

Therapeutic Potential of *Centella asiatica* Linn in Oral Submucous Fibrosis: A Short Communication

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ABSTRACT

Oral Submucous Fibrosis (OSMF) is a chronic progressive disease characterised by fibrosis of the oral mucosa, leading to restricted mouth opening and difficulties in speech and swallowing. Modern science has explored a variety of surgical and medicinal therapy approaches, but the outcomes are often unsatisfactory due to recurrence, side effects, and, at times, a worsening of the condition due to fibrosis. Adjuvant therapies, especially antifibrotic herbs, are urgently needed for better treatment outcomes in OSMF. *Centella asiatica* Linn, also known as Indian pennywort or Asiatic pennywort, has shown potential therapeutic benefits in the treatment of OSMF. This short communication summarises studies indicating that *Centella asiatica* Linn has the potential to act as an antifibrotic agent, as it downregulated most fibrotic markers in both in-vivo and in-vitro set-up.

Keywords: Antifibrotic drug, Herbs, Medicinal therapy

INTRODUCTION

The OSMF is a chronic, potentially malignant condition that poses an international and regional public health issue, particularly across East and Southeast Asia, where the chewing of areca nut is prevalent and is part of certain religious festivals. Oral Squamous Cell Carcinoma (OSCC) results from 7-13% of malignant transformations of OSMF [1]. Two significant clinicopathological aspects of OSMF that immensely affect patients' quality of life are fibrosis and hyalinisation of subepithelial tissue. Components of areca nuts alter the expression of a wide range of biological molecules, including myofibroblasts, growth factors, cytokines, and non coding Ribonucleic Acids (RNAs). The development of OSMF is driven by these abnormally expressed molecules, which lead to buccal mucosa fibrosis due to localised inflammation [2]. Oxidative stress, hypoxia, autophagy, disrupted cell cycle, and Deoxyribonucleic Acid (DNA) damage are all present in oral tissue [3]. Myofibroblast synthesis and α -Smooth Muscle Actin (α -SMA) expression have been speculated to be indicators of increasing fibrosis and to affect the OSMF microenvironment, which in turn contributes to tumour formation [4].

In the long run, herbal derivatives like *Centella asiatica* Linn and its bioactive components have proven to be effective as antifibrotic agents in fibroproliferative diseases and could serve as promising leads in treating OSMF [5]. These medicines would address the need for alternative treatments with fewer side effects [6].

Researchers have been increasingly focusing on plant-based medication discovery, particularly concerning traditional herbal remedies [7]. *Centella asiatica* Linn is a traditional Ayurvedic medicine that is effectively used for treating a wide range of diseases in India and throughout Asia. The aerial portions and roots of the plant are utilised medicinally, and its chemical constituents have a broad spectrum of therapeutic applications, including antimicrobial, anti-inflammatory, anticancer, neuroprotective, antioxidant, and wound-healing properties [8].

Originally, a herb found in South and Southeast Asia (now pantropical), *Centella asiatica* Linn also serves as an effective antifibrotic agent. An early clinical investigation indicated that a titrated extract of *Centella asiatica* Linn reduces inflammatory infiltrates in the livers of patients with hepatic cirrhosis [9]. The main component of *Centella asiatica* Linn, Asiatic acid, has been shown to combat liver fibrosis by inhibiting the Tumour Growth Factor (TGF β 1) signaling

pathway, which is also implicated in the development of OSMF [6]. Moreover, *Centella asiatica* Linn extract has been found to reduce the expression of pro-inflammatory cytokines, such as Tumour Necrosis Factor- α (TNF- α) and interleukin-6, which play a role in the inflammatory process associated with OSMF [10]. Therefore, the therapeutic potential of *Centella asiatica* Linn in OSMF lies in its ability to inhibit fibrosis and inflammation, leading to improved symptoms and quality of life for patients.

Widegrow identified in 2011 that fibrotic disorders are caused by a continuous conflict between pro-inflammatory cytokines (IL-1, IL-6, IL-8, and TNF) and profibrotic substances (TGF β 1, Platelet Derived Growth Factor (PDGF), Connective Tissue Growth Factor (CTGF)). It is critical to restrict the action of inflammatory cytokines such as IL-6 and TNF, which are effective stromal activators, in order to downregulate the fibrosis process. In present review, authors emphasised that *Centella asiatica* Linn has anti-inflammatory potential by downregulating IL-6 [11].

The use of *Centella asiatica* Linn in the treatment of OSMF holds promise due to its anti-fibrotic and anti-inflammatory effects. Additionally, *Centella asiatica* has been shown to promote wound healing and collagen production, which may aid in the regeneration of damaged oral mucosal tissues in patients with OSMF [12]. Furthermore, *Centella asiatica* Linn has demonstrated antioxidant activity, which can help protect against oxidative stress and damage in the oral mucosa [13]. It has also been used in traditional medicine for its wound healing properties, suggesting that it could aid in the regeneration and repair of the damaged oral mucosa in OSMF [14].

In conclusion, the therapeutic potential of *Centella asiatica* Linn lies in its ability to inhibit fibrosis, reduce inflammation, and provide antioxidant protection, making it a potential antifibrotic herb for the treatment of OSMF.

REFERENCES

- [1] Xu H, Lyu FY, Song JY, Xu YM, Jiang EH, Shang ZJ, et al. Research achievements of oral submucous fibrosis: progress and prospect. *Biomed Res Int.* 2021;2021:6631856.
- [2] Prabhu RV, Prabhu V, Chatra L, Shenai P, Suvarna N, Dandekeri S. Areca nut and its role in oral submucous fibrosis. *J Clin Exp Dent.* 2014;6(5):e569-75.
- [3] Gayathri K, Malathi N, Gayathri V, Adtani PN, Ranganathan K. Molecular pathways of oral submucous fibrosis and its progression to malignancy. *Arch Oral Biol.* 2023;148:105644.

- [4] Phulari RGS, Dave EJ. A systematic review on the mechanisms of malignant transformation of oral submucous fibrosis. *Eur J Cancer Prev.* 2020;29(5):470-73.
- [5] Kar IB, Sethi AK. A rare ocular complication following treatment of oral submucous fibrosis with steroids. *Natl J Maxillofac Surg.* 2011;2(1):93-95.
- [6] Adtani PN, Narasimhan M, Punnoose AM, Kambalachenu HR. Antifibrotic effect of *Centella asiatica* Linn and asiatic acid on arecoline-induced fibrosis in human buccal fibroblasts. *J Investig Clin Dent.* 2017;8(2).
- [7] Prakash V, Jaiswal N, Srivastava M. A review on medicinal properties of *centella asiatica*. *Asian Journal of Pharmaceutical and Clinical Research.* 2017;10:69-74.
- [8] Periyasamy A, Mahalingam K. Phytochemical screening and antimicrobial activity from five Indian medicinal plants against human pathogens. *Middle East J Sci Res.* 2010;5(6):477-82.
- [9] Darnis F, Orcel L, de Saint-Maur PP, Mamou P. Use of a titrated extract of *Centella asiatica* in chronic hepatic disorders [in French]. *Sem Hosp* 1979;55:1749-50.
- [10] Rotpenpian N, Wanasuntronwong A, Tapechum S, Vattarakorn A, Care C, Chindasri W, et al. Standardized *Centella asiatica* (ECa 233) extract decreased pain hypersensitivity development in a male mouse model of chronic inflammatory temporomandibular disorder. *Sci Rep.* 2023;13(1):6642.
- [11] Widgerow AD. Cellular/extracellular matrix cross-talk in scar evolution and control. *Wound Repair Regen.* 2011;19(2):117-33.
- [12] Khiljee S, Sarfraz MK, Ur Rehman N, Montazeri H, Khiljee T, Löbenberg R. In-vitro release of Indian penny wort, walnut, and turmeric from topical preparations using two different types of membranes. *IJPSR.* 2010;17:27-32.
- [13] Choi MJ, Zheng HM, Kim JM, Lee KW, Park YH, Lee DH. Protective effects of *Centella asiatica* leaf extract on dimethyl nitrosamine induced liver injury in rats. *Mol Med Rep.* 2016;14:4521-28.
- [14] Ratz-Lyko A, Arct J, Pytkowska K. Moisturizing and anti-inflammatory properties of cosmetic formulations containing *centella asiatica* extract. *Indian J Pharm Sci.* 2016;78(1):27-33.

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