

CHAPTER 3

Medicinal plants in ear problems: traditional & modern insights

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Abstract

Ear disorders, including earache, infections and inflammatory conditions, are commonly managed in traditional medicine by local communities of India, using a wide variety of medicinal plants. Present study documented ethnomedicinal practices involving 32 plant species belonging to 22 families traditionally used for otic ailments. A systematic literature survey was conducted using databases such as PubMed, Scopus, Web of Science and NCBI with targeted ethnomedicinal and ear problems-related keywords. Relevant books and articles were also screened. The most frequently utilized plant parts include leaves, roots, bark, seeds and rhizomes, administered primarily in the form of juices, decoctions, oils and warm extracts. Species such as *Achyranthes aspera*, *Allium sativum*, *Azadirachta indica*, *Ocimum tenuiflorum*, *Vitex negundo* and *Terminalia arjuna* were found to be commonly employed for earache, infections, purulent discharge and related complications. Integration of ethnobotanical knowledge with available pharmacological evidence, recent study highlighted the potential of medicinal plants as complementary options for managing ear-related disorders and underscored the need for further clinical and mechanistic research.

Keywords: Ethnobotanical knowledge, ethnomedicinal, pharmacological evidence

Introduction

Ear disorders such as otitis, earache, tinnitus and hearing impairment pose significant health challenges across communities, particularly in regions with limited access to modern healthcare (Alenezi *et al.*, 2017). For centuries, traditional medical systems, including Ayurveda, folk medicine, African ethnomedicine and indigenous healing practices have relied on medicinal plants as primary remedies for managing ear-related ailments (Das *et al.*, 2025). These plant-based therapies are often chosen for their accessibility, affordability and perceived safety, making them a vital component of community healthcare (Wang *et al.*, 2025). Remedies commonly involved the application of freshly extracted plant juices, warmed leaf decoctions, infusions or oils instilled directly into the ear to relieve pain, reduce

inflammation or address infections. A wide range of botanical species are traditionally used for otic conditions, each valued for specific therapeutic properties such as antimicrobial, anti-inflammatory, analgesic or wound-healing activities (Shedoeva *et al.*, 2019). Plants like *Allium sativum*, *Azadirachta indica*, *Aloe vera* and *Vitex negundo* are noted for their potent antimicrobial or soothing effects (Ahuja *et al.*, 2015; Wylie and Merrell, 2022), while species such as *Achyranthes aspera*, *Cardiospermum halicacabum* and *Ocimum tenuiflorum* are applied in the form of fresh juices to alleviate earache and discharge (Upirey *et al.*, 2016). The ethnomedicinal knowledge surrounding these plants is rich and diverse, with remedies often passed down orally through generations and adapted to local flora and cultural practices (Ullah *et al.*, 2025). Despite their widespread traditional use, many of these medicinal plants remain insufficiently explored within modern scientific frameworks (Davis *et al.*, 2024). While several species have documented phytochemical and pharmacological properties, comprehensive evaluations of their efficacy, safety and mechanisms of action in otic disorders are still emerging. Present study integrated traditional knowledge with contemporary scientific insights, providing an overview of medicinal plants used for ear problems and highlighting the need for deeper investigation. The incorporation of ethnomedicine and modern research, the study aims to support the development of safer, plant-based therapeutic options for ear care.

Methodology

A detailed literature review was carried out to identify medicinal plants traditionally utilized by local communities for treating ear-related disorders. Various scientific databases, including PubMed, Scopus, Web of Science and NCBI, were explored using search terms such as “ethnomedicinal plants”, “herbal treatments for ear problems”, “traditional healing methods in ear problems”, “pharmacological properties”, “medicinal applications in ear problems”, “forms of administration” and “natural healthcare practices”. Additionally, relevant books and published studies were examined to collect comprehensive information on ethnomedicinal plants used for managing ear problems. The plant species mentioned in these sources were verified and classified by the authors with the help of available literature (Mahmoudian-Sani *et al.*, 2017; Kumar, 2025).

Results and discussion

The present study documented 32 medicinal plant species belonging to 22 families traditionally used for the treatment of a range of ear-related ailments, including earache, otitis, ear discharge, infections, swelling, obstruction and deafness (Table 1; Figure 1). The Lamiaceae family contributed the highest number of species, followed by Asteraceae, Euphorbiaceae and Fabaceae, reflecting their prominence in ethnomedicinal practices. Leaves were the most frequently used among the plant parts, attributing more than half of the remedies, followed by roots, bark, seeds, flowers and rhizomes. The mode of administration was notably consistent across species, with fresh plant juice, warm decoctions and medicated oils being the dominant forms of application (Figure 2). Many preparations were applied topically as ear drops, such as those from *Ajuga integrifolia*, *Cardiospermum halicacabum*, *Coccinia grandis* and *Ocimum* species. Plants like *Achyranthes aspera* and *Allium sativum* were used to prepare specialized oils (Dey, 2011), while species such as *Euphorbia hirta* and *Sonchus asper* were used for their latex and sap (Kumar *et al.*, 2010). Remedies targeting infections were frequently documented for antimicrobial species, including *Azadirachta indica*, *Terminalia arjuna* and *Psidium guajava*. A few plants, such

as *Vachellia nilotica*, were reported to have more specific applications, including management of ear tumors (Kumar *et al.*, 2010). Many of the reported plants are known to possess antimicrobial, anti-inflammatory, analgesic or wound-healing properties, offering biological plausibility for their use in otic conditions. For example, *Allium sativum* exhibits strong antimicrobial activity against pathogens associated with otitis (Uzun *et al.*, 2019), while *Vitex negundo* and *Azadirachta indica* are well-documented for their anti-inflammatory and antiseptic effects (Lobo and Pimpliskar, 2018). The use of warm decoctions and warmed plant extracts may further enhance soothing effects and facilitate deeper penetration into the ear canals. Despite the clear cultural and practical significance of these remedies, the scientific validation of their efficacy remains uneven. While some plants, such as *Aloe vera* and *Psidium guajava*, have been evaluated for antimicrobial or anti-inflammatory actions (Okoh and Immanuel, 2024), many others lack controlled laboratory or clinical studies specifically targeting otic disorders. Moreover, safety concerns must be addressed, as certain species, such as *Nerium oleander* contain potent bioactive compounds that may pose toxicity risks if improperly prepared. The variability in preparation methods, dosage and application practices also highlighted the need for standardization. Integrating ethnobotanical insights with phytochemical and pharmacological research can help identify promising plant species for treating different ear problems.

Table 1: List of medicinal plants traditionally used against ear problems

Botanical name	Common name	Family	Parts used	Mode of uses	Sources
<i>Achyranthes aspera</i> L.	Chaff flower (E)	Amaranthaceae	Root	The fresh root juice is used for earache. Alternatively, “Apamarga oil” (prepared using the root) is used for ear pain.	Present study (Collected information from Cuttack, Odisha, India)
<i>Ajuga integrifolia</i> Buch.-Ham. ex D. Don	Bracted bugleweed (E)	Lamiaceae	Leaf	The juice is dropped into the ear cavity, drop wise to treat earache.	Ghosal and Tamuli, (2017)
<i>Allium cepa</i> L.	Onion (E)	Amaryllidaceae	Rhizome	The juice is used to treat earaches	Present study (Collected informat

				and infections.	ion from Cuttack, Odisha, India)
<i>Allium sativum</i> L.	Garlic (E)	Amaryllidaceae	Rhizome and leaf	The oil is used to treat earache and juice extracted from warmed leaves is used in the ear to ease earache.	Ghosal and Tamuli, (2017)
<i>Aloe vera</i> (L.) Burm.f.	Ghrith kumari (H)	Asphodelaceae	Leaf	The gel is crushed to extract the juice and use directly into the affected ear.	Marin <i>et al.</i> , (2020)
<i>Artemisia afra</i> Jacq. ex Willd.	African wormwood (E)	Asteraceae	Leaf	A warm extract obtained by boiling the leaves is instilled dropwise into the ear to ease earache.	Ghosal and Tamuli, (2017)
<i>Azadirachta indica</i> A.Juss.	Neem (E)	Meliaceae	Seed	The oil is applied topically using cotton swab against pathogens associated with ear infections.	Present study (Collected information from Cuttack, Odisha, India)
<i>Barleria prionitis</i> L.	Porcupine flower (E)	Acanthaceae	Leaf	The ground leaf yields juice that is	Present study (Collect

				mixed with camphor and applied to the ear.	ed informat ion from Cuttack, Odisha, India)
<i>Bidens pilosa</i> L.	Spanish needle (E)	Asteraceae	Leaf	The leaf is ground into paste and then mixed into water; the mixture is then used to treat ear problems.	Ghosal and Tamuli, (2017)
<i>Cardiospermum halicacabum</i> L.	Balloon vine (E)	Sapindaceae	Leaf	Two to three drops of fresh leaf juice are used as ear drops to relieve earache and purulent discharge from the ear.	Present study (Collect ed informat ion from Cuttack, Odisha, India)
<i>Chrozophora tinctoria</i> (L.) A. Juss.	Dyer's cotton (E)	Euphorbiaceae	Leaf	The juice is used for the treatment of ear ailments.	Mahmou dian-Sani et al., (2017)
<i>Clitoria ternatea</i> L.	Butterfly pea (E)	Fabaceae	Leaf	The juice extracted from crushed leaves is utilized to alleviate ear pain and reduce swelling of the nearby gland.	Present study (Collect ed informat ion from Cuttack, Odisha, India)

<i>Coccinia grandis</i> (L.) Voigt	Ivy gourd (E)	Cucurbitaceae	Leaf	The juice is utilized as ear drops to alleviate earache.	Mohanty <i>et al.</i> , (2015)
<i>Dracaena roxburghiana</i> (S chult. & Schult.f.) Byng & Christenh.	Indian bowstring hemp (E)	Asparagaceae	Leaf	The leaves are warmed, and the heated juice is pressed onto the impacted area.	Ghosal and Tamuli, (2017)
<i>Euphorbia hirta</i> L.	Asthma weed (E)	Euphorbiaceae	Stem	The stem is fractured to obtain the latex and 1-2 drop is dropped into the ear twice daily to treat earache.	Present study (Collect ed informat ion from Cuttack, Odisha, India)
<i>Hellenia speciosa</i> (J.Koenig) S.R.Dutta	Crepe ginger (E)	Costaceae	Leaf	The decoction is applied into the ear and are used to treat otis problem.	Ghosal and Tamuli, (2017)
<i>Lantana trifolia</i> L.	Popcorn lavender (E)	Verbenaceae	Leaf	The leaves are boiled to make a warm extract or decoction, which is then dropped into the affected ear to relieve pain.	Mahmoudian-Sani <i>et al.</i> , (2017)

<i>Malva parviflora</i> L.	Cheese weed mallow (E)	Malvaceae	Flower	An infusion made from flowers is used as ear drops or consumed orally to alleviate earache.	Mahmoudian-Sani <i>et al.</i> , (2017)
<i>Mentha spicata</i> L.	Spearmint (E)	Lamiaceae	Apical parts	Essential oil is used as a remedy for earache.	Mahmoudian-Sani <i>et al.</i> , (2017)
<i>Nerium oleander</i> L.	Oleander (E)	Apocynaceae	Stem bark	Juice prepared from the stem bark is boiled with gingelly oil and two drops are poured into ear to treat ear pain.	Ghosal and Tamuli, (2017)
<i>Ocimum basilicum</i> L.	Sweet basil (E)	Lamiaceae	Leaf	The leaves are pressed and the juice is released into the ear twice daily to treat earache.	Bose <i>et al.</i> , (2015)
<i>Ocimum tenuiflorum</i> L.	Tulsi (H)	Lamiaceae	Leaf	The juice is instilling a few drops into the affected ear to relieve pain and infection.	Present study (Collected information from Cuttack, Odisha, India)
<i>Psidium guajava</i> L.	Guava (E)	Myrtaceae	Leaf	The decoction is used to	Gutiérrez <i>et al.</i> , (2008)

				treat ear infection.	
<i>Ricinus communis</i> L.	Castor oil (E)	Euphorbiaceae	Seed	The oil is applied topically as ear drops to treat earache, obstruction and deafness.	Mahmoudian-Sani <i>et al.</i> , (2017)
<i>Shorea robusta</i> C.F.Gaertn.	Sal (E)	Dipterocarpaceae	Stem	The stem is ground into juice, subsequently filtered, and utilized for the treatment of earache.	Present study (Collected information from Cuttack, Odisha, India)
<i>Sonchus asper</i> (L.) Hill	Prickly sow-thistle (E)	Asteraceae	Leaf	The leaf sap is used to treat earache and deafness.	Mahmoudian-Sani <i>et al.</i> , (2017)
<i>Terminalia arjuna</i> (Roxb. ex DC.) Wight & Arn.	Arjun (E)	Combretaceae	Bark	The decoction is applied drop wise against bacterial ear pathogens.	Present study (Collected information from Cuttack, Odisha, India)
<i>Vachellia nilotica</i> (L.) P.J.H. Hurter & Mabb.	Babul (E)	Fabaceae	Bark	The gum and bark decoction are used for treating ear tumors.	More <i>et al.</i> , (2024)
<i>Viburnum foetidum</i> Wall.	Stinking viburnum (E)	Viburnaceae	Leaf	A small quantity of fresh leaves is boiled with a minimal	Ghosal and Tamuli, (2017)

				amount of water, resulting in a concentrate mixture is used as ear drops.	
<i>Vitex negundo</i> L.	Chaste tree (E)	Lamiaceae	Whole plant	The whole plant is grinded and extracted juice is mixed with water and used dropwise to treat earache.	Present study (Collected information from Cuttack, Odisha, India)

(E: English; H: Hindi)



Figure 1: Some common medicinal plants used against ear problems

Biotechnological approaches

Laboratory-based experiments and microbial assays are essential for validating traditional applications. Many of the plants reported in the present study are used for infections and discharge, making antibacterial, antifungal and anti-inflammatory assays highly relevant. Plant extracts like *Allium sativum* extracts tested against otitis-causing pathogens such as *Staphylococcus aureus* and *Pseudomonas aeruginosa* (Ghosal and Tamuli, 2017). *Psidium guajava* leaf decoction screened for anti-inflammatory markers such as NO (Nitric oxide) inhibition or COX (Cyclooxygenase) suppression (Gutiérrez *et al.*, 2008). Such assays help scientifically justify the ethnomedicinal use of these plants in otic disorders.

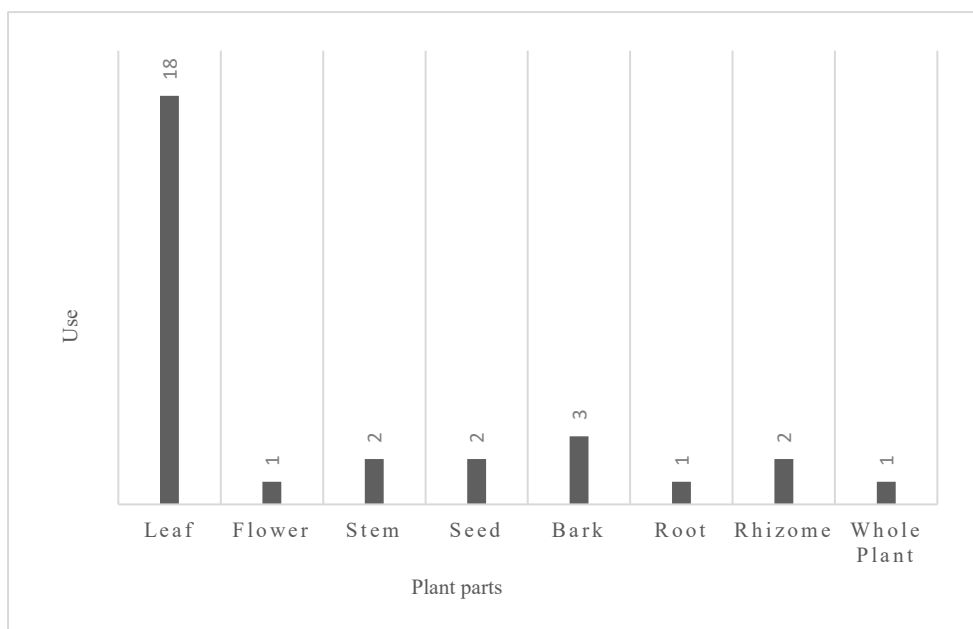


Figure 2: Plant parts and their repeated times of use

Conclusion

The present documentation highlights the extensive traditional knowledge associated with medicinal plants used for managing ear-related disorders across diverse cultural settings. While many of the recorded species possess known antimicrobial, anti-inflammatory or analgesic properties, scientific validation is still limited for several of the plants traditionally used in ear care. The gap highlighted the need for systematic phytochemical and pharmacological studies to establish efficacy, safety and mechanism of action. Integrating traditional knowledge with modern research approaches may help identify promising candidates for developing affordable, accessible and natural therapeutics for otic disorders.

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