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# REVIEW ON THE IMPORTANCE OF MAJOR CARES TO AVOID AND TREAT CARIES DISEASE

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**ABSTRACT**

Caries is an infectious and contagious pathological process that causes a demineralization in the dental tissues, by acids originated from the fermentation of carbohydrates ingested in the diet, through the bacteria. When diagnosed early, it is possible to reestablish the health of the mouth more easily, through the intervention of the professional. The progression of the carious lesion can also be interrupted with the correct hygiene of the oral cavity and control of dietary sugar intake. There are several microorganisms that act in the oral cavity, but *Streptococcus mutans* is the main responsible for the etiology of caries.



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## INTRODUCTION

The carious process occurs with the removal of minerals from the dental elements causing progressive destruction of the teeth, occurs in a dynamic and prolonged way, but when not treated can cause damage to the internal structures of the tooth such as pulp and supporting tissues 22. Caries is related to characteristics that are independent of age, sex, ethnicity or social condition of the individuals, for example, a determinant factor for the development of this pathology is the dental biofilm, which is related to pathogenic bacteria that make up the oral microbiota (Oliveira, 2011). There are diagnostic methodologies for dental caries, taking into consideration that their prevalence is not homogeneous throughout the tooth structure (Manji, 1991). The ways of diagnosing the lesions also depend on the area of action and the scientific knowledge of the dental surgeon, as well as their evaluation of each case and the choice of which diagnostic method fits their reality, being that it can be through a set of Elements such as anamnesis, clinical and complementary examinations, which will lead to a complete diagnosis (Tomita, 1999). In the oral cavity there is a diversified microbiota and some of these microorganisms adhere to the surface of the tooth, some of which are indispensable, but not sufficient, for the development of caries (Maciel, 2007). Bacterial colonies make up the biofilm that adhere to the dental surface and stabilize over time and with the metabolism of the buccal environment, which leads to changes in mineral loss or gain on the dental surface (Filho, 2011). The rapid growth of the biofilm that favors its energetic metabolic activity is justified by the feeding of the bacteria through the sugars ingested in the diet, where acidification occurs from the fermentation process of the carbohydrates, intermediated by microorganisms such as *Streptococcusmutans, Lactobacillus acidophilus, S. salivarius, Eubacterium, Propionibacterium, Actynomycesisraelli*, which are responsible for the demineralization of tooth tissues (FEIJÓ, 2014). The caries index increases proportionally with the intake of foods rich in sugar (Mattevi, Gianina Salton, 2011). The sucrose, which is derived from the breakdown of

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carbohydrates, directly influences the surface of the tooth, decreasing the pH of the dental plaque to values lower than 5.5 and acidification occurs (Kuhn, 2007). The most cariogenic components of the diet are sugars, which requires a conscious intake of them, and the energy that the body needs is from complex carbohydrates, as well as a diet rich in foods that inhibit the carious process, such as Case of proteins, phosphates and fluorides (Zárate, 2012). Caries is still treated for the removal of carious tissue and treatment, but it is important to know (Filho, 2011). Dentistry was known as restorative, when caries was discovered, treatment was established, however, today dentistry is known as a preventive science, pointing out the factors that would lead to caries so that it can be avoided. According to research done in the literature, the non-knowledge of people regarding caries disease implies its propagation. Therefore, the present study aimed to make literary review on the main care and also teachings to avoid caries disease.

## MATERIALS AND METHODS

Experimental and clinical studies were included (case reports, retrospective, prospective and randomized trials) with qualitative and / or quantitative analysis. Initially, the key words were determined by searching the DeCS tool (Descriptors in PubMed, Health Sciences, BIREME base) and later verified and validated by MeSh system (Medical Subject Headings, the US National Library of Medicine) in order to achieve consistent search.

### Mesh Terms

The words were included "Caries disease", "Oral diseases", “Education”. The literature search was conducted through online databases: Pubmed, Periodicos.com and Google Scholar. It was stipulated deadline, and the related search covering all available literature on virtual libraries.

### Series of Articles and Eligibility

A total of 60 articles were found involving caries disease. Initially, it was held the exclusion existing title and duplications in accordance with the interest described this work. After this process, the summaries were evaluated and a new exclusion was held. A total of 45 articles were evaluated in full, and 37 were included and discussed in this study.

### Literature Review

Dental caries are considered an abnormal process, since primitive man did not present lesion of enamel that was considered caries, even exposed to a biodiversity of microorganisms and presenting the fundamental elements for the development of the carious process. The pathological action that occurs in caries is characterized by the demineralization of the enamel and the dentin by acids originating from the fermentation of microorganisms in the mouth, which causes a reduction of saliva pH, providing an environment for the development of caries. Initially, caries was only a condition in adults and only appeared in areas of scars and fissures, present in premolars and molars, but with the beginning of industrialization, high sugar production, caries becomes visible in children and In teeth of smooth surfaces, bringing a concern to dentistry (Almeida, 2010). The multifactorial etiology of caries appears in the combination of factors such as diet, microbial flora of the mouth, salivary pH, oral hygiene, fluoride deposition, tooth susceptibility, socioeconomic level, among other characteristics that express the individual's lifestyle. The caries disease is contagious in character, with localized loss of minerals from the affected teeth and when there is no adequate treatment can lead to partial or total loss of teeth, regardless of the definition of caries, when untreated leads to pulp and tissue infection Of dental support, causing serious sequelae. General health, socioeconomic profile and attitudes directly influence the caries process, and the microorganisms that cause pathology are opportunistic and take advantage of these situations to establish themselves (Gerhardt, 2009). There is still a separation of oral hygiene when one thinks about the integral health of the individual, where the patient is fragmented in systems that generate damages in the integral restoration and in the quality of life (Rosa, 2012). The systems of the body must be treated as a whole so that the general health of the individual is established so that the absence of the caries shows a correct functioning of the human organism 18. From this, the importance of the dental surgeon as a fundamental role in the diagnosis and treatment of caries, preventing formation by preventing or preventing the progression of the carious lesion by means of an early and correct diagnosis 15.

### Diagnosis of carious lesions

"The detection of the carious lesion and the treatment decision constitute a dental procedure subject to a great inter-examiner variability. This may originate from changes in the developmental pattern of caries disease, from the concept and determination of its onset, non-standardization of criteria and conditions for diagnostic exams, subjectivity and bias of professionals in diagnosing the disease, clinical specialties in which The professionals act, the cost of the proposed treatment and the form of remuneration of the professionals. In this context irreversible damage to the oral health of the patients may occur, as well as treatments with very high costs "(Manji, 1991). Aiming at the promotion of Oral Health, several diagnostic methods are studied and discussed for the adoption of appropriate treatment of caries lesions (Filho, 2011). Few national and professional-level studies of dentistry in public health have been done regarding the detection of carious lesions, hence the importance of addressing this issue (Manji, 1991). An ideal and reliable diagnostic method should be able to identify initial as well as incipient caries lesions and to differentiate between reversible and irreversible lesions (Lima, 2007). There are a variety of methods for detecting caries that will lead to the choice of appropriate treatment for each type of injury (Manji, 1991). Among the factors that lead to the choice of the diagnostic method is the morphology of the tooth, where the surfaces of scars and fissures require special care because they present delicate areas that require more attention (Zanardo, 2003). The most common diagnostic methods are: conventional radiography, fiber-optic transillumination, visual inspection, tactile inspection and laser fluorescence (Lima, 2007). Conventional radiographs serve as an auxiliary method for diagnosis, and the most used are interproximal radiographs that are able to show the non-visible regions in a visual examination, verifying the progression of caries in either enamel or dentin (Tomita, 1999) In the interproximal radiographic examinations, the areas where there is loss of dental tissue are presented in the form of radiolucencies and also allow the visualization of excess or lack of restorative material after the treatment of the lesion (Fejerskov, 1990).

Fiber-optic transillumination is a method of detection that is based on the transillumination of the dental element where the shadow in the tooth structure indicates caries lesion, detecting interproximal and occlusal lesions (Lima, 130). Through fiber-optic transillumination, it is able to obtain the diagnosis of different types of caries lesions, incipient or those involving the surface of dentin, in all types of teeth, even in recurrent caries (Lima, 2017). The visual inspection method consists in the observation of physical changes in dental tissues such as cavitations, changes in the enamel, presence of shading and dental biofilm, characterizing the initial diagnosis of caries lesion 19. This procedure is based on the use of the clinical mirror where the professional visually observes the anatomical structures (Santos, 2003). The tactile inspection is characterized by the use of the exploratory probe to verify the presence of soft tissue, characteristic of caries, but it is in disuse, since it can break the integrity of the lesion, transforming it from incipient to a cavitated lesion (Lima, 2007). "It is a device that lends itself to the diagnosis of occlusal caries and smooth surfaces. With this apparatus, the surface of the tooth is irradiated with a red laser (655 nm), and the emission of surface fluorescence is analyzed and quantified. The method is based on the principle that the caries process alters the amount of fluorescence of dental tissues that can be quantified " (Lima, 2007). No diagnostic method alone is sufficient for caries lesions, all methods can be used being associated for a better treatment choice (Tomita, 1999) There are recent and evolved technologies that are essential in the diagnosis of caries, some have a high cost, others have a laborious profile, and it is necessary to evaluate the benefit brought by the technique (Lima, 2007).

**Diet related to caries**

Caries is a multifactorial, infectious, transmissible disease (Narvai, 2001). It results from colonization of the enamel surface by microorganisms - especially Streptococcus mutans - that, by metabolizing fermentable carbohydrates and producing acids (Almeida, 2010). "Dental caries is the infectious disease that most affects the oral cavity, reaching all age groups, from infants to the elderly. " (Zárate, 2012). The concept of caries is very complex and determined by several factors such as susceptible teeth, microorganisms and The caries susceptibility factor should emphasize the entire life structure of the individual, analyzing their environment, financial and cultural status (Olympio, 2016) The reduced salivary flow index increases the susceptibility to caries lesions. Dental caries, since the main protective functions of saliva against dental caries are: the saliva buffering effect that prevents intraoral oral pH reduction after sugar ingestion (sucrose); saliva increases the level of cariogenic microorganisms removal Mouth (Melo, 2011). As for microorganisms, it can be prevented controlled and reversed (Losso, 2009). Thus, microorganisms are a participatory factor in the etiology of caries and not determinant (Losso, 2009). The evolution of this pathology is capable of causing great destruction of the teeth, or even their loss, and may result in local, systemic, psychological and social complications (Traebert, 2004). As for diet, a balanced diet capable of providing an adequate nutritional status certainly contributes to a desirable oral condition of the individual (Melo, 2011). Natural foods perform a plaque control and, because of these properties, they are not considered cariogenic (Olympio, 2016) Sucrose is the most important and most widely used cariogenic food in man.

**Food versus Caries**

"The health of the mouth is fundamental to reach the fullness of this definition, because it cannot be isolated from the rest of the body, considering that what happens in the mouth reflects throughout the organism" (Traebert, 2004). Food and nutrition have great influence on the oral health of individuals, making them more susceptible to dental caries disease. A balanced diet capable of providing an adequate nutritional status certainly contributes to a desirable oral condition of the individual (Melo, 2011). Brazilians are increasingly replacing the consumption of foods rich in fiber and nutrients with industrialized foods rich in fats and carbohydrates, which facilitates the onset of caries disease even in the presence of caries protection factors such as fluorides. The cariogenicity of a given product is associated with its total removal time from the mouth, and this time depends on several factors, such as physical consistency, adhesiveness, characteristics of the dental and arch anatomy and muscle movements (Fejerskov, 1990). The frequency of sugar consumption is an important factor in the etiology of caries (Fejerskov, 1990).

The increase in the consumption of processed foods, both by children and adults, is directly related to the onset of caries since most of them have sucrose in their composition (Silva, 2007). Avoiding certain foods and beverages, reducing the frequency of their intake, especially as the last night intake, has been reported as an important contribution in the treatment of caries patients (Silva, 2007). A dietary assessment is a fundamental part of the examination performed by the dentist, this should be done in patients with high caries activity (Traebert, 2004).

**Sugar as the villain of caries**

The daily consumption of moderate or high sugar can be used to evaluate the level of sugar consumption as follows: less than 3 sugar moments per day: low cariogenic risk; 3 to 6 sugar moments per day: moderate cariogenic risk; More than 6 sugar moments per day: high cariogenic risk (Aguiar, 2011). They can be fermented causing acids by plaque bacteria and, in addition, can influence the quantity and quality and, consequently, the cariogenicity of the microbial aggregates in the teeth (Aguiar, 2011; Gerhardt, 2009; Marinho, 1998). There has been an increase in the frequency of sugar and carbohydrate intake (fruit juices and acid drinks), which together with prolonged contact with dental surfaces are crucial risk factors for the development of dental caries (Traebert, 2004). An individual who has a mild preference for sugar may have a high daily sugar intake (Fejerskov, 1990). Regarding dietary elements and their influences against caries, the authors cited sugars or carbohydrates as the most cariogenic item in the diet (sucrose rather than glucose rather than fructose and ultimately lactose) (Narvai 2001). A preferential gustatory pattern for more sweetened solutions and consequent higher sugar consumption has been related to higher levels of caries (Fejerskov, 1990). With the increasing ingestion of cariogenic foods by the human being, producing a growing imbalance, dental caries established itself in the world population in an endemic way, leading to the conclusion that diet would be the determinant factor of the "disease" 20]. Thus, the oral mucosa is particularly susceptible to anatomical and physiological changes as a result of food types, nutritional deficiencies or excesses (Traebert, 2004).

**Use of sweets: major cause of caries in children**

"Dental caries is the most common chronic disease in childhood, which is a major problem for the world's public health" (Losso, 2009), the early introduction of sugary foods such as tea, soft drinks and honey is related to the prevalence of dental caries in this Age group (Silva, 2007). A preference for sweets has been suggested as an important factor in individual sugar consumption, being highly cariogenic (Lima, 2007). However, some foods containing starch in their composition, such as breads and fries, reduce the pH to levels that are sometimes lower than sucrose and are among the foods also considered as cariogenic (Aguiar, 2011). Children with higher socioeconomic status further restrict sugar consumption, one of the main determinants of dental caries, especially in childhood (Maciel, 2007). Refrigerants and gaseous beverages contain carboxylic acids, which due to acidic pH, also alter the enamel making it more susceptible to a posterior cariogenic attack (Traebert, 2004). Children with a high intake of snacks and irregular brushing frequency have a greater caries experience (Aguiar, 2011). Early decay is characterized by the presence of one or more decayed or lost teeth in childhood in children less than six years of age (Fejerskov, 2009). The high correlation between the sweetness preference of the children and their parents has been observed, which suggests that the preference for sweets is, in part, a learned habit (Fejerskov, 1990). A sticky sugary food is more difficult to remove and will stay longer in contact with the surface of the tooth (Traebert, 2004). In Brazil, the Oral Health Project - 2003 showed that 27% of children aged 18-36 months and almost 60% of 5-year-old children had at least one deciduous decayed tooth. On average, a Brazilian child up to 3 years of age already has at least one tooth with caries experience; At 5 years, this value increases to almost three teeth (Silva, 2012). Inadequate sugar use is one of the most important factors in children who will develop a greater number of carious lesions (Aguiar, 2011).

**Importance in dental hygiene after feeding**

"This hypothesis is due to the fact that, without the presence of plaque, it is not possible the appearance of the caries lesion, justifying the old concept that a clean tooth will never present caries" (Olympio, 2016) Oral hygiene represents a factor to be considered for disease onset (Kuhn, 2007). The performance of brushing and cleaning, guidance on hygiene, oral health maintenance and diet are important tools to be used during caries prevention treatment (Antunes, 2006). Prevention is the most economical and effective way to avoid the onset and development of diseases such as caries, gingivitis and periodontitis, and several preventive activities, education and motivation of the individual occupy a prominent place (Traebert, 2004). Fluoridation of public water supply, addition of fluoride in toothpaste, changes in the pattern of sugar consumption, improved personal hygiene, including brushing, and increased access to information and education were essential factors for the decline in Prevalence of caries in the last decades (Manji, 1991). Education and information on oral health care have been highlighted by several researchers. The prevention of caries disease has as main objective to prevent the appearance of incipient lesions and not simply to restrict the damages of the disease (Traebert, 2004). One of the main and most common challenges in oral health prevention is the control of dental plaque and consequently the control of dental caries and gingival inflammation, mechanical methods such as the use of toothbrushes and dental floss when applied efficiently, They can promote a correct plaque control (Manji, 1991). Health professionals have a responsibility to act in the prevention of diseases, minimizing risks and promoting favorable conditions so that it becomes possible to achieve and maintain oral health. On the other hand, patients also need to be made aware of their role in health care (1991). The prevention of dental caries is possible effectively through regular oral hygiene (Traebert, 2004).

**Caries-related oral microbiota**

Caries is a chronic, multifactorial, infectious disease that is caused by a process of dental demineralization by organic acids from the fermentation of carbohydrates from the diet by bacteria. Some physical-chemical factors characterize several different environments, thus supporting the development of different microbial communities (Olympio, 2016). One of the main factors related to dental caries is directly related to the biofilm, a film acquire that soon originates when the oral hygiene is made, with the formation of this layer, pathogenic bacteria from the food and that is not excluded with a good oral hygiene uses Of this layer that would be a kind of "protection" as a shelter. The dental biofilm thus formed is composed of a heterogeneous group of microorganisms in the different sites and tends to stabilize with the passage of time. These biological communities are embedded in polymer matrices (Leites, 2006). Authors have demonstrated the relationships between the biofilm and the multiple biological determinants that influence the possibility of caries lesion development. The teeth are colonized by bacteria that exist in the biofilm, whose metabolism causes fluctuations in pH (Narvai, 2001). In the oral cavity the dental surfaces are covered by microbial deposits, with thickness determined according to the location. Microorganisms need to adhere to a surface because they will not be carried by salivary flow and swallowed, thus most microorganisms are found in areas of stagnation (Leites, 2006). This bacterial homeostasis results from a dynamic process in microbial interactions and metabolic activity causes pH fluctuations even under resting conditions (Leites, 2006). Such pH fluctuations cause changes in the biofilm or dental plaque fluid, resulting in an equilibrium disorder at the tooth and plaque interface, leading to intermittent loss and gain of minerals on the dental surface (Tanaka, 2004). "The group of bacteria that are known as streptococcus is among the predominant in the biofilm. Many species of streptococcus are identified, all associated exclusively with mammals. Most S*treptococcus* species are considered commensal, organisms that live in harmony with and are tolerated by the host. *Streptococcos* are generally found in mucous membranes and, when the conditions provided by these sites are favorable, may develop systemic or localized diseases. The success of streptococcal colonization is attributed to three factors: the ability of these organisms to adhere to almost all surfaces present in their natural environment; Its ability to rapidly utilize available nutrients under oscillations under the environment conditions; And their ability to tolerate, resist, or even destroy the host's immune defenses " (Fraga, 2007). The bacteria that are often associated with caries are *Streptococcus mutans,* first described by Clark in 1924, when examining carious tissue from cavities, this group of bacteria is able to withstand an acidic environment, common in the mouth of Who consumes sugar very often, which favors it in a competition with the other bacteria that live on the plate (FEIJÓ, 2014). "Many authors relate *S.*

*mutans and Lactobaccillus* to root caries, especially when there is an association of these two microorganisms. Studies have reported that there are significantly larger amounts of *S. mutans and Lactobaccillus* in the dental plaque of patients with root caries when compared to individuals with periodontal disease who did not have root caries lesions. Other microorganisms were related to root caries. In caries-free surfaces, the predominant microorganisms were *S. sangui II, Veillonella* and *A. viscosus.* In the incipient caries lesions, S. *mutans, A. viscosus and Lactobacillus* were found in higher amounts, whereas in advanced caries lesions there was a predominance of *S. mutans, A. naeslundii, Veiullonella and Clostridiun.*

On the other hand, some authors have studied the presence of bacteria in different environments in the oral cavity and found that the predominant aurium bacteria in root caries lesions were *A. israelli* (pH 4.8 and 5.2), *Lactobacillus* (pH 4.8 and 5.2) and PH 7.0 was *A. naeslundii,* whereas in root surfaces that are prone to develop carious lesions the predominant bacterium in 60% of cases was *A. gerencseriae* at pH 4.8 and 5.2, and at pH 7.0 the predominant bacterium was *S. Salivarius.* In root surfaces that are not subject to caries, the most common bacteria were *S. anginosus* (pH 4.8) and *S. bucalis* (pH 5.2 and 7.0),the *S. mutans* (Soraggi, 2007). Many studies seek to clarify the correlation between dental caries and the presence of microorganisms, salivary flow, saliva buffer capacity and sucrose, but not reaching a conclusive result regarding the influence of these factors on caries control. The relationship, sometimes inverse, between these factors and caries activity, already present in the literature, suggests that the methods of diagnosis of at-risk patients are reviewed. The control of the presence of microorganisms in the oral cavity influencing the caries process, or being influenced by organic salivary, immunological and chemotherapeutic factors, should not be considered for the establishment of prevention strategies, and the simple presence of microorganisms in the oral cavity, Whether in saliva or plaque, is not a factor that determines the onset of "disease" caries (Soraggi, 2007; Leite, 1999; Aguiar, 2011; Gerhardt, 2009; Marinho, 1998).

However, its participation is unquestionable and indispensable, since the caries lesion goes through the bacterial metabolism, culminating with the formation of acid and consequent demineralization of the enamel, thus simply triggering the physiological process of demineralization-remineralization, not determining, But the "disease". Thus, the microorganism should be considered as a participatory factor in the etiology of the "disease" and not determinant, and the interpretation of the caries as an infectious disease is not justified (Olympio, 2016)

**Conclusion**

It is concluded that caries is a multifactorial disease, chronic development relatively slow and in need of care. In addition to being a contagious infectious process, the prevention and reduction of this contamination and its chemical-mechanical control should be a concern when the objective is to control and eliminate the disease. It is clear the importance of a balanced diet and a good oral hygiene, besides, of course, routine trips to a dentist.

**Conflict of interests**

There is no conflict of interest between authors.

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