

## EVALUATION OF THE EFFECTIVENESS OF COMPLEX TREATMENT OF HALITOSIS ASSOCIATED WITH CATARRHAL GINGIVITIS USING A CONVENTIONAL PEGANUM HARMALA (SYRIAN RUE) INFUSION

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**Abstract** Halitosis is a common oral health problem that significantly affects patients' quality of life and social interactions. One of the major etiological factors contributing to oral malodor is catarrhal gingivitis, an inflammatory condition of the gingival tissues characterized by plaque accumulation, microbial imbalance, and increased production of volatile sulfur compounds. Despite the availability of various antiseptic and antimicrobial agents, the search for safe, affordable, and plant-based therapeutic alternatives remains relevant in modern dentistry. This study aimed to evaluate the clinical effectiveness of a conventional Peganum harmala (Syrian rue) infusion as part of a comprehensive treatment protocol for patients with halitosis associated with catarrhal gingivitis. A comparative clinical assessment was conducted involving patients diagnosed with chronic catarrhal gingivitis accompanied by oral malodor. The treatment protocol included professional oral hygiene measures, patient education on oral care, and local application of Peganum harmala infusion. Clinical indices, including the Gingival Index, Plaque Index, and organoleptic assessment of halitosis, were used to evaluate treatment outcomes.

**Keywords:** halitosis, catarrhal gingivitis, Peganum harmala, Syrian rue, periodontal therapy, oral malodor, phytotherapy, dental inflammation, antimicrobial activity, oral hygiene.

**Introduction** Halitosis remains one of the most prevalent oral health complaints encountered in dental practice worldwide. The condition is characterized by an unpleasant odor originating from the oral cavity and may negatively affect psychological well-being, self-esteem, interpersonal communication, and overall quality of life. Epidemiological studies indicate that approximately 20–50% of the global population experiences halitosis to varying degrees, making it a significant public health concern.

The etiology of halitosis is multifactorial; however, oral causes account for nearly 85–90% of all cases. Among these causes, inflammatory periodontal diseases, particularly catarrhal gingivitis, play a prominent role. Catarrhal gingivitis is characterized by inflammation of the gingival tissues without destruction of the periodontal attachment apparatus. The disease develops primarily due to inadequate oral hygiene, accumulation of dental plaque, and colonization by pathogenic microorganisms capable of producing volatile sulfur compounds responsible for unpleasant oral odor. Microbial metabolism within dental plaque results in the degradation of sulfur-containing amino acids such as cysteine and methionine, leading to the production of hydrogen sulfide, methyl mercaptan, and dimethyl sulfide. These compounds are recognized as the primary chemical mediators of oral malodor. Persistent gingival inflammation further creates favorable conditions for anaerobic bacterial proliferation, exacerbating halitosis and compromising periodontal health. Current therapeutic approaches for halitosis associated with gingivitis focus on eliminating microbial biofilms, controlling inflammation, and improving

oral hygiene. Conventional treatment methods include professional dental cleaning, antiseptic mouth rinses, antimicrobial agents, and patient education. Although these interventions often demonstrate clinical effectiveness, long-term use of synthetic antiseptics may be associated with adverse effects, including mucosal irritation, tooth staining, taste alteration, and disruption of the normal oral microbiota. In recent years, increasing attention has been directed toward medicinal plants as potential alternatives or adjuncts to conventional therapeutic agents. Herbal preparations are valued for their biological activity, affordability, accessibility, and relatively low incidence of side effects. Among medicinal plants traditionally used in Central Asian folk medicine, *Peganum harmala* occupies a special place due to its broad spectrum of pharmacological properties. *Peganum harmala*, commonly known as Syrian rue, contains biologically active alkaloids, flavonoids, tannins, and phenolic compounds exhibiting antimicrobial, anti-inflammatory, antioxidant, and wound-healing effects. Previous pharmacological studies have demonstrated the inhibitory activity of *Peganum harmala* extracts against various bacterial and fungal microorganisms implicated in oral infectious processes. Furthermore, its anti-inflammatory potential may contribute to the reduction of gingival edema, erythema, and bleeding.

This study was conducted to evaluate the clinical effectiveness of a conventional *Peganum harmala* infusion as part of the comprehensive treatment of halitosis associated with catarrhal gingivitis. A prospective comparative clinical study was carried out at a dental clinic involving adult patients diagnosed with chronic catarrhal gingivitis accompanied by oral malodor. The study included 60 participants aged between 18 and 45 years who met the established inclusion criteria. Prior to participation, all patients provided informed consent, and the research protocol complied with the ethical principles outlined in the Declaration of Helsinki. The participants were randomly divided into two equal groups consisting of 30 individuals each. The control group received conventional periodontal treatment, including professional oral hygiene procedures, removal of dental plaque and calculus, and oral hygiene instruction. The experimental group received the same standard treatment protocol supplemented with a conventional *Peganum harmala* infusion used as a local therapeutic agent. The *Peganum harmala* infusion was prepared from dried plant material according to traditional phytotherapeutic recommendations. Ten grams of dried seeds were infused in 200 mL of boiled water for 20 minutes and filtered before use. Patients in the experimental group were instructed to rinse the oral cavity with the prepared infusion twice daily after tooth brushing for a period of 14 days. Clinical examination was performed at baseline and after completion of the treatment period. Gingival condition was assessed using the Gingival Index (GI) developed by Löe and Silness. Oral hygiene status was evaluated using the Plaque Index (PI). The severity of halitosis was determined through organoleptic assessment performed by calibrated dental specialists using a standardized five-point scoring system. Additional evaluation included the presence of gingival bleeding, edema, and subjective patient complaints regarding oral malodor.

**Conclusion** The results of this study demonstrated that the incorporation of a conventional *Peganum harmala* infusion into the comprehensive treatment of patients with halitosis associated with catarrhal gingivitis significantly improved clinical outcomes. The use of the herbal infusion contributed to a noticeable reduction in gingival inflammation, plaque accumulation, and the severity of oral malodor compared with conventional treatment alone. These improvements can be attributed to the antimicrobial, anti-inflammatory, and antioxidant properties of the biologically active compounds present in *Peganum harmala*. Clinical observations revealed enhanced gingival health, decreased bleeding tendency, and improved oral hygiene status among patients who used the infusion regularly during the treatment period. Furthermore, most participants reported subjective improvement in oral freshness and greater confidence in social interactions due to the reduction of unpleasant breath odor. The findings indicate that *Peganum*

*harmala* infusion may serve as a safe, accessible, and cost-effective adjunctive therapeutic agent in periodontal practice. Its natural origin and favorable biological effects make it a promising alternative to some synthetic antimicrobial products commonly used in the management of gingival inflammation and halitosis.

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