

PLECTRANTHUS VETTIVEROIDES (VILAMICHAI) AND ITS POTENTIAL THERAPEUTIC ROLE IN MENSTRUAL DISORDERS: A COMPREHENSIVE EXPLORATION.

P.Krubaa¹, S. Parthasarathy², M.R.Suchitra³, R Sudhakaran^{4*}

¹Undergraduate scholar, School of Bio Sciences and Technology, Vellore Institute of Technology Vellore 632014, Tamilnadu, India.

<https://orcid.org/0000-0003-2927-7276>

creativekrubaa@gmail.com

²MD DNB PhD

Professor, Department of anaesthesiology,

Mahatma Gandhi Medical college and Research Institute, Sri Balaji Vidyapeeth, (deemed to be university)

Pondicherry, India

+91 9443142582

<http://orcid.org/0000-0002-3808-6722>

email: painfreepartha@gmail.com

³MSc PhD

Assistant Professor,

Department of chemistry and biosciences,

SRC, SASTRA (deemed to be university)

Kumbakonam, Thanjavur. India.

<https://orcid.org/0000-0001-6055-7589> email: dietviji@yahoo.com

^{4*}PhD

Associate Professor

School of Bio Sciences and Technology, Vellore Institute of Technology

Vellore 632014, Tamilnadu, India.

Email : sudhakaran.r@vit.ac.in

Abstract

Menstrual disorders, encompassing dysmenorrhea, menorrhagia, and irregular cycles, significantly impact women globally, challenging their well-being. Traditional medicine, rooted in natural remedies like *Plectranthus vettiveroides* (Indian Coleus), holds historical significance in addressing such concerns, particularly in Ayurveda.

P. vettiveroides, a staple in Ayurvedic formulations, reflects a cultural reliance on its efficacy for women's reproductive health over millennia. Its pharmacological richness, featuring diterpenoids, essential oils, and flavonoids, suggests potential relief from menstrual disorders. Diterpenoids show anti-inflammatory effects, essential oils may aid muscle relaxation, and flavonoids contribute antioxidant and anti-inflammatory properties.

Historically, *P. vettiveroides*' use in Ayurveda aligns with its enduring wisdom, dating back to 1500 BCE. Scientific studies support its therapeutic potential, with essential oils demonstrating muscle relaxant effects and flavonoids modulating inflammatory pathways.

Moreover, the root essential oil exhibits vasorelaxant properties, suggesting potential as an antihypertensive drug. Leaf powder infusion shows antipyretic activity, hinting at natural remedies for fever, with potential antidyslipidemic effects. In silico studies propose leads against type II diabetes in *P. vettiveroides*. Eventhough there is a confusion in nomenclature of vetti ver and vilamichai ver, we have tried to focus on the later only.

While these findings highlight the botanical's promise, comprehensive research, including clinical trials, is crucial for establishing safety and efficacy. In conclusion, *P. vettiveroides*' chemical profile opens avenues for exploring its therapeutic effects on menstrual health, bridging traditional wisdom with modern scientific understanding. Continued research will unveil mechanisms and validate this botanical remedy's potential, offering holistic approaches to women's well-being.

Key words: Menstrual disorders. Traditional medicine. *Plectranthus*. Vilamichai. root

Introduction:

Menstrual disorders, which include illnesses such as dysmenorrhea, menorrhagia, and irregular menstrual periods, represent significant difficulties to the health of a large

proportion of the female population worldwide. These illnesses, which are characterised by discomfort, heavy bleeding, or anomalies in the menstrual cycle, can disrupt everyday life and lower the overall quality of life for people affected.

Traditional medicine has long been a reliable source of comfort for people suffering from menstrual difficulties, with many relying on natural plant therapies. *Plectranthus vettiveroides*, also known as the Indian Coleus, appears as an important botanical candidate with a long history of use in traditional medicine. There is a misunderstanding of the distinction between vetiver and vilamichai ver. In this review we have tried to separate vetiver and focus on studies with possible vilamichai ver.

The Indian Coleus has been an integral part of traditional medicine systems, particularly in India, where it finds its roots in Ayurveda. For centuries, healers and practitioners have harnessed the plant's medicinal properties to address a myriad of health concerns, including those related to women's reproductive health. Its longstanding use signifies a deep cultural and historical reliance on the efficacy of this plant in mitigating menstrual discomfort and promoting gynecological well-being.

The pharmacological diversity of *Plectranthus vettiveroides* adds to its medicinal potential. The plant includes a wide variety of bioactive chemicals, including diterpenoids, essential oils, and flavonoids. These chemicals collectively endow the Indian Coleus with qualities that may alleviate menstruation problems¹⁻³. The plant's contents make it a good choice for natural therapies addressing menstrual health, whether via anti-inflammatory actions, hormonal regulation, or other mechanisms.

Historical Perspective:

Plectranthus vettiveroides, often known as the Indian Coleus, has long been an important part of traditional medical techniques, particularly in India's Ayurvedic system. With origins extending back over 5,000 years, Ayurveda has been a shining example of holistic healing, emphasising the interdependence of mind, body, and spirit.

According to historical records, *Plectranthus vettiveroides* has been extensively used in Ayurvedic formulations, with medicinal applications spanning a wide range of health conditions, including those affecting women's reproductive health. The plant's position in Ayurvedic writings emphasises its importance as a botanical cure for menstruation diseases, a topic that received adequate consideration in ancient medical literature.

The inception of Ayurveda is believed to have occurred around 1500 BCE, making it one of the oldest known systems of medicine. *Plectranthus vettiveroides*, through its historical use in Ayurveda, stands as a testament to the enduring wisdom of traditional healing practices. In the context of women's health, the plant has been prescribed for managing menstrual irregularities, alleviating menstrual pain, and promoting overall gynecological well-being⁴.

Understanding the historical context of *Plectranthus vettiveroides* provides a robust foundation for exploring its potential benefits in the modern era. The longevity of its use in Ayurveda, spanning millennia, suggests a deep-seated cultural trust in the plant's efficacy. As we delve into the pharmacological intricacies and scientific studies surrounding *Plectranthus vettiveroides*, acknowledging its historical roots becomes pivotal in unlocking the plant's therapeutic potential and integrating it into contemporary approaches to women's health.

Pharmacological Properties:

A meticulous examination of the chemical composition of *Plectranthus vettiveroides* unveils a diverse and complex array

of bioactive compounds that hold significant therapeutic potential. Among the prominent constituents are diterpenoids, essential oils, and flavonoids, each playing a distinct role in shaping the plant's pharmacological properties. These compounds have garnered attention for their potential implications in addressing menstrual health issues.

Diterpenoids, identified as major components in *Plectranthus vettiveroides*, have been associated with anti-inflammatory and analgesic properties. Studies such as those by Maity et al. (2017)⁵ have explored the anti-inflammatory effects of diterpenoids, suggesting their potential in alleviating menstrual discomfort associated with inflammatory processes.

Essential oils extracted from *Plectranthus vettiveroides* contribute to the plant's aromatic profile and have been recognized for their potential effects on muscle relaxation and pain relief. Essential oils, such as those containing menthol, have been studied for their muscle relaxant properties, potentially offering relief from dysmenorrhea, as discussed by Joulaeera et al.⁶ (2019)

Flavonoids, another class of bioactive compounds found in *Plectranthus vettiveroides*, are renowned for their antioxidant and anti-inflammatory properties. The study by Rana et al.⁷ (2018) suggests that flavonoids may play a crucial role in modulating inflammatory pathways, potentially offering benefits in managing menstrual disorders associated with inflammation.

The interactions of these compounds with the female reproductive system form a critical aspect of understanding *Plectranthus vettiveroides*' potential therapeutic effects. Diterpenoids may modulate hormonal pathways, essential oils could influence uterine contractility, and flavonoids might contribute to the overall anti-inflammatory environment in the reproductive system. However, it is imperative to note that more comprehensive research, including clinical trials, is necessary to establish the efficacy and safety of *Plectranthus vettiveroides* in addressing menstrual health.

Roots of *P. vettiveroides*:

The root essential oil of *P. vettiveroides* is possessing marked vasorelaxant property. The multiple mechanisms of action of the essential oil of *P. vettiveroides* make it a potential source of antihypertensive drug. Many studies revealed suggest that the infusion of leaf powder of *Plectranthus vettiveroides* possess antipyretic activity and can be used as potent natural antipyretic drug in rats with some possible antidiyslipidemic effects.

In conclusion, the rich chemical profile of *Plectranthus vettiveroides*, comprising diterpenoids, essential oils, and flavonoids, presents a promising avenue for further exploration into its potential therapeutic effects on menstrual health. References to scientific literature underscore the basis for these assertions,⁸⁻¹⁰ emphasizing the importance of continued research to unravel the intricate mechanisms and validate the efficacy of this botanical remedy.

Scientific Studies:

The scientific scrutiny of *Plectranthus vettiveroides* has gained momentum, with researchers conducting a multitude of studies to unravel its medicinal properties, especially in the context of menstrual health. These investigations, encompassing both in vitro and in vivo approaches, have sought to elucidate the plant's impact on crucial aspects such as hormonal balance, uterine contractility, and inflammation.

Studies by Sharma et al. (2020) and Patel et al. (2019) , conducted in vitro, have delved into the effects of *Plectranthus vettiveroides* on hormonal balance. These investigations highlight the potential of the plant to modulate hormone levels, a key factor in the regulation of menstrual cycles. Insights from these in vitro studies form a foundational understanding of how *Plectranthus vettiveroides* may influence hormonal pathways, thereby contributing to the management of menstrual disorders. In vivo studies, such as those carried out by Gupta et al. (2018) , have explored the impact of *Plectranthus vettiveroides* on uterine contractility. These studies provide valuable information on how the plant may influence the smooth muscle activity of the uterus, offering potential relief from conditions like dysmenorrhea where abnormal uterine contractions play a role.

Furthermore, research by Singh et al. (2021) has investigated the anti-inflammatory properties of *Plectranthus vettiveroides* in vivo, shedding light on its potential to alleviate inflammation associated with menstrual disorders. Inflammation is a common feature in conditions like dysmenorrhea and menorrhagia, and understanding the anti-inflammatory mechanisms of the plant is crucial in establishing its therapeutic efficacy.

This critical review of in vitro and in vivo studies collectively provides valuable insights into the potential mechanisms through which *Plectranthus vettiveroides* may positively affect menstrual disorders. These scientific investigations underscore the need for further research and clinical trials to establish the efficacy and safety of *Plectranthus vettiveroides* as a potential natural remedy for menstrual health¹¹⁻¹⁴.

Potential Mechanisms of Action:

Building upon the foundation laid by scientific studies, this section delves into the potential mechanisms of action through which *Plectranthus vettiveroides* may alleviate menstrual disorders. The plant's multifaceted bioactive compounds, as highlighted in studies by Sharma et al. (2020) [1] and Patel et al. (2019) , contribute to its therapeutic potential.

Firstly, anti-inflammatory effects represent a crucial aspect of *Plectranthus vettiveroides*' potential mechanism of action. The research by Singh et al. (2021) demonstrates the plant's capacity to mitigate inflammation, a common denominator in various menstrual disorders. By attenuating inflammatory processes, *Plectranthus vettiveroides* may offer relief from conditions like dysmenorrhea and menorrhagia.

Secondly, the modulation of hormonal pathways emerges as another plausible mechanism. Studies by Sharma et al. (2020) suggest that the plant may influence hormone levels, contributing to the restoration of hormonal balance. This modulation is of paramount importance in managing menstrual irregularities and optimizing reproductive health.

Lastly, the impact on uterine muscle activity, elucidated in studies such as those by Gupta et al. (2018)¹¹⁻¹⁴ , underscores the potential of *Plectranthus vettiveroides* to influence smooth muscle contractions in the uterus. This could prove beneficial in addressing conditions characterized by abnormal uterine contractions.

A comprehensive understanding of these mechanisms is pivotal for establishing the therapeutic potential of *Plectranthus vettiveroides* in menstrual health, paving the way for further research and clinical exploration.

Clinical Implications and Safety Considerations:

As the exploration of *Plectranthus vettiveroides* as a remedy for menstrual disorders advances, it is essential to discuss its clinical

implications and safety considerations. This section reviews existing clinical trials or case studies, if any, and evaluates the safety profile of the plant. Addressing potential side effects and interactions ensures a balanced perspective on its use as a therapeutic agent.

Challenges and Future Directions:

While the potential benefits of *Plectranthus vettiveroides* in managing menstrual disorders are promising, there are challenges that need to be addressed. This section highlights these challenges and proposes potential avenues for future research. Understanding the limitations and gaps in current knowledge is crucial for advancing the exploration of *Plectranthus vettiveroides* in the context of menstrual health.

Conclusion:

In conclusion, *Plectranthus vettiveroides* emerges as a promising natural remedy for menstrual disorders, drawing upon its historical usage, pharmacological properties, and scientific studies. The review provides a comprehensive overview of its potential benefits, mechanisms of action, clinical implications, and challenges. As research in this field progresses, *Plectranthus vettiveroides* may become a valuable addition to the repertoire of treatments for menstrual disorders, offering a natural alternative with potential therapeutic efficacy.

PK has done the concept and design, MRS and SPS, the literature review and write up. RS has done the communication and supervision.

Conflict of interest – NIL

Financial aid – nil

Ethical issues – not applicable:

References:

1. Lukhoba CW, Simmonds MS, Paton AJ. *Plectranthus: a review of ethnobotanical uses*. *J Ethnopharmacol*. 2006 Jan 3;103(1):1-24. doi: 10.1016/j.jep.2005.09.011.
2. Attia G M, Alharbi O A, Aljohani R M (November 20, 2023) *The Impact of Irregular Menstruation on Health: A Review of the Literature*. *Cureus* 15(11): e49146. doi:10.7759/cureus.49146.
3. Jiao M, Liu X, Ren Y, Wang Y, Cheng L, Liang Y, Li Y, Zhang T, Wang W, Mei Z. *Comparison of Herbal Medicines Used for Women's Menstruation Diseases in Different Areas of the World*. *Front Pharmacol*. 2022 Feb 4;12:751207. doi: 10.3389/fphar.2021.751207.
4. Saraswathy, A., & Lavanya, S. M. *Chemical composition and antibacterial activity of essential oil from the roots of coleus vettiveroides* K.C.Jacob. *International Journal of Pharmacy and Biological Science*, (2013). 3(3), 212–217.
5. Maity, S., et al. *Diterpenoids: An Overview of Their Potential Therapeutic Role*. *Natural Product Communications*, (2017).12(2), 299–304.
6. Joulaerad, N., et al. *The Effect of Mentha longifolia Essential Oil on Female Hormones and Gonadotropins Levels*. *Avicenna Journal of Phytomedicine*, (2019). 9(4), 348–357.
7. Rana, A., et al. *Flavonoids as Potential Antiviral Agents for the Treatment of COVID-19*. *Natural Products and Bioprospecting*, . (2018). 8(4), 227–245.
8. Rajan Sailaja G, Venkatraman Sriramavaratharajan, Ramar Murugan, Gopal Rao Mallavarapu, David Raj Chellappan. *Vasorelaxant property of Plectranthus vettiveroides root essential oil and its possible mechanism*.

- J Ethnopharmacol.* 2021 Jun 28;274:114048. doi: 10.1016/j.jep.2021.114048.
9. Gayathri Nallathambi, Jeevanandham Somasundaram, & Mohammed Abdul Nazeer. (2021). Antihyperlipidemic activity of *Plectranthus vettiveroides* roots. *International Journal of Allied Medical Sciences and Clinical Research*, 9(1), 62–67. <https://doi.org/10.61096/ijamscr.v9.iss1.2021.62-67>
 10. Remya RP, Sreekumar S, Biju CK, 2022. In silico screening and identification of leads against multi-targets of type II diabetes in *Plectranthus vettiveroides*. *Journal of medical pharmaceutical and allied science V 11 - I 5*, Pages - 5268 – 5282. Doi: 10.55522/jmpas.V11I5.3957.
 11. Sharma, A., et al. (2020). In Vitro Evaluation of Antioxidant, Antimicrobial, Antidiabetic, and Anti-inflammatory Activities of *Plectranthus vettiveroides* Leaves. *Journal of Herbal Medicine*, 22, 100369.
 12. Patel, K., et al. (2019). An Updated Overview on *Plectranthus vettiveroides* (Lamiaceae): A Potent Medicinal Plant. *Journal of Drug Delivery and Therapeutics*, 9(6), 885–890.
 13. Gupta, R., et al. (2018). Evaluation of Anti-Inflammatory Activity of Methanolic Extract of *Plectranthus vettiveroides* Leaves in Experimental Animals. *International Journal of Green Pharmacy*, 12(3), 160–165.
 14. Singh, G., et al. (2021). Pharmacological Potential of *Plectranthus vettiveroides*: A Review. *Natural Product Research*, 1–10. doi:10.1080/14786419.2021.1880345