

## ***Systemic Impacts of Dental Caries on the General Health of Adults: A Literature Review.***

Mariana Carla Freire dos Santos<sup>1</sup>, Beatriz Galeno Tiné Leão<sup>2</sup>, Caline Albuquerque Alcoforado Duarte<sup>3</sup>, Maria Eduarda Cassimiro Araújo<sup>4</sup>, Kamilly Emylle da Silva Dias<sup>5</sup>, Avani Medeiros Cabral<sup>6</sup>, Luana Maria de Farias Costa<sup>7</sup>, Allane Coelho de Melo Silveira<sup>8</sup>, Rosenildo Alexandre de Souza<sup>9</sup>, Janine Bianka da Silva Moreira<sup>10</sup>, Ana Giulia Trindade Saraiva<sup>11</sup> e Luciano Barreto Silva<sup>12</sup>



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### **ORIGINAL ARTICLE**

#### **ABSTRACT**

**Introduction:** Dental caries remains the most prevalent non-communicable oral disease worldwide, with significant physical, psychosocial, and socioeconomic repercussions. In adults, the condition is strongly associated with health inequities and social exclusion. **Objective:** To analyze the multidimensional impact of dental caries in adults, emphasizing its clinical, psychological, and socioeconomic consequences, as well as access and management barriers within the context of Brazilian public health. **Methods:** A narrative literature review was conducted using peer-reviewed studies and reference scientific publications in the fields of dentistry and public health. **Results:** The findings show that dental caries causes chronic pain, nutritional impairment, aesthetic damage, and social stigmatization. The disease disproportionately affects socially vulnerable groups, and access to adequate dental treatment remains limited due to structural inequalities. Early diagnosis, health education, and the development of integrated public policies are crucial strategies for effective management. **Conclusion:** Dental caries should be understood as a multifactorial disease that requires an integrated, person-centered approach, combining clinical interventions with actions targeting the social determinants of health, in order to improve quality of life and reduce health inequities.

**Keywords:** Dental caries; Oral health; Health inequalities; Public health dentistry; Psychosocial impact.

## RESUMO

**Introdução:** A cárie dentária permanece como a doença oral não transmissível mais prevalente no mundo, com repercussões físicas, psicossociais e socioeconômicas expressivas. Em adultos, a condição associa-se fortemente a iniquidades em saúde e exclusão social. **Objetivo:** Analisar o impacto multidimensional da cárie dentária em adultos, enfatizando suas consequências clínicas, psicológicas e socioeconômicas, bem como as barreiras de acesso e manejo no contexto da saúde pública brasileira. **Métodos:** Foi realizada uma revisão narrativa da literatura, utilizando estudos revisados por pares e publicações científicas de referência nas áreas de odontologia e saúde pública. **Resultados:** Os achados evidenciam que a cárie dentária provoca dor crônica, comprometimento nutricional, prejuízo estético e estigmatização social. A doença atinge de forma desproporcional grupos socialmente vulneráveis, e o acesso ao tratamento odontológico adequado permanece limitado pelas desigualdades estruturais. O diagnóstico precoce, a educação em saúde e a formulação de políticas públicas integradas são estratégias cruciais para o manejo eficaz. **Conclusão:** A cárie dentária deve ser compreendida como uma doença multifatorial, que exige uma abordagem integrada e centrada no indivíduo, combinando intervenções clínicas e ações sobre os determinantes sociais da saúde, visando a melhoria da qualidade de vida e a redução das iniquidades em saúde.

**Palavras-chave:** Cárie dentária; Saúde bucal; Desigualdades em saúde; Odontologia em saúde pública; Impacto Psicossocial.

**Instituição afiliada:** Faculdade de Odontologia do Recife (FOPCB/FOR)

**Autor correspondente:** Mariana Carla Freire dos Santos<sup>1</sup>. –  
[mariana.carla@aluno.for.edu.br](mailto:mariana.carla@aluno.for.edu.br)

## **INTRODUCTION**

*In adult individuals, dental caries tends to manifest in a chronic and progressive manner, with insidious evolution, potentially seriously compromising the integrity of dental structures. In advanced stages, the pathology frequently culminates in acute pulpitis, pulp necrosis, periapical infections, and the need for endodontic intervention. At this stage, the damage goes beyond the biological dimension, substantially affecting essential functions such as mastication, phonetics, and aesthetics, with direct repercussions on the patient's self-esteem and psychosocial well-being (Locker, 2004).*

Additionally, odontogenic pain associated with the progression of caries is a relevant factor of negative impact on quality of life, often associated with professional absenteeism and the search for emergency dental care (Gift et al., 1992). Although traditionally conceived as a disease confined to the oral environment, there is growing evidence that dental caries — especially when related to endodontic lesions and periapical infections — may play a role in the genesis or exacerbation of systemic conditions.

Contemporary literature highlights associations between infectious foci of odontogenic origin and the decompensation of clinical conditions such as diabetes mellitus, cardiovascular diseases, and respiratory infections, suggesting a complex interaction between oral health and systemic health (Lockhart et al., 2012; Sanz et al., 2020).

Given this scenario, the present study aims to carry out a literature review on the impacts of dental caries on the general health of adults, with emphasis on quality of life, health habits, and individual perception of oral condition.

## **LITERATURE REVIEW**

The comprehensive understanding of dental caries in adults transcends the restricted assessment of its etiopathogenesis and clinical manifestation, requiring an approach that considers its biopsychosocial implications in the context of public health. In recent decades, an expanded perspective of carious disease has been consolidated, recognizing

it as a multifactorial and dynamic condition, whose consequences significantly affect individuals' quality of life, especially in vulnerable populations (Gerritsen *et al.*, 2010)

The literature has shown that the experience of active or residual caries is associated not only with pain and functional loss of dental elements, but also with limitations in eating practices, compromised self-esteem, and restricted social interactions — elements inseparable from the broader concept of oral health proposed by the World Health Organization (Locker, 2004). In this sense, the assessment of the impact of caries on oral health-related quality of life (OHRQoL) emerges as a central axis of contemporary studies, incorporating validated instruments that are sensitive to the subjectivity of the experience of oral illness (Locker and Allen, 2007).

Additionally, health habits — especially preventive behaviors such as the regular use of fluoride, proper brushing, and periodic visits to the dentist — are crucial determinants in both the prevention and progression of carious lesions. However, such practices are strongly influenced by sociocultural, economic factors and access to health services, revealing deep disparities that affect equity in oral health (Gerritsen *et al.*, 2010).

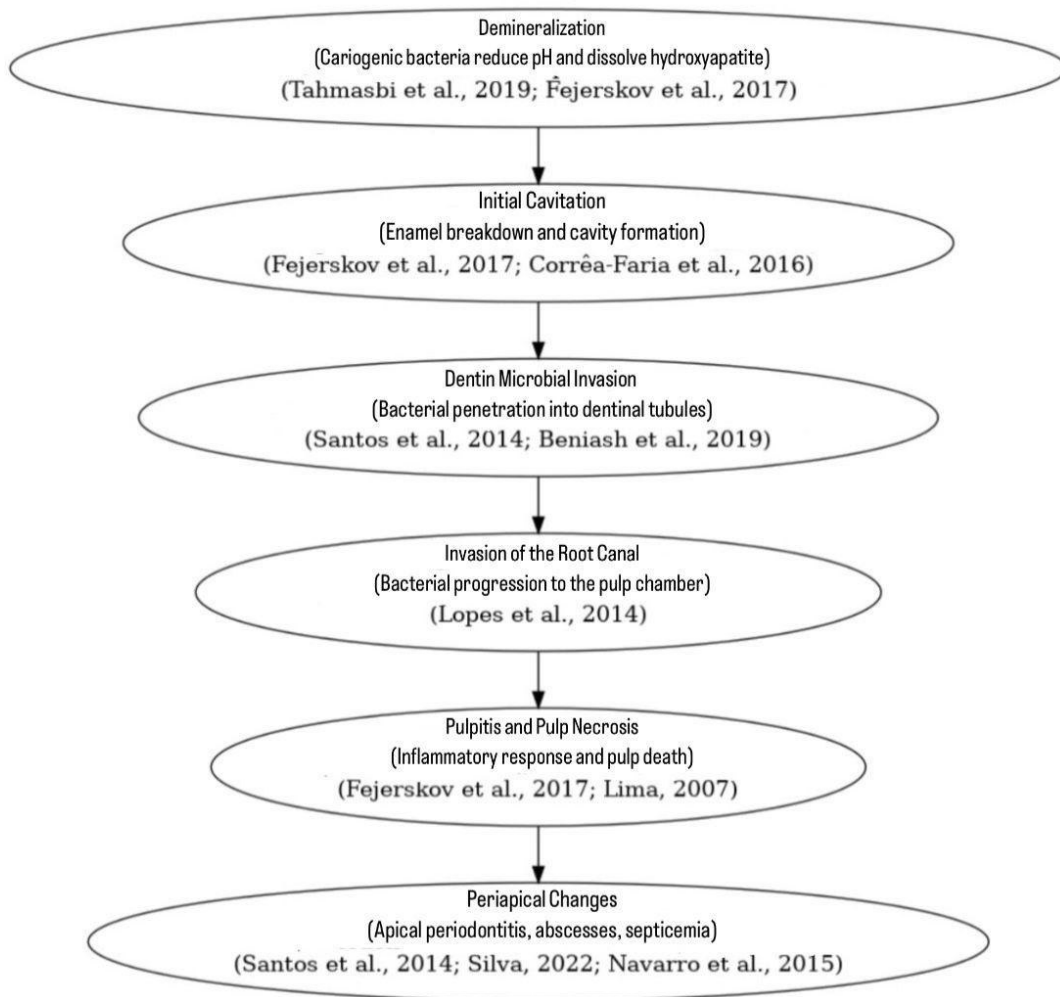
Another relevant point concerns the individual perception of oral condition, often dissociated from the objective clinical severity observed in dental examinations. Studies have shown that many adults underestimate the severity of their carious lesions or normalize tooth loss as an inevitable part of aging, which contributes to neglect of oral care and worsening of oral conditions (Locker and Allen, 2007).

In addition to local impacts, there is growing scientific evidence linking the presence of chronic odontogenic infections, such as those associated with dental caries and endodontic lesions, to the worsening of pre-existing systemic conditions, such as cardiovascular diseases (Sanz *et al.*, 2020) and diabetes mellitus (Sanz *et al.*, 2018), reinforcing the need for an integrated approach between oral and general health.

In this scenario, the present literature review seeks to critically explore the main scientific findings regarding the influence of dental caries on the general health of adults, with emphasis on quality of life, health habits, and the subjective perception of oral condition, contributing to the deepening of academic discussion and the formulation of more effective and integrated intervention strategies.

## 2.1. Pathophysiology of Dental Caries

The pathophysiology of dental caries generally follows the sequence illustrated in the flowchart below:



In this context, dental caries is a biofilm-dependent, chronic disease with variable progression that involves a complex interaction between the dental substrate, cariogenic microbial biofilm, a diet rich in fermentable carbohydrates, and host factors such as salivary flow and composition (Fejerskov et al., 2017; Walsh et al., 2019). The disease begins with enamel demineralization, mediated by bacterial acid production,

and progresses with microbial invasion of the dentin, compromising the dentinal structure and tubules, as illustrated in Figure 1.



**Figure 1.** Magnified image of the dental structure of a human molar, showing a deep carious lesion in the dentin. Darkened, disorganized, and friable dentin tissue can be observed, consistent with infected dentin colonized by microorganisms. The discontinuity of the enamel and dentin exposure indicate caries progression beyond the dentinoenamel junction. The image illustrates the distinction between infected dentin, which must be removed, and affected dentin, which may be remineralizable — a fundamental concept in the conservative clinical management of caries (Santos *et al.*, 2014).

During the initial phase, chronic acidic attack on enamel reduces its mineral content, leading to the formation of clinically visible white spot lesions without cavitation (Tahmasbi *et al.*, 2019). Continued exposure to the acidic challenge results in enamel surface breakdown, allowing bacterial penetration into the dentin. In this less mineralized and highly permeable tissue, the diffusion of acids and bacterial toxins is favored, resulting in morphological and functional changes that compromise the dental structure (Beniash *et al.*, 2019).

The progression of infection along the dentinal tubules is facilitated by the lack of an effective barrier after enamel integrity is lost, promoting bacterial migration toward the dental pulp. This trajectory may be accelerated under conditions of high microbial load and lack of early intervention (Corrêa-Faria *et al.*, 2016).

The advancement of caries toward the root canal is an inevitable development in the absence of timely clinical intervention. In this way, the natural course of the carious disease culminates in pulp exposure, followed by microbial invasion of the root canal system. The movement of microorganisms toward the periapex is an expected consequence and represents the transition from caries to endodontic and periapical involvement, as shown in Figure 2.



**Figure 2:** Magnified image of a lower molar with a deep carious lesion, showing extensive dentin destruction and invasion of the pulp chamber. A darkened coloration and tissue disorganization are observed, suggestive of advanced dentin necrosis. The lesion's progression to the pulpal floor indicates pulp exposure and risk of periapical infection, illustrating the typical course of untreated caries (Santos *et al.*, 2014).

Upon reaching the pulp, the initial response of the pulp tissue is acute inflammation, mediated by innate immune mechanisms, with the release of inflammatory cytokines and recruitment of defense cells (Fejerskov *et al.*, 2017). If the aggression persists, the pulp tissue loses its defense capacity, progressing to irreversible pulpitis and subsequently to pulp necrosis (Lima, 2007).

Pulp necrosis allows the infection to spread through the apical foramen, reaching the periapical tissues. At this stage, chronic inflammatory responses occur, with the formation of periapical granulomas, abscesses, and, in more severe cases, radicular cysts (Navarro *et al.*, 2015). Moreover, in immunocompromised individuals or in cases of hematogenous dissemination, the infection may evolve into severe systemic conditions, such as cervicofacial cellulitis or odontogenic septicemia (Silva, 2022). Therefore, the pathophysiology of dental caries is a progressive process that begins at the enamel surface and may extend deeply into the periapical and systemic tissues if early clinical intervention is not provided.

## **DISCUSSION**

The present literature review reinforces that dental caries in adults transcends its characterization as a localized pathology, impacting in a multidimensional way the general health, self-esteem, and quality of life of individuals. Contemporary studies

point out that the deleterious effects of the disease go beyond physical damage, resulting in significant psychosocial suffering, including nutritional impairment, disturbances in self-image, social isolation, and, in extreme cases, compromise of professional productivity (Fejerskov *et al.*, 2017; Corrêa-Faria *et al.*, 2016).

In the psychosocial context, the presence of extensive carious lesions, darkened tooth coloration, associated halitosis, gingival bleeding, and purulent secretions in advanced stages contribute to the stigmatization of the individual, which may result in depression, social anxiety, and exclusion from community life. Clinical cases report that transcutaneous fistulas, with visible purulent exudate drainage in the facial skin region, although uncommon, are still observed in occupational environments, causing embarrassment and social rejection, including in industrial and corporate sectors (Beniash *et al.*, 2019). The literature highlights the direct correlation between health behaviors — especially oral hygiene practices, dietary patterns, and use of dental services — and the prevalence of dental caries. These practices are deeply influenced by social determinants, such as socioeconomic level, educational attainment, access to health information, and availability of public and private services (Santos *et al.*, 2014; Navarro *et al.*, 2015). In Brazil, the reality of the Unified Health System (SUS), marked by high demand and a limited supply of professionals in many locations, leads to delayed seeking of dental care, which favors the perpetuation of the cycle of disease and suffering.

Additionally, the subjective perception of oral health emerges as a critical factor in health behavior. The way the patient interprets the severity of the disease and values the aesthetic and functional integrity of their teeth directly influences the search for treatment, adherence to preventive guidance, and acceptance of conservative therapies (Fejerskov *et al.*, 2017; Lima, 2007). In more vulnerable populations, caries is often seen as an unbearable burden, with frequent requests for tooth extraction as an immediate solution, even in cases amenable to restorative approaches. This phenomenon reflects the physical and emotional suffering imposed by the disease, in addition to limited access to more complex services. Furthermore, the lack of alternatives in the public system and the limited number of accredited professionals in private dental plans create an environment conducive to the repetition of traumatic experiences, particularly in



pediatric patients, which reinforces avoidance behaviors regarding treatment and worsens the clinical situation of the lesions (Navarro *et al.*, 2015; Silva, 2022).

In view of this scenario, it becomes imperative to understand dental caries from a broader health perspective, integrating the biomedical, social, and subjective dimensions of the health-disease process. The implementation of effective public policies, based on promoting equity in access to dental care and integrating clinical, educational, and preventive actions at all levels of care — especially in Primary Health Care — is fundamental to tackling this issue. The integrated and humanized approach can not only mitigate the prevalence of the disease but also improve quality of life, restoring the dignity and well-being of affected individuals.

## **CONCLUSION**

Dental caries in adults, far from being an isolated condition of the oral cavity, constitutes an important marker of health inequity and social exclusion in unequal societies such as Brazil. The present study showed that the impacts of the disease go beyond the biological field, affecting psychosocial, economic, and work-related dimensions. A broader understanding of caries, together with the strengthening of public policies for prevention, early diagnosis, and expanded access to treatment, should be a priority for oral health managers and professionals. The recovery of self-esteem and quality of life of the patient affected by caries disease will only be possible through intersectoral and integrated actions, based on respect for comprehensive care and a commitment to reducing health inequalities..

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