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Clinical efficacy analysis of the mouth rinsing with pomegranate and chamomile plant extracts in the gingival bleeding reduction

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A B S T R A C T

Medicinal plants represent important therapeutic resources to health restoration, including the use of herbal products in the mouth conditions treatment. A randomized controlled clinical trial was performed in order to evaluate the effectiveness of mouth rinse with pomegranate and chamomile plant extracts, against chlorhexidine 0.12% in the gingiva bleeding condition. The mouth rinses with the herbal products were effective for this case, showing thus, antimicrobial and anti-inflammatory properties similar to that of chlorhexidine 0.12%.

1. Introduction

Gingivitis, an inflammatory condition limited to the protection periodontal tissue (marginal and attached gingiva), which is characterized by redness, swelling and bleeding gingiva, and periodontitis, which also involves supporting periodontal tissues (cementum, periodontal ligament and alveolar bone) especially characterized by the presence of periodontal pockets and alveolar bone resorption, have as the primary etiologic agent dental biofilm accumulation, resulting from poor oral hygiene [1,2].

Biofilm is the determining factor for caries and periodontal disease [3], representing a dense, non-calcified mass, composed of micro-organisms, being *Streptococcus mitis* and *Streptococcus sanguis* the pioneers. They are involved in a matrix rich in bacterial extracellular polysaccharides and salivary glycoproteins, firmly attached to the teeth, stones and other hard surfaces of the oral cavity [4]. However, the pathogenesis of periodontal disease is determined not only by the accumulation of dental biofilm, but also by the ratio of their pathogenic potential and quality of immune response of the host organism [5], and other factors such as the morphology of the gingival tissue, the presence of different malocclusion types and factors related to tooth eruption [4].

Until the early '70s, therapies based on the non-specific plaque hypothesis focused on reducing the amount of dental biofilm. Subsequently, the specific plaque hypothesis established the role of some microorganisms such as *Porphyromonas gingivalis* (Pg), *Prevotella intermedia* (Pi), *Bacteroides forsythus* (Bf), *Agreggatibacter actinomycetemcomitans* (Aa), *Treponema denticola* (Td) and *Fusubacterium nucleatum* (Fn) in different forms of periodontal disease. Recently it was suggested that these periodontal pathogens do not act alone and interactions between species, as the balance between beneficial and pathogenic bacteria, affect disease progression and tissue response to periodontal therapy. Nowadays it is well established that one of the goals of periodontal therapy is controlling these pathogens [6]. Therefore, it is appropriate the use of dental biofilm control measures, being its removal an important factor for the periodontal disease prevention and control.

Brushing, a usual method of biofilm mechanical removal, although practical sometimes becomes difficult, not allowing a reasonable control since it requires time, motivation and manual dexterity [4]. Thus, many patients have to call upon professional practice to remove biofilm and of supra and under-gingival stones. Thus, the procedures for scraping and root planing (SRP) may contain the progression of periodontal disease, providing improvement of their clinical parameters such as reduction in probing depth and clinical attachment gain [7]. However, in some cases, the SRP does not seem to be able to maintain periodontal health, which can be explained by microorganisms' recolonization.

Because of possible after-SRP recolonization of microorganisms, it was proposed the non-surgical periodontal therapy, which consists in mouth cleaning and disinfection in a single stage, with the root surface debridement concept, reducing the microbial load of

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the oral cavity in order to minimize the risk of reinfection of the treated areas [8]. This treatment should promote the elimination and control of periodontal disease risk factors, such step is usually performed with scraping and root planing per quadrant (SRP) or sextant, with a one to two weeks break between sessions. However, the possibility of reinfection of treated sites by periodontal pathogens at sites not yet addressed, and even by pathogens present in other intra-oral niches like tongue, saliva, oral mucosa and tonsils have been the subject of much discussion and, on this basis, a new protocol was proposed, aiming at full mouth disinfection by scrapíng and root planing in a short period of time [9].

Due to the limitations of mechanical oral hygiene methods, chemical control of dental biofilm acts as a supporting, through the use of antimicrobial agents in mouthwash, reducing the number of pathogenic microorganisms in the oral cavity and aiding in the periodontal diseases prevention and treatment. However, in no case shall such antimicrobial agents replace the mechanical methods of oral hygiene [4].

In order to obtain an antiplaque action, the antimicrobial mouthwash agent should: reduce the bacterial adhesion to the tooth surface, inhibit the growth and proliferation of microorganisms, inhibit the formation of the biofilm intercellular matrix, modify the bacterial biochemistry to reduce the cytotoxic products formation and modify the biofilm ecology to develop a less pathogenic microbiota [4].

Chlorhexidine is well characterized as an excellent antimicrobial agent used in the gingivitis treatment and prevention, and is also used as a reference in efficacy testing studies [10] and considered the most effective chemical agent [11]. Although used in different formulas, in Brazil it is found in 0.12% and 0.20% concentrations [4]. However, it presents local adverse effects when used for prolonged periods [12], including: the teeth and restorations staining, the tongue staining, the oral scaling and sensitivity, and allergic reactions. The bitter taste and interference in the gustatory sense the solution caused some hours, after rinsing, have also been reported [13].

Given the adverse effects of chlorhexidine, one can see the need to develop a substance with potent antimicrobial activity, capable of interfering in the biofilm development and minimize side effects. In this context, there are natural agents that are effective and economically viable alternatives [12], have wide popular acceptance, being used to fight diseases at low cost [14] and contribute to improving people's access to prevention and treatment of periodontal disease [4]. Lastly, the "Health for All" WHO strategy in the year of 2000, finally recognized the need to incorporate in the public health the principles, the resources and the techniques of Natural Medicine, because beyond easing the sickness of millions of people, it is a therapeutic alternative at virtually no cost [15].

So, medicinal plants represent important therapeutic resources for health restoration, including the use of herbal medicines for oral diseases treatment [4]. Among the natural substances used in dentistry, are noteworthy the *Caesalpinia ferrea* ("Jucá"), the Peruvian mastic, ginger, basil, propolis, pomegranate and Cuban oregano (*Plectranthus amboinicus*) that due to its therapeutic properties, have widespread use in folk medicine [12].

The advantages of herbal medicine to justify its use are: the synergistic effect, due to its various phytochemicals that work best in combination, the compounds interaction mechanisms that act on different target molecules, providing diverse actions throughout the body, the low risks of side effects due to low concentrations in which the active ingredients are present in the plants, and also the dose-time correlation and lower research costs, when comparing to the development of a new drug [16].

Punica granatum Linn. species, known as pomegranate, is a shrub of the Lythraceae family, and its parts have different medicinal importance, with different active ingredients and therapeutic indications [17]. For this reason, it is considered a great potential plant for preventing and fighting various diseases, with antioxidant, hypoglycemic, cholesterol reducer, antiviral, antiparasitic, antifungal and antidiarrhoeal properties, plus cancer preventive, cell differentiation promoter, estrogen enhancer and even antimicrobial (against *Staphylococcus aureus* and *Salmonella typhi*), anti-inflammatory, healing and antiseptic for the large quantity of tannin in the fruit skin [12,14,17,18]. However, due to the presence of alkaloids in its composition, some precautions regarding poisoning should be considered since its use may produce nausea, dizziness and vision problems, and is contraindicated in pregnancy, lactation, children under 5 years, gastritis cases and gastroduodenal ulcer [19].

Matricaria recutita Linn. (Chamomile) is a Europe and western Asia native plant and commonly used by northeastern Brazilian people. Belonging to the Asteraceae family and as a member of the daisy family, chamomile receives names such as: wild chamomile, Hungarian chamomile, pineapple weed (referring to the shape of the inflorescences), and scented mayweed. Chamomile is used forever in popular culture and, therefore, represents one of the few medicinal plants whose chemical constituents have been extensively evaluated pharmacologically, including in clinical trials [20].

Chamomile is known to have a variety of active flavonoids, as well as its volatile oil, which is rich in terpenoids, such as alpha-bisabolol, azulene, matricine and chamazulene. These components provide the anti-inflammatory, antispasmodic and antibacterial activity of the Chamomile [20].

Multiple therapeutic modalities have been tested and used over time, with the purpose of fighting, inhibiting or reducing pathogenic oral microbiota and, therefore, bleeding gingiva, with no real effectiveness to justify an indication to the general population [11]. Therefore, the purpose of this study is to clinically evaluate the effects of herbal mouthwash with extracts of chamomile and pomegranate in reducing the gingival bleeding in periodontal disease, comparing them with one another as well as with the chlorhexidine solution 0.12%.

2. Method

A comparative clinical study was performed, a randomized controlled trial, double blind, interventional, experimental, longitudinal and prospective, with an inductive approach, all data being recorded in specific forms.

The universe of this study involves patients usually treated at the Department of Clinical Dentistry at the Paraíba State University of Brazil. The sample is composed by individuals of both sexes, aged over 18 years old, during October 2010 to June 2011 that after clinical examination were diagnosed as having periodontal disease (gingivitis or chronic periodontitis), met the other criteria for inclusion in the study (absence of periodontal treatment and antibiotics in the last three months) and were in accordance with the participation in it. We excluded patients with healthy periodontium, users of braces and patients with diseases or systemic conditions with periodontal repercussions requiring antibiotic prophylaxis for the periodontal therapy completion as well as patients with diabetes mellitus, immunocompromised individuals, pregnant women, nursing mothers and drug users with periodontal repercussions.

Following the precepts of the CNS/MS 196/96 resolution which regulates the research ethics involving human subjects in Brazil, a total of 55 Brazilian adults with gingivitis [31] and chronic periodontitis [24] participated voluntarily in the study, in compliance with the protocol (CAAE: 0076.0.133.000-10) approved by the Paraíba State University Ethics Committee.