Assessment of the effects of allium sativum on the dental plaque

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Abstract

Aim and objectives: Over time, individuals have come to comprehend that in order to maintain good health, it is imperative to utilize natural substances as extensively as possible to avoid detrimental effects on the body. In light of this, researchers have undertaken certain investigations with the aim of substituting chemically-based mouthwash products with natural alternatives available in the market. These studies have led to the revelation that the extract derived from Allium sativum possesses the remarkable ability to eliminate plaque without causing irritation to the tissues or requiring the use of additional substances. Building upon these findings, our study sought to scrutinize the effects and inherent properties of Allium sativum within the oral cavity, particularly in the presence of dental plaque on the dental arches.

Material and methods: Bacterial plaque deposits became visible with the help of substances, erythrosine was used in the study, and the properties of Allium sativum were evaluated, the effect being clearly visible after about one minute. Quigley-Hein index was used in the evaluation of plaque deposits and a diagram was created to understand if it was actually a process of reducing bacteria.

Results: The results were good due to the fact that the Allium sativum extract allowed the removal of a large part of the plaque from the dental arches.

Conclusions: It was confirmed that this natural substance can be a good alternative to mouthwash with chlorhexidine, even if with less effective results.

Keywords: dental plaque, oral hygiene, dental caries, erythrosine

INTRODUCTION

The impact of mechanical oral hygiene techniques on the levels of microorganisms in saliva, particularly mutans streptococci, is of great interest to dentists who prioritize preventive care.

Regular and effective use of oral hygiene techniques, such, as toothbrushing and interdental cleaning have been proven to impact the levels of microorganisms in saliva, including mutans streptococci [1]. These techniques can help inhibit. Eliminate microorganisms reduce plaque bacteria and minimize gingival inflammation when practiced consistently and correctly [2]. A study investigating the effects of oral hygiene education and professional tooth cleaning discovered a decrease in the number of Streptococcus mutans in saliva after three months indicating that these measures have the potential to control species [3]. Similarly another study demonstrated that tongue scraping, tongue brushing and saturated saline rinsing all showed effectiveness in reducing streptococcal colony counts in saliva [4]. However despite improvements, in oral hygiene status salivary mutans streptococci levels tend to increase after treatment. Therefore it is crucial for individuals to follow procedures to reduce the risk of dental caries. Dentists prioritize care. Emphasize regular and effective mechanical oral hygiene techniques as essential for maintaining oral health and controlling microorganism levels in saliva.

Mechanical oral hygiene techniques (toothbrushing and interdental cleaning) have shown to have an impact on the number of microorganisms in saliva, that includes mutans streptococci [5]. These techniques, when used regularly and effectively, can help inhibit or kill oral microorganisms and reduce plaque bacteria and gingival inflammation [6]. In a study evaluating the effect of oral hygiene education and professional tooth cleaning, a significant reduction in salivary count of Streptococcus mutans was observed after 3 months, indicating the potential of these measures to control cariogenic species [7]. Another study found that tongue scraping, tongue brushing, and saturated saline rinsing all showed equal efficacy in reducing streptococcal colony counts in saliva [8-9]. For example after an orthodontic treatment the number of mutans streptococci in the saliva increases, and it is important to reduce the risk of caries so that oral hygiene status can be improved [10]. Therefore, dentists prioritize preventive care and emphasize the importance of regular and effective mechanical oral hygiene techniques to maintain oral health and control microorganism levels in saliva.

The act of brushing teeth with toothpaste containing fluoride is widely regarded as a pivotal measure in preventing tooth decay [11-12]. Tooth brushing with fluoridated toothpaste is considered to be the “milestone” of caries prevention [13-14]. However, tooth brushing alone is effective in reducing bacterial counts in the mouth, but not enough and to overcome this issue, it was decided to incorporate antimicrobial or other chemotherapeutic agents in dental practice [15].

Mouth rinsing as a formal practice was first used in China, in 2700 bc, for the treatment of disease of the gums and is the most cost-effective method of preventing dental caries [16]. Mouth rinsing for the prevention of dental caries in children and teenagers was established as a mass prophylactic method in the 1960s and has shown an average efficacy of caries reduction between 20 and 50% [17].

Chlorhexidine has been studied extensively for over 20 years, and is the gold standard for chemotherapeutic agent against mutans streptococci and dental caries [18].

To prove that even natural products can achieve positive results on bacterial plaque removal, we looked for some variants of chlorhexidine [19]. We discovered the Allium sativum extract, which has many characteristics against the accumulation of the plaque, but

its capacity was analyzed step by step [20]. Demonstrating the effect of an ordinary product used in the kitchen, completely natural and cheap was a surprise for us all [21].

Aim and objectives

In order to demonstrate that even natural products can yield positive outcomes in the removal of bacterial plaque, we explored various iterations of chlorhexidine. This led us to discover the extract of Allium sativum, which possesses numerous attributes that combat plaque accumulation. However, we meticulously analyzed its efficacy step by step. The revelation that an ordinary, completely natural, and inexpensive kitchen product could produce such an effect was a pleasant surprise for all involved.

MATERIAL AND METHODS

The research was conducted at the Aurel Vlaicu Polyclinic and comprised a total of 13 participants who were students specializing in dental medicine. These individuals fell within the age range of 20 to 25 years. Each participant was duly informed about the procedures involved in the study and provided their consent by signing a written agreement that contained all the necessary information.

Every student received a single clove of Allium sativum, commonly known as garlic, as well as a plaque indicator.

Upon performing chemical analysis on Allium sativum, it was discovered that this plant contains sulfur-containing compounds, such as Alicin. Alicin exhibits properties of being an antioxidant and has the capability to attach sulfur (SH) groups to enzymes and proteins, thereby altering their activities. This, in turn, leads to the inhibition of sulfur enzymes. Furthermore, Alicin has the unique ability to rapidly penetrate cell membranes and enter cells.

The plaque indicator is a valuable and effective tool used in both professional and domestic oral hygiene. Its purpose is to assess the presence, quantity, and location of plaque buildup, even in the smallest amounts, and facilitate its removal. These indicators are composed of non-toxic chemicals that have the capacity to bind to the organic components of bacterial plaque. In our study, we utilized erythrosine as the plaque indicator.

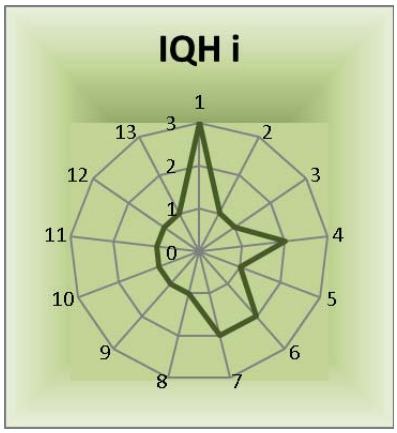

Figure 1. Quigley-Hein plaque index initially

The method of using the plaque indicator is as follows: it is imperative not to clean the teeth in order to promote plaque accumulation. After consuming a source of carbohydrates to facilitate the accumulation of plaque, an erythrosine tablet was employed to reveal the

presence of dental plaque. The tablet was held in the oral cavity for a duration of one minute. Due to its effect, the tablet uniformly stained all deposits of dental plaque in a vivid red hue.

Each participant in the study was thoroughly examined, and the data obtained from these examinations were meticulously documented in the patient records and captured through photographs of the oral cavity (fig.1).

The assessment of plaque quantity was conducted by means of the Quigley-Hein plaque index, which is utilized to evaluate the extent of plaque coverage on the dental crown, disregarding its thickness.

Figure 2. IQH before and after

Consequently, the surface area occupied by the plaque was assessed and assigned scores ranging from 0 to 5 as follows: absence of plaque was assigned a score of 0; a fragmented strip of plaque at the gingival margin was assigned a score of 1; the presence of a continuous strip (up to 1mm) of plaque at the gingival margin was assigned a score of 2; the existence of a plaque strip exceeding 1mm in size, covering less than one third of the gingival area of the dental surface, was assigned a score of 3; plaque coverage surpassing one third but less than two thirds of the dental surface was assigned a score of 4; a score of 5 represents plaque coverage exceeding two thirds or more of the dental surface.

In order to facilitate the centralization of data, the initial assessment of the Quigley-Hein plaque index involved the scoring of IQH i and IHQ f. Following the maintenance and mastication of Allium sativum in the oral cavity, the evaluation of the Quigley-Hein plaque index was conducted (fig.2).

RESULTS

The data was inputted into an Excel spreadsheet to facilitate the creation of charts and subsequently transferred to statistical software for analysis.

Upon conducting the initial consultation, it was discovered that the majority of participants, specifically nine in number, exhibited a Quigley-Hein plaque index of 1. This index signifies the presence of a non-continuous band of plaque located at the gingival margin.

Solely one patient displayed an IQH of 3, denoting the presence of a plaque band greater than 1mm in size, which covered less than one third of the gingival surface of the

coronary surface. In total, four participants showcased a continuous and narrow strip of plaque situated along the gingival margin, measuring up to 1mm (fig.3).

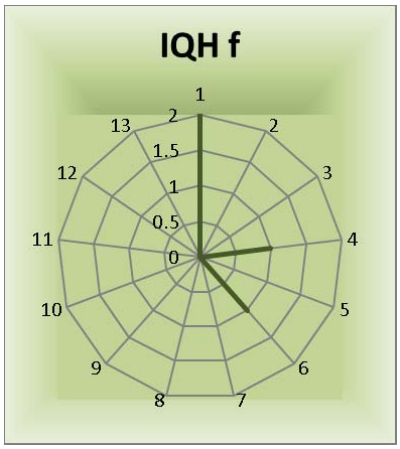

Figure 3. Final IQH

Following the comprehensive assessment of the Quigley-Hein plaque index in each participant, we transitioned to utilizing Allium sativum in order to observe its impact on periodontal tooth structures. Each participant was instructed to chew a clove of Allium sativum for a duration of 3 minutes.

The eradication of the plaque's coloration was progressively intensified. The participants were once again consulted and the collected data were reported with accompanying photographs. Following the recording of each participant's data, the obtained results were meticulously analysed, leading to the formulation of several personal and general conclusions.

Hence, it can be deduced from the graph above, that a total of ten individuals possessed a Quigley-Hein plaque index of zero, while only one patient exhibited an IQH 1 with a sporadic band of plaque at the gingival boundary.

DISCUSSIONS

The acquired results were subsequently juxtaposed with the initial findings and have been visually represented in the diagram below.

Figure 4. Comparison of the initial and final IQH

In assessing the impact of Allium sativum on bacterial plaque, it was observed that the values experienced an average reduction of one point on the Quigley-Hein scale. This serves to underscore the beneficial effects of Allium sativum on oral well-being.

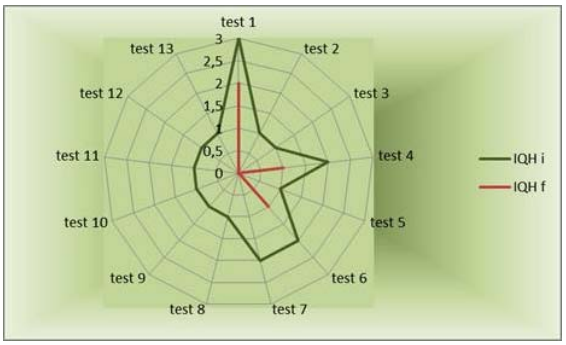

Figure 5. IQH before and after

CONCLUSIONS

The research findings indicate that Allium sativum effectively reduces the buildup of dental plaque, as evidenced by an average decrease of one degree on the Quigley-Hein scale. The visual documentation obtained from each individual instance further substantiates this outcome. The obtained results unequivocally validate the advantageous properties of Allium sativum as a holistic approach to uphold optimal oral hygiene.

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