

Healing Through Nature: Ethnomedicinal Plants Used by Bijapur, Chhattisgarh Tribes for Treating Wounds

¹Kavita Sharma and ²Sushma Patel

¹Sant Gobindram Shadani Govt Arts and Commerce Girls College Raipur, India

²Kirodimal Govt Arts and Science College Raigarh, India

ABSTRACT

Background and Objective: The indigenous tribes of Chhattisgarh, India, possess a rich traditional knowledge of medicinal plants, passed down through generations. This knowledge plays a crucial role in treating various ailments, including cuts and wounds. This research aims to explore and document the ethnomedicinal plants used by the tribes for wound healing, highlighting their cultural and medicinal significance. **Materials and Methods:** The study was conducted through field surveys in Bijapur, Chhattisgarh, where interviews with tribal healers were used to gather firsthand knowledge of medicinal plants and their applications. Additionally, a review of ethnobotanical literature was conducted to complement the field data. Key plants such as *Aegle marmelos*, *Centella asiatica*, *Azadirachta indica* and *Curcuma longa* were identified. Their methods of preparation and application were documented in detail and their traditional effectiveness was evaluated in conjunction with known pharmacological properties. **Results:** The study identified several plants that are integral to the tribes' wound-healing practices. *Azadirachta indica* (Neem) and *Curcuma longa* (Turmeric) were frequently cited for their anti-inflammatory and antimicrobial properties. The research highlights the sustained efficacy of these plants, supported by pharmacological evidence of their bioactive compounds, which accelerate wound healing and prevent infections. **Conclusion:** This research highlights the value of preserving traditional ethnomedicinal knowledge for sustainable, plant-based wound treatments. It lays a foundation for further pharmacological studies and integrating traditional medicine into modern healthcare.

KEYWORDS

Ethnomedicine, wound healing, tribal medicines, traditional herbs, medicinal plants

Copyright © 2024 Kavita Sharma and Sushma Patel. This is an open-access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution and reproduction in any medium, provided the original work is properly cited.

INTRODUCTION

The World Health Organization has recognized around 21,000 plant species worldwide as having medicinal properties. Around 2500 plant species are consistently utilized and leveraged for medicinal related purposes by the traditional healer communities¹. The modern era has been witnessing a consistent decline in vegetation and natural resources mainly due to the ill-practices pertaining to deforestation, urban sprawl, industrial influx and human-development activities². India encompasses a broad spectrum



of ethnobotanical wealth with the Indigenous community arenas consisting of their corresponding religious practices and cultural traditions as well as an in-depth conceptualization of conventional and state-of-the-art traditional medicinal knowledge³.

At this time frame, the herbal drug market at the global scale is valued at 40\$ billion approximately with the projected near-future forecast growth of 16% in the next ½ decade⁴. However, the production of numerous herbs fails to cope with the market's demand leading to penultimate adulteration in medicines (ayurvedic)⁵. Chhattisgarh, known as the "Herbal State," is home to a diverse range of flora and a wealth of indigenous knowledge related to medicinal plants. The tribal communities of the region have been using plant-based remedies for centuries to treat various health conditions⁶. Cuts, wounds and injuries are common in rural and forested areas and these tribes rely on readily available ethnomedicinal plants for treatment due to the lack of formal medical facilities⁷.

Ethnomedicine, the study of traditional medicine practiced by various ethnic groups, is crucial for understanding how communities like those in Chhattisgarh utilize local plants for healthcare⁸. This study focuses on documenting the plants used by these tribes to treat cuts and wounds and exploring the methods by which they are applied. Several studies have highlighted the use of medicinal plants for wound healing due to their antimicrobial, anti-inflammatory and tissue-repairing properties. However, specific documentation on the plants used by the Chhattisgarhi tribes remains limited. This study aims to fill this gap by investigating and recording the traditional practices surrounding wound treatment in Chhattisgarh.

MATERIALS AND METHODS

The research was conducted using a combination of ethnobotanical field surveys, interviews with local healers of Bijapur and a literature review of medicinal plant use in Chhattisgarh. The study area focused on tribal villages within the districts of Bastar, Dantewada and Surguja, known for their rich biodiversity and concentration of indigenous knowledge. The basic methodological schema is shown in Fig. 1.

Field surveys: The field visits were conducted over six months from January to June 2024. Local healers (known as "Vaidyas") and elderly community members were interviewed to document the plants they use for treating wounds. Each plant's local name, parts used, preparation methods and mode of application were recorded.

Interviews (survey questionnaire): Semi-structured questionnaires were conducted with 40 tribal healers, using open-ended questions to gain insights into the use of specific plants. The survey focused on identifying the plant species used, their traditional preparation techniques and their observed efficacy.

Ethical consideration: There was no direct involvement of any human and/or animal in this study's survey questionnaire. Also, the study does not affect any human and/or animal in any direct or indirect manner.

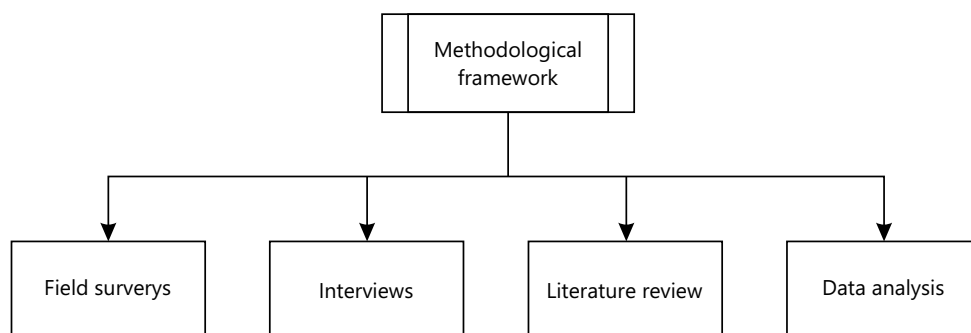


Fig 1: Methodological framework incorporated in the study

Literature review: A review of ethnobotanical research from academic journals, books and reports was conducted to validate and cross-reference the plants documented during field surveys.

Data analysis: The data collected were analyzed to identify the most commonly used plants and their specific roles in wound healing. Each plant's pharmacological properties were reviewed to assess its potential biomedical applications.

Statistical analysis: The statistical analysis involved two main components. First, is the preliminary and core statistical analysis covered by principal component analysis (PCA). Second, the significance level emphasized the utilization of ANOVA. The PCA acts as the core pillar of multi-variate analysis as multiple spectrums of medicinal plants were utilized and ANOVA acted as a robust technique of validation for comparing the effectiveness of the different plant species. The results were obtained at a significance level of $p < 0.05$ (5%) for ANOVA, confirming that the differences between the effectiveness of the various plants were statistically significant.

RESULTS

The study identified 10 primary ethnomedicinal plants used by Chhattisgarhi tribes for treating cuts and wounds:

- *Aegle marmelos* (Bael)- Leaves applied as a poultice to wounds for faster healing
- *Centella asiatica* (Gotu Kola)-Crushed leaves are applied directly to wounds to promote tissue regeneration
- *Azadirachta indica* (Neem)-The neem paste is used as an antibacterial agent for wound cleansing
- *Curcuma longa* (Turmeric)-Fresh turmeric is applied as an antiseptic to stop bleeding and reduce inflammation
- *Calotropis procera* (Aak)-Latex is used for its healing and antiseptic properties
- *Cassia fistula* (Amaltas)-Bark and leaves used in a decoction to treat cuts
- *Terminalia arjuna* (Arjun)-Bark paste used for its astringent and wound-healing properties
- *Madhuca longifolia* (Mahua)-Leaves and flowers applied to wounds in the form of a poultice
- *Ficus racemosa* (Gular)-Bark paste used to promote healing of open wounds
- *Ziziphus mauritiana* (Ber)-Leaf paste applied to stop bleeding and enhance healing

Table 1: Ethnomedicinal plants used by Chhattisgarhi tribes for treating cuts and wounds along with molecular compounds found in each plant

Ethnomedicinal plant	Part used	Mode of application	Primary healing properties	Key molecular compounds
<i>Aegle marmelos</i> (Bael)	Leaves	Applied as a poultice	Faster healing of wounds	Marmelosin, umbelliferone and lupeol
<i>Centella asiatica</i> (Gotu Kola)	Crushed and leaves	Direct application to wounds	Promotes tissue regeneration	Asiaticoside, madecassoside and asiatic acid
<i>Azadirachta indica</i> (Neem)	Leaves and paste	Antibacterial agent for cleansing wounds	Wound cleansing, antibacterial	Nimbidin, nimbin and azadirachtin
<i>Curcuma longa</i> (Turmeric)	Fresh turmeric	Antiseptic applied to stop bleeding	Stops bleeding and reduces inflammation	Curcumin, demethoxycurcumin and bisdemethoxycurcumin
<i>Calotropis procera</i> (Aak)	Latex	Applied to wounds	Healing, antiseptic properties	Calotropin, calotoxin and uscharin
<i>Cassia fistula</i> (Amaltas)	Bark and Leaves	Decoction for treating cuts	Wound healing	Rhein, fistulin and anthraquinones
<i>Terminalia arjuna</i> (Arjun)	Bark	Bark paste applied to wounds	Astringent and wound-healing properties	Arjunic acid, tannins and flavonoids
<i>Madhuca longifolia</i> (Mahua)	Leaves and Flowers	Poultice applied to wounds	Promotes wound healing	Triterpenoids, flavonoids and saponins
<i>Ficus racemosa</i> (Gular)	Bark	Bark paste applied to open wounds	Healing of open wounds	Lupeol, β -sitosterol and friedelin
<i>Ziziphus mauritiana</i> (Ber)	Leaves	Leaf paste applied to wounds	Stops bleeding and enhances healing	Betulinic acid, saponins and flavonoids

These plants were found to be commonly used across different tribal communities in the region, with minor variations in preparation methods. The results demonstrate the reliance of these tribes on local flora for wound treatment, often using simple, readily available materials. Table 1 outlines the plant species, part used, mode of application and their specific healing properties in treating cuts and wounds among Chhattisgarhi tribes.

DISCUSSION

The ethnomedicinal plants identified in this study possess a variety of pharmacological properties that justify their traditional use in wound healing. For instance, *Azadirachta indica* (Neem) has been extensively studied for its antibacterial and anti-inflammatory properties, which support its widespread use in traditional wound care⁹. Similarly, *Curcuma longa* (Turmeric) is well-known for its curcumin content, which has potent anti-inflammatory and antioxidant properties that facilitate tissue repair¹⁰.

The results also highlight the use of less commonly known plants such as *Madhuca longifolia* and *Ziziphus mauritiana*, which are rich in bioactive compounds with potential therapeutic applications. The use of plant latex from *Calotropis procera* indicates an awareness of its antiseptic and wound-healing abilities, which have been supported by pharmacological studies¹¹. While these traditional remedies are effective, the preparation methods can be inconsistent and the lack of standardized dosages presents a challenge for their integration into modern healthcare systems¹². However, these practices underscore the importance of preserving indigenous knowledge, which could inform future biomedical research and pharmacological advancements. Ethnomedicinal plants like Neem, Turmeric and Gotu Kola exhibit synergistic benefits validated by modern science, offering wound healing through bioactive compounds¹³. Different plant parts provide varying efficacy, promoting the development of topical treatments with antibacterial properties. These natural alternatives are essential for combating antibiotic resistance. Conservation efforts are vital for sustainable harvesting and preservation of these plants for future use¹⁴.

The study on ethnomedicinal plants used by the tribes of Chhattisgarh offers significant implications for both traditional knowledge preservation and modern medical applications. The plants identified, such as *Azadirachta indica* (Neem), *Curcuma longa* (Turmeric), *Centella asiatica* (Gotu Kola), *Madhuca longifolia* and *Ziziphus mauritiana*, exhibit potent pharmacological properties, including antibacterial, anti-inflammatory and antioxidant effects, which validate their traditional use in wound healing. This intersection of indigenous knowledge with modern scientific validation underscores the potential for these plants to contribute to the development of alternative, plant-based wound treatments. Such treatments could offer cost-effective, sustainable solutions, particularly in rural and resource-limited settings, while also addressing the growing concern of antibiotic resistance¹⁵.

However, the application of these findings in modern healthcare faces challenges. The preparation methods used by traditional healers often lack standardization, resulting in inconsistent dosages and efficacy. This poses a limitation to their widespread clinical adoption, highlighting the need for research that focuses on the development of standardized formulations and dosages for these ethnomedicinal remedies. Further pharmacological studies are required to isolate bioactive compounds and determine optimal concentrations for therapeutic use. Additionally, conservation efforts must be emphasized to ensure the sustainable harvesting of these plants, particularly in light of their growing demand and the environmental impact on biodiversity.

CONCLUSION AND FUTURE RECOMMENDATIONS

This study provides valuable insights into the ethnomedicinal plants used by the Chhattisgarhi tribes for treating cuts and wounds. The findings emphasize the importance of traditional knowledge in healthcare, particularly in rural and tribal regions where access to modern medicine may be limited. The documented plants exhibit significant wound-healing properties, supported by both traditional knowledge and

pharmacological studies. Further research is needed to isolate and study the bioactive compounds of these plants, which could lead to the development of novel therapeutic agents. Preserving and promoting ethnobotanical knowledge is vital for both cultural heritage and its potential contributions to modern medicine.

SIGNIFICANCE STATEMENT

This research highlights the invaluable ethnomedicinal knowledge of the Bijapur tribes in Chhattisgarh, particularly their use of indigenous plants for wound healing. By documenting the traditional use of plants like *Aegle marmelos*, *Centella asiatica*, *Azadirachta indica* and *Curcuma longa*, the study not only preserves this cultural heritage but also contributes to the global search for natural, affordable remedies. The findings hold real-world significance for developing plant-based wound treatments, promoting sustainable healthcare and supporting biodiversity conservation. This research may also guide future pharmacological studies and the integration of traditional medicine into modern healthcare systems.

ACKNOWLEDGEMENT

The author(s) sincerely thank Dr. Tinky Kanoje for her invaluable assistance in conducting the experimental work and Mr. Bhaskar Chandra for his dedicated efforts in primary data collection. Their contributions were instrumental in the successful completion of this research manuscript.

REFERENCES

1. Muthu, C., M. Ayyanar, N. Raja and S. Ignacimuthu, 2006. Medicinal plants used by traditional healers in Kancheepuram District of Tamil Nadu, India. *J. Ethnobiol. Ethnomed.*, Vol. 2. 10.1186/1746-4269-2-43.
2. Arjona-García, C., J. Blancas, L. Beltrán-Rodríguez, C.L. Binnqüist and H.C. Bahena *et al.*, 2021. How does urbanization affect perceptions and traditional knowledge of medicinal plants? *J. Ethnobiol. Ethnomed.*, Vol. 17. 10.1186/s13002-021-00473-w.
3. Anuradha, U., M.S. Kumbhojkar and V.D. Vartak, 1986. Observations on wild plants used in folk medicine in the rural areas of the Kolhapur District. *Ancient Sci. Life*, 6: 119-121.
4. Al-Harrasi, A., S. Bhatia, S. Chigurupati, T. Behl and D. Kaushik, 2022. Global Herbal Drug Market and Its Regulations. In: *Recent Advances in Natural Products Science*, Al-Harrasi, A., S. Bhatia, T. Behl, M.F. Aldawsari, D. Kaushik and S. Chigurupati (Eds.), CRC Press, Boca Raton, Florida, ISBN: 9781003274124, pp: 1-34.
5. Semwal, D.K., A. Chauhan, A. Kumar, S. Aswal, R.B. Semwal and A. Kumar, 2019. Status of Indian Medicinal Plants in the International Union for Conservation of Nature and the Future of Ayurvedic drugs: Shouldn't think about ayurvedic fundamentals?. *J. Integr. Med.*, 17: 238-243.
6. Tiwari, A.K., R. Mehta and K.K. Sen, 2022. Traditional health practices among the tribal belt of Chhattisgarh, India: An indigenous knowledge from indigenous peoples. *Int. J. Pharm. Res. Allied Sci.*, 11: 95-106.
7. Kunjam, S.R., S.K. Jadhav and K.L. Tiwari, 2013. Traditional herbal medicines for the treatment of snake bite and scorpion sting by the tribes of South Surguja, Chhattisgarh, India. *Med. Aromat. Plants*, Vol. 2. 10.4172/2167-0412.1000120.
8. Sahu, P.K., V. Masih, S. Gupta, D.L. Sen and A. Tiwari, 2014. Ethnomedicinal plants used in the healthcare systems of tribes of Dantewada, Chhattisgarh India. *Am. J. Plant Sci.*, 5: 1632-1643.
9. Biswas, K., I. Chattopadhyay, R.K. Banerjee and U. Bandyopadhyay, 2002. Biological activities and medicinal properties of neem (*Azadirachta indica*). *Curr. Sci.*, 82: 1336-1345.
10. Chainani-Wu, N., 2004. Safety and anti-inflammatory activity of curcumin: A component of tumeric (*Curcuma longa*). *J. Altern. Complementary Med.*, 9: 161-168.
11. Deshmukh, P.T., J. Fernandes, A. Atul and E. Toppo, 2009. Wound healing activity of *Calotropis gigantea* root bark in rats. *J. Ethnopharmacol.*, 125: 178-181.

12. Saggar, S., P.A. Mir, N. Kumar, A. Chawla, J. Uppal, Shilpa and A. Kaur, 2022. Traditional and herbal medicines: Opportunities and challenges. *Pharmacogn. Res.*, 14: 107-114.
13. Rupani, R. and A. Chavez, 2018. Medicinal plants with traditional use: Ethnobotany in the Indian subcontinent. *Clin. Dermatol.*, 36: 306-309.
14. Tanko, H., D.J. Carrier, L. Duan and E. Clause, 2005. Pre- and post-harvest processing of medicinal plants. *Plant Genet. Resour.*, 3: 304-313.
15. Nair, S. and J. Abraham, 2020. Natural Products from Actinobacteria for Drug Discovery. In: *Advances in Pharmaceutical Biotechnology: Recent Progress and Future Applications*, Patra, J.K., A.C. Shukla and G. Das (Eds.), Springer, Singapore, ISBN: 978-981-15-2194-2, pp: 333-363.