiares e socioeconômicos também exercem influência relevante na adesão às práticas preventivas. Conclui-se que o manejo terapêutico da gengivite infantil deve ser multidimensional, integrando controle mecânico do biofilme, educação em saúde, orientação nutricional e envolvimento familiar, a fim de promover a saúde bucal ao longo da infância.

Palavras-chave: Gingivitis. Criança. Higiene Oral.

RESUMEN

La gingivitis inducida por biofilm es una condición inflamatoria frecuente en la infancia, caracterizada por una respuesta gingival reversible a la acumulación de placa bacteriana. Aunque presenta un carácter local, evidencias recientes indican que la salud bucal infantil puede influir en futuros desenlaces sistémicos, reforzando la importancia de estrategias preventivas tempranas. El presente estudio tuvo como objetivo discutir los principales protocolos de manejo terapéutico de la gingivitis infantil, con énfasis en el control mecánico del biofilm, las intervenciones de higiene oral y los factores moduladores asociados a la dieta y al contexto socioeconómico. Se trata de una revisión bibliográfica narrativa realizada en la base de datos PubMed, incluyendo estudios publicados en los últimos cinco años. Los resultados demuestran que los enfoques educativos interactivos, especialmente aquellos mediados por herramientas digitales y modelos lúdicos, presentan mayor eficacia en la reducción de los índices de placa y sangrado gingival en comparación con las orientaciones verbales convencionales. También se observó que el seguimiento profesional periódico y la motivación continua favorecen respuestas clínicas rápidas, con reducción significativa de los signos inflamatorios. Además, hábitos alimentarios adecuados, con menor consumo de azúcares y mayor ingesta de proteínas lácteas, contribuyen al control de la inflamación gingival. Los factores familiares y socioeconómicos también ejercen una influencia relevante en la adherencia a las prácticas preventivas. Se concluye que el manejo terapéutico de la gingivitis infantil debe ser multidimensional, integrando el control mecánico del biofilm, la educación en salud, la orientación nutricional y la participación familiar, con el fin de promover la salud bucal a lo largo de la infancia.



Palabras clave: Gingivitis. Niño. Higiene Oral.



1 INTRODUCTION

Biofilm-induced gingivitis is one of the most prevalent inflammatory conditions in childhood, characterized by the reversible immune response of gingival tissues to bacterial accumulation. Although it is often seen as an isolated clinical condition, recent evidence suggests that oral health status in childhood acts as a significant predictor of long-term systemic health. Longitudinal studies demonstrate that elevated levels of gingivitis and caries during childhood are associated with an increased risk of developing Type 2 Diabetes Mellitus in adulthood (Nygaard et al., 2025).

Despite these possible systemic repercussions, childhood gingivitis should be understood, primarily, as a local inflammatory condition, which can be prevented and reversed through early interventions. Thus, the control of dental biofilm and the adoption of appropriate oral hygiene habits play a central role in maintaining gum health during childhood, reducing the risk of progression of inflammation and future impacts on general health (Nygaard et al., 2025).

The etiology of childhood gingivitis is multifactorial, involving not only the effectiveness of mechanical control of the biofilm, but also the influence of dietary habits and socioeconomic factors. Excessive consumption of sugars is directly correlated with the severity of gingival inflammation, while the consumption of dairy proteins has been pointed out as a possible protective factor against the progression of bacterial plaque (Salim et al., 2025). In addition, variables such as parents' education and access to hygiene programs directly influence the child's preventive behavior (Tastan Eroglu et al., 2024).

In this context, understanding the factors that favor the accumulation of dental biofilm and those that contribute to its removal becomes essential for the planning of effective clinical strategies, especially those based on health education and continuous motivation.

Dental biofilm is the main etiological factor of childhood gingivitis, being formed by a complex microbial community adhered to the tooth surface. When not removed properly, it triggers a local inflammatory response characterized by edema, erythema, and gingival bleeding, without loss of clinical attachment, which differentiates gingivitis from more advanced forms of periodontal disease (Tankova et al., 2024). During childhood, behavioral and cognitive factors can compromise the effectiveness of oral hygiene, favoring plaque retention. Thus, educational strategies adapted to the age group



are essential for the consolidation of hygiene habits and for the promotion of the child's autonomy in oral health care (Tankova et al., 2024).

Eating habits also play a relevant modulating role in gingival inflammation. Frequent intake of sugars favors the maturation of dental biofilm and intensifies the clinical signs of gingivitis, while a balanced diet, with adequate consumption of dairy proteins, can contribute to the reduction of bacterial plaque and the protection of gingival tissues (Salim et al., 2025).

In addition, socioeconomic and family factors, such as parental education, income, and access to oral health programs, directly influence adherence to preventive practices, reinforcing the importance of family involvement in the management of childhood gingivitis (Tastan Eroglu et al., 2024).

In view of the above, the objective of this review is to discuss the protocols for the therapeutic management of childhood gingivitis, with emphasis on the mechanical control of biofilm, oral hygiene interventions, and the clinical dynamics of the resolution of the inflammatory process in pediatric patients.

2 METHODOLOGY

The present study is characterized as a narrative literature review, developed with the objective of synthesizing and analyzing the most recent scientific evidence related to the therapeutic management of childhood gingivitis and the control of oral biofilm. The search was carried out in the PubMed database, using the descriptors "Gingivitis", "Child", "Oral Hygiene" and "Biofilm Control", combined by means of the Boolean operators AND and OR, according to the terminology of the Medical Subject Headings (MeSH). Articles published in the last five years, available in full and written in Portuguese or English, that directly addressed the topic, were included. Studies that did not have a direct relationship with plaque-induced gingivitis in children, duplicate publications, and articles not indexed in the database used were excluded. The selection of studies was conducted in two stages: screening of titles and abstracts, followed by the evaluation of full texts to confirm academic relevance. The information extracted was organized in a descriptive way.



3 RESULTS AND DISCUSSION

The study by Nygard (2025) points out that oral health in childhood influences systemic health in the long term. Longitudinal studies point to a relationship between gingivitis and dental caries and an increased risk of type 2 diabetes mellitus in adulthood. Therefore, the prevention of these diseases in childhood can have a protective effect in the long term. Prevention becomes a primary factor.

Effective control of childhood gingivitis requires an approach that combines health education, motivation, and precise mechanical techniques. Interventions based on digital tools and tactile models have shown superiority in reducing plaque and inflammation rates when compared to traditional verbal counseling (Madawana et al., 2024). These playful strategies facilitate the internalization of brushing habits and the use of dental floss in children under seven years of age, a critical phase for the establishment of health behaviors. These findings demonstrate that interactive educational methodologies favor greater child engagement, contributing to the effective control of dental biofilm and to the consolidation of oral hygiene habits from the first years of life.

The reduction in plaque index and consequently the reduction in gingival bleeding rates are associated with the adoption of these good oral health habits. In addition, health education strategies based on digital media are a motivating tool not only for the child but for the whole family, being fundamental for the control of the disease. (Madawana et al., 2024). Family participation is essential in this process, expanding the impact of educational interventions and promoting more lasting behavioral changes.

It is an approach that involves the professionals, responsible for removing the biofilm and providing hygiene guidance, associated with the family that will continue the treatment at home.

The dynamics of periodontal recovery in adolescents reveals that the clinical response to treatment is rapid when the biofilm disorganization protocol is strictly followed. It is observed that, after the beginning of assisted mechanical control, the values of gingival bleeding and plaque accumulation indices can be reduced by half in a period of only two weeks. At the end of 30 days of professional therapy and the motivation for oral hygiene, there was a significant reduction in the rate of gingival bleeding from 53% to 18% at the end of the period (Tankova et al., 2024).



These results reinforce the efficacy of protocols based on mechanical control of biofilm, especially when associated with periodic professional follow-up and continuous patient motivation.

Microbiologically, PCR analysis demonstrates that the treatment promotes a significant change in the subgingival bacterial load, although specific pathogens may persist at reduced levels, which reinforces the need for constant maintenance (Tankova et al., 2024). Although the frequency of many bacteria decreased, species such as *P. gingivalis* and *T. denticola* exhibited greater resistance, returning to initial quantitative levels after one month, which reinforces the recommendation of a minimum clinical follow-up of 30 days, spread over at least five visits, to ensure tissue stability and patient behavior change (Tankova et al., 2024).

The persistence of these periodontopathogenic microorganisms highlights the need for continuous strategies to maintain and reinforce oral hygiene in order to prevent the recurrence of gingival inflammation.

In addition, diet plays a crucial modulating role. While the frequency of sugar consumption intensifies the clinical signs of gingivitis, frequent intake of dairy proteins has antiplaque activity that can mitigate gingival inflammation in children (Salim et al., 2025). In this way, a balanced and balanced diet contributes not only to systemic health, but also to oral health. These findings reinforce the importance of nutritional guidance as an integral part of the therapeutic management of childhood gingivitis.

Social and sociodemographic factors also cannot be isolated from clinical management; birth order, daycare attendance, and family socioeconomic status shape the initial microbiological environment and predisposition to developing early periodontal disease (Tastan Eroglu et al., 2024). These factors reflect the influence of early exposures on the development of the immune system and on the host's inflammatory response to dental biofilm.

Thus, exposures occurring in the perinatal period and early childhood can modulate the development of the immune system through early contact with microorganisms, influencing the host's inflammatory response to dental biofilm. In this sense, daycare attendance and later birth order were associated with a lower risk of generalized gingivitis in young adults, suggesting a possible protective effect of greater microbial diversity acquired early.



The authors discuss that children born in later orders or who attend collective environments from an early age tend to have early exposure to common infectious agents, which may favor the development of more efficient immunoregulatory responses throughout life. This mechanism is compatible with the hypothesis that the age of first microbial exposure is a determining factor for the balance between immunity and inflammation, reflecting on gingival health in adulthood.

In addition, the study highlights the influence of socioeconomic context on childhood, especially parental education and family income, as factors associated with gum health. These determinants can act both through indirect biological routes and through behaviors related to oral health, reinforcing the importance of considering early exposures and social conditions in the planning of preventive strategies and in the clinical management of periodontal diseases (Tastan Eroglu et al., 2024).

Therefore, the results show that the therapeutic management of childhood gingivitis should go beyond office prophylaxis, integrating health education, mechanical control of biofilm, nutritional guidance, family support, and the use of educational technologies, in order to ensure lasting clinical results.

4 CONCLUSION

The present narrative literature review study aimed to discuss the protocols for the therapeutic management of childhood gingivitis, focusing on the mechanical control of biofilm, oral hygiene interventions and associated modulating factors. The findings reinforce the multifactorial nature of the condition and the need for a multidimensional approach to its reversal and prevention of recurrences.

First, effective biofilm control is central. Professional intervention, with a strict protocol of mechanical disorganization and continuous follow-up, has been shown to promote a rapid clinical response, with a significant reduction in plaque and gingival bleeding rates in a period of up to 30 days. However, the persistence of subgingival periodontopathogenic microorganisms requires a minimum clinical follow-up of 30 days, with five visits, to ensure tissue stability and the consolidation of new behaviors.

Second, health education and ongoing motivation are crucial. Interactive educational strategies, which use digital tools and playful models, have been shown to be superior to verbal counseling, as they favor child engagement and the internalization



of healthy habits. Family participation and involvement act as an amplifying factor, promoting more lasting behavioral changes.

In addition, modulating factors such as diet and socioeconomic context cannot be neglected. Frequent consumption of sugars intensifies inflammation, while eating dairy proteins may play a protective role. Likewise, socioeconomic variables, such as parental education, have been shown to influence adherence to preventive practices.

It is concluded, therefore, that the therapeutic management of childhood gingivitis should transcend office prophylaxis, systematically integrating mechanical control of biofilm, age-appropriate health education, nutritional guidance, and family involvement, in order to ensure complete reversal of the inflammatory condition and promote oral health as a predictor of long-term systemic health.

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