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ORIGINAL ARTICLE

Efficacy of *Acacia arabica* gum as an adjunct to scaling and root planing in the treatment of chronic periodontitis: A randomized controlled clinical trial

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KEYWORDS

Acacia gum;
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Periodontal pocket;
Scaling and root planing;
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Abstract *Aim:* The aim of the present study was to explore the adjunctive use of Acacia arabica gel in the treatment of chronic periodontitis.

Methods: Single centre, randomised, triple blind, controlled trial on mild to moderate chronic periodontitis patients; Group I (SRP + Acacia arabica, n = 40) and Group II (SRP + placebo, n = 40); were analysed for clinical improvements in periodontal pocket depth (PPD) and clinical attachment levels (CAL) at baseline, 15 and 90 days on application of gels. Gingival index and plaque index were assessed as secondary parameters.

Results: Statistically significant PPD reduction ($p < .05$) and CAL gain ($p < .05$) was observed with use of Acacia arabica gel. The reduction in sites with moderate PPD was observed more among Group I than Group II and the difference was statistically significant ($p = .001$). Secondary outcome variables; Plaque Index and Gingival Index showed better resolution with Acacia arabica gel.

Conclusion: Acacia arabica leads to better clinical outcomes in patients with mild to moderate chronic periodontitis with effective antiplaque and anti-gingivitis action. It may be recommended adjunct to SRP for maintenance in patients with mild to moderate chronic periodontitis.

1. Introduction

Chronic periodontitis is an inflammatory disease of the periodontium which is multifactorial. Bacterial plaque is the major etiological factor. Bacteria and their endotoxins play a significant role in periodontal breakdown (Cobb, 1996).

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Thorough subgingival debridement is the cornerstone of non-surgical periodontal therapy in controlling subgingival microflora. Its effectiveness decreases as the probing pocket depth (PPD) increases, especially as PPD exceeds 5 mm (Cobb, 1996). Supragingival plaque play a contributory role in increasing subgingival bacterial populations (Mousques et al., 1980; Braatz et al., 1985; Sbordone et al., 1990; Pedrazzoli et al., 1992). Effective supragingival plaque control is important in controlling the quantity, composition and rate of subgingival plaque formation and maturation (Dahlen et al., 1992; Hellstrom et al., 1996). It is difficult to achieve long term control over inflammatory periodontal diseases (Lindhe and Nyman, 1984; Knowles et al., 1979; Axelsson and Lindhe, 1981).

Various adjunctive therapies such as chemotherapeutic agents, local bisphosphonates (Akram et al., 2016), statins (Pradeep and Thorat, 2010), lasers and photodynamic therapy (Akram et al., 2016 Apr 1; Abduljabbar et al., 2017) have been employed along with mechanical plaque control regimen (Mandel, 1988). These therapies have shown variable but promising results.

Natural herbal products have been tested for their antiplaque and antibacterial activity in periodontal diseases. *Acacia arabica* (AA), commonly used in India as chewing stick ('Babul' or 'Kikar' datun) is one of such plant. The gum of AA has been used by many communities in daily oral hygiene regimen (Tyler et al., 1977). The composition consists of arabica which is a complex mixture of calcium, magnesium and potassium salts of arabic acid. Other constituents are tannins, cyanogenic glycosides, oxidases, peroxidases and pectinases with documented individual antimicrobial properties (Kirtikar and Basu, 1984). *In vitro* study provides evidence for the antibacterial and antiprotease activities of AA (Clark et al., 1993).

The gold standard adjunct to scaling and root planing (SRP) is chlorhexidine (CHX) (Addy, 1986). Clinical trials comparing AA gum with chlorhexidine have proved its equivalence in plaque inhibition, microbial count reduction and gingivitis resolution without associated adverse effects of CHX (Pradeep et al., 2010; Pradeep et al., 2012). Therefore long term use of AA can be recommended.

The lacuna in evidence which remains is whether AA gum through inhibition of supragingival plaque would be effective against control of chronic periodontitis. The other hypothetical question is whether certain sites inaccessible to SRP and mechanical plaque control may show better resolution through an adjunctive local application of AA. Clinical trial on the effect of AA on chronic periodontitis is a novel study to the best of our knowledge.

This study was conducted with the objective to analyse the adjunctive effect of AA on clinical parameters in mild to moderate chronic periodontitis patients.

2. Methods

2.1. Study design

Pilot, triple-blind, placebo-controlled randomised clinical trial.

Study is approved by Institutional ethics committee of King George's Medical University's (KGMU). The present study is in accordance to the Declaration of Helsinki as revised in 2013.

The trial was registered with the Primary Registries in the *WHO Registry Network (CTRI/2013/09/004013)*. Changes in the trial design after ethical approval and trial registration was limited to additional blinding of the statistician.

Participants meeting the eligibility criteria were selected and randomised from the patients coming to the outpatient department of Periodontology, KGMU.

Eighty subjects of both genders aged 18–70 years were recruited in the period from 22nd February 2012 to July 2014. Clinical data collection was completed by November 2014.

2.2. Eligibility criteria

Inclusion: (i) subjects of both gender aged between 18 and 70 years, (ii) in good systemic health condition (iii) with mild to moderate chronic Periodontitis (dentition with at least 30% sites exhibiting attachment loss with pocket depth range of 4–6 mm), having minimum of five natural teeth in each quadrant. Exclusion: (i) Subject with history of tobacco chewing/smoking, any known clinically significant hematological, endocrine, hepatic, renal, cardiovascular, cerebrovascular or psychiatric disease, (ii) on prohibited medication interfering with the efficacy and safety objectives of the trial, (iii) participant in any clinical study in past 6 months.

Subjects were informed regarding the study's purpose, duration, implications, potential risks and benefits. Willing participants were asked to sign a written informed consent form.

2.3. Sample size calculation

Power analysis for sample calculation was done prior to subject's enrolment for the trial. Assuming a 1 mm difference in Clinical attachment level (CAL) and using 0.8 mm as standard deviation power analysis revealed that 28 patients (total 56 patients in both groups) were required in each group for a *t*-test power level of 85% with significance level of 0.95 (Christodoulides et al., 2008). Recruitment of additional patients accounting noncompliance and follow up dropouts were done.

2.4. Clinical periodontal assessment

Baseline examination consisted of recording Periodontal probing depth (PPD) and CAL (at four sites per tooth: mesial, buccal, distal and lingual); Plaque Index (Loe, 1967); dichotomous recording of bleeding on probing (BOP) (Akram et al., 2017) and Gingival index (GI) (Loe, 1967). Positive reading meant bleeding occurrence within 15 s of pocket probing.

PPD was defined as the distance between the gingival margin (GM) and the bottom of the probeable pocket, to the nearest whole millimetre. CAL was calculated as the distance between the cemento enamel junction (CEJ) and the bottom of the probeable pocket, to the nearest whole millimetre.

All measurements were done using the manual periodontal probe with William's marking (*University of Michigan 'O' probe, Hu Friedy, Chicago, IL, USA*) and the pressure sensitive probe (*FP32, Florida probe Corporation, Gainesville, FL, USA*).

Clinical periodontal parameters were assessed at baseline, 15 days and 90 days after SRP.

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