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A Randomized Clinical Trial to Evaluate the Efficacy of Arimedadi Oil Pulling in Plaque Induced Gingivitis and its Effect on Metabolic Marker in GCF

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Arimedadi Oil Pulling, Gingivitis

ABSTRACT:

Introduction: An age-old method of maintaining dental health was oil pulling. It is connected to Ayurvedic medicine, and the majority of the substances utilised in oil pulling are Ayurvedic medications. Arimedadi oil, an Ayurvedic oil with therapeutic qualities, has been utilised to preserve dental hygiene. The effectiveness of Arimedadi oil in treating gingivitis caused by plaque was assessed in the current investigation.

Methodology: In this randomised clinical trial, 29 participants with a diagnosis of gingivitis were included. In addition to scaling and root planing (SRP), group A received oil-pulling therapy in the form of Arimedadi oil; group B received SRP combined with a mouthwash containing chlorhexidine; and group C received SRP combined with distilled water flavoured with mint as a placebo. Every group received instructions to use the prescribed chemical agents for a duration of 1 month. Gingival Index, Plaque Index, and Modified Sulcular Bleeding Index were measured. Prostaglandin E2 (PGE2) levels in gingival crevicular fluid (GCF) were also assessed.

Results: In every one of the categories, there was a substantial decrease in clinical parameters from the baseline to the 1-month follow-up ($P < 0.05$). In contrast to groups A and C, group B's mean difference in clinical parameters was greater in the post-1-month follow-up data. Group B's PGE2 levels in GCF were noticeably lower than those of groups A and C.

Conclusion: Arimedadi oil pulling is a useful substitute for treating gingivitis brought on by plaque. It can be applied in addition to SRP.

Introduction

Chemical compounds are utilised in addition to mechanical therapy to maintain dental hygiene. Chemicals like biguanides and essential oils may be able to slow the development and maturation of plaque. On the other hand, prolonged use is linked to adverse effects include tooth discolouration, impaired salivary flow, and heightened calculus development.[1] Over-the-counter medications are prohibited due to a recent association between mouthwash use and a higher risk of diabetes. This offers us the opportunity to develop a more potent chemical agent that successfully decreases plaque while posing fewer side effects. The term "gingivitis" describes an inflammation of the gingiva that can be either acute or chronic.[3] There are systemic and local causes of chronic gingivitis. In the context of local variables, biofilm is linked to the start of infection and inflammation.[4] Gingival redness, an increase in gingival crevicular fluid (GCF) flow, and bleeding upon probing are early indicators of gingivitis. If the illness is not stopped now, it may move to more severe stages and harm periodontal tissue permanently. Consequently,

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sustaining periodontal health depends greatly on early diagnosis and treatment. guidelines for oral hygiene and mechanical therapy, such as scaling and root planing (SRP), are advisable.[5] While there is no set process for treating gingivitis, chemical therapy can be started as an adjuvant to promote recovery.[6] Listerine, cetylpyridinium mouthwashes, and chlorhexidine (CHX) are common chemical agents used in the treatment of gingivitis. However, because these medications have less adverse effects and good efficacy, there has been a recent shift towards the use of herbal medicines such Punica, Morinda citrifolia L., aloe vera, and curcumin.[7,8]

Ayurvedic arimedadi oil, also known as taila, has been used to treat systemic illnesses like diabetes, rheumatoid arthritis, hypertension, and heart conditions.[9] There are several components in this oil, and each one plays a vital role in lowering infection and inflammation. Yashti, Manjistha, Bilva patra, Tejani, Shweta chandana, Rakta chandana, Mrinala, Kumkuma, Vyaghri, Mishi, gayatri, Brihati, Vaidehi, Pushkara, Manjistha, Mamsi, Dhataki, Suradruma, Rakta Chandana, Takkola, Samanga, Palasha, Lodhra, Sarala, Pradhakaleya, Agaru, Madana, Katphala, Priyangu, Jati, Kshirivrikshatwak, Sprikka, Irimeda twak, Musta, Karpoora, Gairika, Padmakesara, Laksha, Shaileya, Rajani, Daruharidra, Jaya, and Tila taila are a few of its constituents.[9]

Arimedadi oil has important therapeutic uses. It is employed in dental care to manage periodontal, gingival, and dental cavities as well as glossitis, stomatitis, ulcers, and other conditions.10 The present study focused on evaluating the effectiveness of Arimedadi oil pulling in plaque-induced gingivitis and its effect on metabolic marker (PGE2) in GCF. However, its use as an oil-pulling agent and its efficacy in reducing plaque-induced gingivitis, along with the measurement of prostaglandin E2 (PGE2) levels in GCF, need assessment. The present research's justification stems from a review of the available literature, which revealed a dearth of research and data supporting the use of Arimedadi oil as a gingivitis therapy adjuvant.

Methodology

This was a single-center, three-blinded, randomised controlled experiment that ran from July 2023 to September 2023 at Sharda University's School of Dental Sciences, Department of Periodontology. Written informed consent was acquired before to the start of the research. In compliance with the Helsinki Declaration, ethical approval was acquired. According to the Gingival Index (GI) values of 1.1–3.0, subjects between the ages of 18 and 45 were diagnosed with mild to severe plaque-induced gingivitis. This study covered subjects who had at least 20 teeth present and had positive bleeding upon probing. Subjects who had received periodontal therapy within the previous six months, smokers, expectant or nursing mothers, and patients with any systemic disorders were among those who met the exclusion criteria.

A total of 36 subjects were allocated to each group in this study. However, at the 30-day follow-up, seven subjects dropped the study from each group so 29 subjects in each group participated and completed the study. The study participants were randomly allocated to three groups:

(1) Group A received Arimedadi oil as oil-pulling therapy (Indian Medicines Pharmaceutical Corporation Ltd).

(2) Group B received CHX mouthwash–0.2% CHX digluconate (Hexidine mouthwash, ICPA Health Products).

(3) Group C received mint-flavored distilled water as placebo (preparation 300 mL distilled water + four drops of mint-flavoring agent).

All the groups received SRP within 48 hours of initial clinical examination.

Rinsing Instructions

Groups B and C:

Quantity: 10 mL of a mouthrinse

Frequency: twice daily

Duration: 1 minute

Other specification: brushing/food intake—30 minutes post rinsing

Group A—oil-pulling instructions

Quantity: 10 mL of Arimedadi taila

Direction of use: sipped, sucked, and swished between the teeth

Frequency: twice daily

Duration: 10 to 15 minutes

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Other specification: avoid swallowing, water intake post oil pulling.

All the study subjects were advised to report immediately if they felt any discomfort in using the taila during the study.

Randomization and Blinding

Utilising the Prism 4.0 software program, web-based randomisation was used to assign these patients at random. Every mouthwash had a code on the label, and identical sheets were used to cover them. Personnel from the study who did not participate in therapy or clinical parameter measurement administered the medication.

Each category had thirty individuals at first, but we also took into account a 20% attrition rate with 80% power and 5% alpha. A final determination of the study's size was made, with 36 subjects in each group. We determined this sample size by comparing it to a prior study that was comparable.[14]

The Modified Sulcular Bleeding Index, the GI (by Silness and Loe), the Plaque Index (PI by Silness and Loe), and other clinical indicators were evaluated.15A single operator (AM) used the UNC 15 probe (Hu-Friedy Co., Chicago, IL, USA) to conduct each examination. Patients were instructed to follow a regular diet and use fluoride-containing toothpaste with a soft-bristle toothbrush as part of the preassessment process. At the baseline, two-, and four-week points, the clinical measures were documented follow-up visits**.**

In order to prevent cross-contamination, GCF collection was carried out using GCF Microcapillary pipettes (1–5 μL). It was collected before to the start of the clinical examination. Samples tainted with saliva or blood were thrown away. After being gathered, the samples were put in sterile tubes and kept in the Department of Microbiology at a temperature of -70°C until they were examined subsequently. Utilising a human PGE2 kit (R&D System, USA), an enzyme-linked immunosorbent test was used to determine the concentration of GCF PGE2 level. The measurements were acquired by the use of a Model 680 microplate reader. The optical density of the plate reader was 590 nm. 13.4 pg/mL was the lowest dose that could be found.

Statistical Analysis

Intragroup comparison of clinical parameters were done using repeated measure analysis of variance (ANOVA) at baseline, 2- and 4-week interval. For intergroup comparison, one-way ANOVA was performed. The PGE2 levels in GCF was analyzed using Student *t* test. Level of significance was set at 5%.

Results

A total of 87 subjects participated in this randomized clinical trial. There were 45 males (51.72%) and 42 females (48.2%). The mean age group was 27.66 ± 6.76 years (18–45 years).

Table 1 - Demographic Parameters of Different Groups in the Study.

Group	Total No. of Subjects	No. of Females	No. of Males	Age (Years) Mean ± Standard Deviation
Group A	29	12	17	25.92 ± 6.09
Group B	29	14	15	30.67 ± 6.02
Group C	29	16	13	28.38 ± 6.17
Total	87	42	45	27.66 ± 6.76

Table 2 - Periodontal Parameters among the Study Groups

Clinical Parameters	Group 1 Mean ± SD	Group 2 Mean ± SD	Group 3 Mean ± SD	*P* Value
PI				
Baseline	1.91 ± 0.36	2.32 ± 0.23	1.99 ± 0.16	NS
Second week	1.85 ± 0.45	0.83 ± 0.21	1.98 ± 0.12	>0.05
Fourth week	1.79 ± 0.65	0.22 ± 0.12	1.88 ± 0.18	<0.05

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P value*	0.012	0.023	0.22	
GI				
Baseline	4.15 ± 0.22	4.87 ± 0.12	4.23 ± 0.13	NS
Second week	3.15 ± 0.13	2.17 ± 0.53	3.17 ± 0.43	>0.05
Fourth week	3.09 ± 0.27	1.04 ± 0.17	7.21 ± 0.19	<0.05
P value*	0.045	0.032	0.01	
BOP %				
Baseline	2.53 ± 0.65	2.84 ± 0.44	2.14 ± 0.43	NS
Second week	0.73 ± 0.57	0.58 ± 0.73	2.13 ± 0.64	>0.05
Fourth week	0.43 ± 0.38	0.47 ± 0.86	4.4 ± 0.14	<0.05
P value*	0.014	0.037	0.032	

Statistically significant at $P < 0.05$. BoP = bleeding on probing, GI =gingival index, SD = standard deviation, NS = nonsignificant, *P* = probability value, PI = plaque index. *Repeated measure analysis of variance (ANOVA) analysis for intragroup comparison.

Table 3 - Gingival Crevicular Fluid-Prostaglandin E2 Levels among the Study Groups

Variable	Group 1	Group 2	Group 3	*P* Value
GCF-PGE2 (pg/mL)				
Baseline	194.92 ± 0.27	201 ± 0.77	191.43 ± 0.23	>0.05
2 Week	182.67 ± 0.17	147 ± 0.65	197.3 ± 0.67	>0.05
4 Week	173.28 ± 0.14	103 ± 0.78	222.8 ± 0.54	<0.05
P value*	0.049	0.003	0.035	

Statistically significant at $P < 0.05$. Analysis of variance (ANOVA) for intergroup comparison. GCF = gingival crevicular fluid, *P* = probability value, PGE_2 = prostaglandin E2. *t test for intragroup comparison.

Intergroup comparison from baseline to the fourth week demonstrated that group B had the highest reduction in crevicular PGE2 levels percentage (48.68%), followed by group A (11.10%). However, group C had an increase in the GCF PGE2 levels (8.98%).

Discussion

Since ancient times, oil pulling has been utilised as an accessible and affordable dental health treatment method. Nevertheless, there is still debate regarding the efficacy of oil-pulling treatments in the management of gingivitis.[18] The current investigation sought to determine the effectiveness of arimedadi oil in treating gingivitis caused by plaque and how it affected GCF PGE2 levels. The trial lasted four weeks, including baseline, second, and fourth week intervals for measuring clinical parameters and GCF biomarkers. Between the baseline and the fourth week interval, we observed that, with the exception of PI, the GI and GCF PGE2 scores declined in the CHX and Arimedadi oil-pulling agent group. GI and GCF PGE2 levels increased in the placebo group between the baseline and the fourth week interval. The results were statistically significant. This indicated that Arimedadi oil has an effect in reducing gingival inflammation, although it is inferior to CHX. Arimedadi oil's antibacterial properties may be linked to its possible advantages. In addition to strengthening the cleansing system, the saponification process inhibits the growth and spread of bacteria.[19] Future molecular research is required to determine the precise mechanism of bacterial suppression by arimedadi oil, even though tangible proof of the exact mechanism of action is still unclear. According to a research by Mali et al.12, when used as a supplement to mechanical plaque control, Arimedadi (herbal) oil is just as efficient as 0.2% CHX gluconate mouthwash in terms of antiplaque activity. The outcomes of this research are consistent

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with our investigation. There are extremely few randomised clinical trials that use Arimedadi oil as an oil-pulling agent. Therefore, our study objective aimed to evaluate the efficacy of Arimedadi oil as an oil-pulling agent in gingivitis. Gingival tissue assessment was performed using clinical indices. Crevicular PGE2 levels were also measured. CHX was used as the positive functional control. Although CHX has some disadvantages such as tooth staining, altered taste sensation, and allergic reactions, it showed better performance in all clinical parameters measured.[18,19] Arimedadi oil has medicinal values, and its vast range of uses include prevention of decay, oral malodor, bleeding gums, dryness of the throat, and cracked lips.[9] It is a cost-effective alternative to CHX with minimal side effects. There is no literature comparing the effects of Arimedadi taila as an oil-pulling agent with CHX mouth rinsing with respect to metabolic indicators like PGE2 in GCF. As such, a direct comparison with other studies concerning this parameter was not feasible. In their investigation, Patil et al.[19] examined the use of Irimedadi oil as a supplement to treat plaque-induced gingivitis. They discovered that, as compared to the study group that received only nonsurgical periodontal therapy, Irimedadi oil was successful in lowering the gingival bleeding index and GI. There was a strong statistical significance to the findings. In our current investigation, we also discovered comparable outcomes, emphasising Arimedadi oil's potential as a supplement to nonsurgical periodontal therapy.

Conclusion

Throughout the 4-week follow-up, the gingival health was preserved by using CHX mouthwash as the inflammation subsided. Although CHX continued to be better to Arimedadi oil pulling in terms of lowering the quantity of plaque and gingival inflammation, the use of Arimedadi oil as an oil-pulling agent also enhanced gingival health. Arimedadi oil is a cost-effective and minimally invasive treatment for gingivitis that can be utilised as an addition to phase 1 therapy.

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