

# The Science of Cariostatic Action of Cheese against Dental Caries

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**Abstract:** Dental caries, often known as tooth decay or cavities, is a common oral health issue that has a significant impact on overall health. Cheese, a dairy product, has received attention in terms of nutrition due to its potential benefits for reducing tooth cavities. This narrative review examines the nutritional benefits of cheese in the context of avoiding dental caries, as well as its nutritional profile, mechanisms of action, and relevant advice for incorporating cheese into a caries-preventive diet.

Keywords: Cheese, Dental caries, Tooth decay, Oral health, S.Mutans

## Introduction

Dental caries is a widespread oral health problem caused mostly by the demineralization of tooth enamel by acids produced by bacteria in dental plaque. Dietary factors have a significant impact on the development and progression of dental caries, with sugars and fermentable carbohydrates being the principal culprits.<sup>1</sup> Certain dairy items, particularly cheese, have been suggested to protect against tooth caries. The purpose of this review is to outline the nutritional qualities of cheese that contribute to its possible role in dental caries prevention.

## Methodology

From their debut until September 2021, electronic databases such as PubMed, Scopus, and Web of Science were used to conduct a literature search. Combinations of "cheese," "dental caries," "tooth decay," "oral health," and related phrases were among the search queries. The search was restricted to articles written in English. Studies were selected if they looked into the link between cheese consumption and human dental caries. There were both observational and interventional studies considered. Case studies, case series, reviews, and studies with insufficient data were all discarded. The first database search produced 385 articles. This narrative review comprised 23 papers after screening titles and abstracts and applying the inclusion and exclusion criteria.

## Dental Caries and Diet: The Inextricable Link

Dental caries has a complex causality, with three major components interacting: the host (saliva and teeth), the microbiota (plaque), and the substrate (diet), as well as a fourth element: time. Microorganisms, primarily *Streptococcus mutans*, ferment sucrose and glucose in the mouth to produce lactic and other organic acids that induce erosion and decalcification, resulting in the formation of caries. The dynamic caries process involves swiftly alternating phases of tooth demineralization and remineralization, which, if a net breakdown of minerals occurs over a long period, results in the onset of specific caries lesions at specific morphological favored locations on the teeth.<sup>1-3</sup>

Because it was perceived to be significantly more cariogenic than other sugars, sucrose was for a long time referred to as the "arch criminal" of tooth caries.<sup>4</sup> A World Health Organization (WHO) Scientific Panel, whose members examined the strength of scientific data linking dietary variables to caries, validated the link between dental caries and an excessive amount of sugar. The Panel discovered a relationship between the frequent and continuous consumption of free, simple sugar and an increased risk of caries.<sup>5,6</sup>

### Nutritional Components of Cheese and their mechanism of action against caries:

Cheese is a nutritious item that includes an array of elements that are favorable for dental health :

- **Calcium and Phosphorus:** The minerals calcium and phosphorus, which are necessary for the development and maintenance of strong dental enamel, are abundant in cheese. A sufficient intake of both aids in preventing acid-induced enamel demineralization. The calcium and phosphate ions found in dental plaque have a close correlation, according to studies. Cheese consumption elevates the calcium concentration in plaque, which increases the pH of the plaque to greater than the threshold point where demineralization begins. Hence, Cavities are avoided attributed to the high calcium and phosphate content of cheese, which serves as a buffer to neutralize acids and encourage the remineralization of enamel.<sup>7-9</sup>
- **Casein and Whey Proteins:** Casein and whey proteins found in cheese have been demonstrated to have a protective impact on dental enamel. Salivary casein from milk and cheese binds with hydroxyapatite to inhibit *S. mutans* adhesion. According to a study, casein phosphopeptides stabilize calcium phosphate by forming complexes with the mineral, which makes it easier for plaque to absorb calcium and phosphate. Casein phosphopeptides have been proven in numerous studies to be anticariogenic.<sup>9-12</sup> Several studies have shown that caseins and whey proteins prevent caries formation from sucrose, even in very vulnerable rats, such as those that have been desalinated.<sup>13</sup>
- **Micronutrients that can alter the oral microbiota:** According to a study, eating cheese after dinner supplies essential micronutrients like calcium, vitamins, and some amino acids like arginine as well as shifts the pH of the mouth toward more basic conditions. This causes a slight modification of the oral microbiome that lowers the total amount of acidophilic bacteria. Additionally, a lower *S. mutans*/*S. sanguinis* ratio results in a more protective environment for the emergence and development of caries.<sup>14</sup>

### Other Mechanisms of Cariostatic Actions :

- **Enhancement of Saliva:** Chewing cheese increases salivation, which acts as a natural defense against acid attack. Chewing cheese enhances saliva production. Saliva's alkaline composition buffers the acids produced by plaque. Due to the neutralizing effect of saliva stimulated by cheese, there is also an accelerated rate of sugar clearance.<sup>15</sup>
- **Low Sugar Content and Reduced Acid Production:** Unlike many other dairy products, cheese is low in lactose which by itself has lower cariogenicity than sucrose. Due to its low sugar content, acid-producing microbes in the oral cavity have less access to the sugars that ferment. This low availability of fermentable sugars, reducing the substrates for acid-producing bacteria.<sup>16-18</sup>

### Practical Recommendations:

- Incorporating cheese into a balanced diet can promote oral health and help prevent dental caries.<sup>19</sup>
- Cheese as a Snack: Consuming a small serving of cheese as a snack can help neutralize acids after meals, reducing the risk of enamel demineralization.<sup>19</sup>
- Cheese with Carbohydrate-Rich Foods: Pairing cheese with carbohydrate-rich foods, such as crackers or whole-grain bread, can mitigate the acidogenic potential of the meal.<sup>15,19</sup>
- Cheese in Oral Hygiene Routine: Chewing cheese as part of an oral hygiene routine, especially after consuming sugary or acidic foods, can contribute to maintaining optimal oral health on account of its ability to buffer acids and enamel protective properties of its constituents.<sup>7-15</sup>

### Conclusion

Cheese is a viable choice for reducing dental cavities due to its excellent nutritional makeup and mechanisms of action. Cheese, when combined with excellent oral hygiene practices, can lead to improved oral health and a lower incidence of dental caries. However, additional research is needed to validate these findings and develop evidence-based dietary suggestions for avoiding dental caries with cheese.

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DOI: <https://doi.org/10.15379/ijmst.v10i1.2667>

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