The nutritional impact on bacterial plate, the development and treatment of tartar in cats

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Abstract
The accumulation of bacterial plaque on the teeth, the mineralization of these and the change of the oral cavities pH are the result of the interactions between different components of the oral environment and bacterial flora. These interactions will determine the type of bacterial populations that will occur on every situs thus forming the dental plaque. The bacterial plaque can be characterized based on localization, bacteriological composition and the effect on the oral cavity. Tartar is the main factor, which determines different grades of gingivitis, infections, and paradental diseases leading to tooth loss at cats. A thorough prevention and treatment plan will primarily consist of a well-balanced alimentation with a gross structure of feed. Potassium phosphate has a crucial role in the efficiency of the therapeutic protocols capacity to eliminate bacterial plaque, accounting for a reduction of 32% of calcium accumulations thus considerably slowing the mineralization or calcification of bacterial plaque at cats. This study looked at the impact that certain foods have on the development of plaque and tartar formation, furthermore it analyzed the tartar reduction after implementing a therapeutic diet. We also did a microbiologic examination of the saliva and the deposits at the level of the enamel. It was also observed that cats that were fed dry and moist food in equal amounts, were more prone to develop the above mentioned deposits..
Keywords: *bacterial plaque, tartar, diet, cats.*

Introduction

The dental plaque is mainly composed of a constantly proliferating microbial ecosystem, together with leukocytes, macrophages, epithelial cells that are hollowed out at various stages of anatomical integrity, all contained in an organic matrix. It is presented as a yellowish-white film that is naturally deposited on the surface of the teeth, formed by colonizing bacteria that try to penetrate the fine surface of the teeth. The bacterial plaque is formed by the adherence of bacteria to the superficial dental film, then forming complex structures, which are more resistant than the cleaning force. In this way the bacterial cultures grow and adhere on a larger surface, helping to accumulate the dental plaque. Dental film is the initial stage of bacterial plaque development. It is present on all surfaces of the oral cavity. This biofilm is derived from the components of saliva, cervical fluid, detriment and tissue and bacterial components.

The mechanism of tooth plate formation follows several steps, the first being the creation of a thin film on the tooth surface and the adhesion of bacteria to this formed film. The bacterial accumulations present in the buccal cavity are the result of the interactions between the different components of the buccal environment and the bacterial flora, these interactions will determine the type of bacterial populations. The colonizing bacteria will attach to the primary ones.

There are several types of dental plaque, the classification being made according to: localization - the plaque from the groove level or from the smooth surfaces; depending on their properties - they may be adherent or less adherent, and according to their pathogenic potential, they are karyogenic or cause of parental diseases. The nutritional management for reducing tartar formation is divided into 3 stages: prevention, maintenance and treatment.

The reduction of the existing deposits in the enamel or gingival blackmail is stimulated by several factors: physical / mechanical, chemical and microbiological. All these factors through

functions that they perform stimulate the gradual reduction of the existing deposits until they disappear.

The dental plaque deposited at the enamel level can be reduced by administration of a therapeutic diet based on a composition that prevents the mineralization of bacterial deposits. On the other hand it helps to reduce the existing tartar by the mechanical forces exerted on the tooth surface. The diet should have a high fiber level, with a specific, hexagonal shape and a high bite penetration index. At the same time, sodium polyphosphate plays an important role in preventing biofilm mineralization (Adler et al, 2016).

Materials and methods

The study aimed to track the nutritional impact in the formation and treatment of tartar in cats. Bacterial plaque in cats represents the first step in the appearance of different oral pathologies, such as: gingivitis, periodontitis, calculi, tartar, so it is necessary to discover methods of prevention. The research was carried out on a number of 9 cats, divided into 3 groups of 3 cats. The first group represented the control group, the cats consuming both dry and wet food. Group 2 and group 3 consumed dietary food A and B respectively, from two different brands, for therapeutic purposes to reduce tooth plaque formation and to combat tartar. Diet A consists of cereals, meat and animal by-products, plant protein extracts, vegetable by-products, oils and fats, minerals, while Diet B contains rice, corn flour, dehydrated poultry meat, animal fats, wheat gluten, hydrolyzed animal protein, beet pulp, vegetable fiber, fish oil, mineral salts, yeasts, soybean oil, fructose-oligo-saccharides, green tea extract (polyphenol source), crustacean hydrolysate (glucosamine source), yolk extract (lutein source), cartilage hydrolysate (chondroitin source).

The experiment was performed during 40 days, during which a clinical examination of the oral cavity was performed on day 1 and day 40. This examination included an objective examination of the teeth and gum, checking the gingival duct with the help of a periodontal probe. In addition, for the paraclinical examination the sample was collected from the buccal cavity at the level of the gum, between the edge of the gum and the mucogingival junction, for microbiology.

After 40 days, the nutritional impact was monitored, verifying the level of reduction of tartar both visually and with the help of an index based on the use of a numerical scale and a standardized, accurate and repeatable evaluation method, collecting the sample with the periodontal and microbiological probe. In order to carry out the microbiological examination, the collection of the samples was performed in the evening, previously the cats having no access to food for 5 hours, in order for the sample to be relevant. For the same reason, cats have not been treated with antibiotics for the last 6 weeks.

The Pocket-out technique allows the extraction of biological material from the supragingival area (fixed gingiva, mobile mucosa) using a foam-head plastic pad. It is easily applied to the gum, between the edge of the gum and the mucogingival junction (Gorrel, 1998).

Results and discussions

Following the microbiological examination, in the control group, no major differences in the composition of the oral microbial flora, during the 40-day experiment, were observed after the two feeding administrations. In contrast, in the groups of cats in which the two experimental diets A and B were administered, a slight change of the bacterial flora was observed, which came after the second administration period. Following the study on the nutritional impact on the formation of calculus or tartar in the 9 cases of cats, the study resulted in the following: the low fiber content, having a small, fine granulation and the consumption of wet food, has led to the early evolution of

tartar; poor food in sodium polyphosphate resulted in mineralization of the deposits, forming a very adherent amorphous mass of different sizes; In 6 out of 9 cats, in addition to the tooth enamel disease, gingivitis was also observed as a result of the overpopulation of the bacterial flora in the gingival gum and in the mouth cavity, due to an alkaline pH, favoring their multiplication.

The observations regarding the nutritional impact on the treatment of calculus or tartar deposits in the 9 cases of cats that were studied are the following: the food belonging to group A, had a visible impact in reducing the tartar in the tooth enamel and reducing the gingivitis, visible in all the 3 patients in this group. Through the coarse structure of the pellets, it exerts an abrasive mechanism, helping to clean the teeth. This diet has been designed for tooth decay and tartar (calculus), bad breath, gingivitis, while diet B is recommended to maintain oral and dental hygiene after detection and prophylactic.

Diet A was the subject of a study conducted by Logan EI et al in 2002, in which 40 dogs were tracked in the study and compared the deposits of tartar when the animals were fed with dry food, from different brands and when fed with diet A, has been reported to reduce the accumulation of tartar by 45% in dogs in 30 days (Logan et al, 2002).

Another study done on diet A in the University of Kansas, Lawrence, KS, USA in 2008, done on 21 adult cats, over 3 weeks, shows us that a decrease of tartar is observed after the first 7 days, but the major difference was observed after 3 weeks after the gingivitis was reduced. The study was conducted in comparison with cats that consumed dry food.

Studies have also been conducted for diet B, showing 36% efficiency in reducing calculations, over 1 year and 4 months based on chemical effects, the interaction between the types of sodium polyphosphate and the content of microorganisms in saliva. The study was performed on 60 cats in 2008 (Servet et al, 2008).

Conclusions

It can be affirmed that the dietary food type A has a high efficacy in reducing tartar and gingival inflammation, preventing calculus and mineralization of bacterial biofilm.

It is important to mention that despite the composition rich in animal protein and natural additives, 5 out of 9 cats have a low appetite for dietary foods. This is due to the large and hard size of the pellets, being 3 times larger than a classic food for adult cats. Following the experiment it is observed that there are no major differences between the oral microflora cited in the literature and the microflora identified by us.

In the control group, after the period of the experiment, the oral microflora did not change, whereas in the groups that received the diet A and B, there was a reduction in the number of bacterial germs present, which contributes to reducing the inflammatory effect in the gums.

References

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