Ethno-botanical Study of Indigenous Knowledge of Medicinal Plants used by Traditional Healers in Odisha

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Abstract:
Indigenous knowledge of medicinal plants has played a crucial role not only in addressing health issues but also in preserving plant diversity. The knowledge base has recently been recognised for its potentiality and there are growing debates around the threat and need for conservation of this rich knowledge base. Odisha, being a land with many tribal communities and forest resources, is home to many such practices. In this context, this study explores the nature of the alternative medicine practices used by traditional healers in two districts of Odisha, namely Dhenkanal and Bolangir. The study explores the characteristics of plants used for medicinal purposes and the challenges faced by practitioners of traditional medicine. The data was collected through a questionnaire survey containing both objective and subjective questions. Seventeen traditional herbal healers were interviewed in Dhenkanal and twenty healers were interviewed in the Balongir district. The study reported a rich knowledge base, including the kinds of diseases they treat and the threats they face.

Keywords: Indigenous knowledge, Alternative Medicine, Traditional Healers, Conservation

1. INTRODUCTION

Ethnobotany, a term first introduced by John W. Harsberger in 1896, initially referred to the practices of documenting and utilising plants by different cultural groups. It later evolved into a more comprehensive discipline when Ford (1978) incorporated anthropological tools to investigate indigenous knowledge systems (Panda, 2011). The term "ethno" pertains to the study of people, their cultures, languages, and traditions, while "botany" is the scientific study of plants. Ethnobotany, therefore, refers to the interactions between people and plants within their cultural and environmental contexts (Bansal et al., 2016). This field is deeply influenced by factors such as local classification systems, cognitive frameworks, historical and cultural backgrounds, religious beliefs, social networks, and the accessibility of information (Mechaala et al., 2022). One key aspect of ethnobotany is "ethno-restorative exploration," which involves investigating how rural populations utilise their extensive traditional knowledge of plant resources, particularly for preparing natural medicines.

Ethnobotany plays a vital role in documenting the indigenous knowledge of plant usage and compiling inventories of useful plants among ethnic communities. Traditional medicine—predominantly plant-based—has been an essential component of healthcare in many societies for centuries, serving as the backbone of primary healthcare in rural and tribal areas. These practices reflect a holistic approach to health, intertwining physical, mental, and spiritual well-being, and are deeply rooted in cultural identity (Kumar, 2016; Kala, 2005). Ethnobotanical research helps us to understand how different cultures utilise plants to cure diseases and sheds light on both the potential and the challenges faced by this vanishing body of wisdom (Martin, 2010; Cotton, 1996).

According to the World Health Organisation (WHO, 2005), approximately 80% of the global population—especially in developing countries—relies on plant-based remedies as their primary source of healthcare (Mechaala et al., 2022). This reliance is largely due to cultural traditions, poverty, and limited access to

modern medicine. Medicinal plants are often perceived as safe and non-toxic, which contributes to their popularity (Krishna Gitanjali, 2024). However, the absence of standardised treatment protocols and scientific validation poses challenges. Furthermore, factors such as population growth, urbanisation, and climate change are significantly impacting the availability of these crucial natural resources (Mirzaeian et al., 2019).

Traditional medicinal knowledge has historically been passed down orally from generation to generation. However, modern lifestyle changes, urbanisation, and a shift in youth occupational interests have disrupted this transmission. Environmental degradation and biodiversity loss further threaten this knowledge base (Chakrabarty et al., 2021). The oral nature of this tradition makes it especially vulnerable to extinction, as much of it remains undocumented (Poorna et al., 2014). Moreover, the lack of legal and institutional frameworks for protecting traditional knowledge leaves indigenous practitioners exposed to exploitation and cultural erosion (Chakrabarty et al., 2021).

Despite these challenges, indigenous people and local communities play a critical role in conserving traditional knowledge, which has historically contributed to innovation and is essential to food and nutritional security (Albuquerque et al., 2024). The Convention on Biological Diversity also emphasizes the importance of preserving such knowledge (Kannaiyan, 2007). Traditional healers, for example, are central to conserving ethnomedicinal practices, fostering species conservation, sustainable biodiversity use, and awareness about environmental stewardship (Haq et al., 2023).

India is one of the world's most biologically diverse countries, with approximately 45,267 plant species (BSI, 2020), including around 8,000 medicinal plants (BSI, 2019). Roughly 25% of drugs in the modern pharmacopoeia are derived from plants, with many others based on synthetic analogues of plant-based compounds. Ancient Indian texts like the *Charaka Samhita* and *Sushruta Samhita* provide comprehensive pharmacological classifications of plant-derived remedies (Singh et al., 2012). In India, where a significant portion of the population still depends on natural resources for basic healthcare, this traditional knowledge remains relevant (Krupa et al., 2019).

With its 29 states, India hosts vast cultural and ethnic diversity, including more than 53 million tribal people from 550 communities and 227 ethnic groups (RK et al., 2010). Approximately 60% of rural communities depend on forests for their daily subsistence, drawing income from forest resources, agriculture, livestock, and other means (MoEF, 1996). Odisha, a state in eastern India, is particularly notable, ranking third in terms of tribal population with 62 tribal groups, including 13 Particularly Vulnerable Tribal Groups (Das et al., 2023; Nayak & Kumar, 2023). Tribes such as the Kondhs, Santals, Gonds, Bhuyans, Bondas, and Juangs are known for their rich knowledge of medicinal plants (Kumar et al., 2022).

Odisha is also the second-largest producer of Non-Timber Forest Products (NTFPs), with 37% of its population depending on NTFPs for daily needs (Kandari et al., 2012). In regions like Koraput, tribal communities utilize a wide range of medicinal plants—for example, 38 species have been documented for treating snakebites (Kumar et al., 2016). The Similipal Biosphere Reserve alone houses over 1,076 plant species, with more than 200 known for their medicinal properties (Rout, 2004). The tribal healthcare system, known as the "Traditional Health Care System," integrates herbal treatments with psychosomatic

and magico-religious practices. Healers from tribes such as the Saora use herbs alongside rituals to treat illnesses, indicating a blend of spiritual and physical healing (Balgir, 1997).

The health and healing methods of tribal people are influenced by their unique social, cultural, and environmental contexts. However, despite India's rich traditions in herbal medicine and its widespread rural applications, much of this indigenous knowledge remains undocumented and is at risk of disappearing. In districts like Balangiri and Dhenkanal in Odisha, traditional healers still rely heavily on locally available medicinal plants to treat common ailments. Yet, rapid modernization, limited scientific validation, and declining interest among younger generations have made this traditional wisdom increasingly fragile.

Although broader studies have examined Indian ethnomedicine and Ayurveda, very few have focused on localized traditional medicinal practices, particularly in biodiversity-rich regions like Balangiri and Dhenkanal. There is limited scientific documentation on how these communities perceive, use, and conserve medicinal plants in everyday life. The exclusion of traditional healers from policy discussions on conservation and healthcare further exacerbates this issue, leaving a significant knowledge gap.

To address this, the present study seeks to explore: How is traditional medicinal knowledge preserved and practiced in the Balangiri and Dhenkanal districts of Odisha? and What are the current challenges in conserving medicinal plants and their traditional uses? This inquiry aims to document the unique local practices, assess their current status, and identify barriers to the preservation and sustainability of traditional knowledge systems.

2. MATERIALS AND METHODS

2a. Study Area and Data Collection

The present research work was carried out in 13 villages of Dhenkanal district and 30 villages of Balangiri district. The research work was started from June 2022 to February 2024.During the present study, 17 traditional healers from Dhenkanal and 29 traditional healers from different blocks of Balangir district — including Patnagarh, Khaprakhol, Titlagarh, Bangomunda, Muribahal, and Belpara — were interviewed.

Dhenkanal district is situated in central Odisha and extends between 20° 29’ and 21° 11’N and 85°58’ and 86°2’E. The district has an area of 4452 km2 inhabited by 11.93 lakhs numbers of people (2011 Census). Dense forest covers around 1737.62 sqkm of the district. The district is predominantly rural in nature, as around 91.29% of the population lives in villages. The climate condition of Dhenkanala is predominantly hot and dry sub-humid. The district receives average annual rainfall of 1696 mm and the mean minimum & maximum temperatures are 19.6 ºC and 33.3 ºC respectively. The humidity is generally high varying from 31 to 88%. Twenty-four tribal communities i.e., Saor, Sabar, Pendia, Juanga, Matia, Paraja, , Munda, Araon, Mirdha, , Lodha, Mankidi Koya, Mahali, Kolha, Haria, Koru, Kishan, Ho, Kandha, Gand, Binijhal, Dharua, Bhuyan & Bhomij, are residing in the district. Tribal communities in total constitutes 13% of the total population of the district. A survey of literature reveals that a few number of ethnobotanical contributions have been made on Dhenkanal district during the last few decades (Mahalik et al.,2015, Mohanty et al.,2015).

The Balangir district, also spelt as Bolangir, is located between 20^0 11' 40"-21^0 05'08" North latitude and 82^0 41'15"-83^0 40'22" East longitude. The district extends over an area of 6,569 sq.km. Forest in the district covers over 1,543.85 sq.km serving around 16,48,997 number of people living in and around forest areas. The district comprises of 3 sub-divisions, 6 Tehsils,14 Blocks and 285 Gram panchayat. The maximum temperature goes up to 48.7^0C in the month of May and minimum temperature fall down to 16.6^0Cin the month of December. The district is situated in the valley of rivers like Ang and Tel. Altogether, 43 tribal groups with a population of 2,75,822 are inhabited in the district but dominant tribal groups are Gond(83,711), Khond (80,670), Saora (38,760), Binjhal(29,177), Shabar (11,455), Mirdha(5,970), Munda (3,096), Kulis (1,620), Kondadora (1,262), Santal (1,060), Banjara (896), Kolha (685), Generic Tribes (545), Dharua(433), Tharua (305), Kolah Lohara (169), Kol (159), Oraon (133), Bhuiya (119),Bhunjia(117), Kisan(101), Mahali(57), Mankirdia(27),etc. (Bhatt &Bhargava,2006).Among them Binjhal,Gond, Ho,Santal and Saora are identified as primitive tribal groups of the district. About 50 categories of Schedule cast are also found in the district (Bhatt &Bhargava,2006). A survey of literature reveals that a few numbers of ethnobotanical contributions have been made on Balangir district during the last few decades by Brahmam & Saxena (1990), Misra& Das (2003), Misra (2006), Mohapatra and Sahoo (2008) and Tripathy and Behera (2008).

Both the districts, being rich in forest cover and diverse communities, especially rural and tribal provide potential to explore traditional medicinal practices. Rural and forest communities has been dependent upon forest and kitchen garden not only for dietary necessity but also for healing various health ailments.

2b. Data Collection

Data were collected from a field survey conducted from June 2022 to February 2024. Data were collected through personal interviews with traditional healers practising alternative medicines. Traditional healers were identified through snowball sampling. A questionnaire consisting of both objective and subjective questions is used for the survey.

Information on ethnomedicinally important species was recorded, including the local names of the plants, Growth form, availability, category (wild or cultivated), abundance, and the part used in medicinal practices.

(Table 1: Demographic Characteristics of the Traditional healers of both the Districts)

Characteristics		Dhenkanal	Balangiri	Total	%
No of the Healers		17	29	46	100
Gender	Female	5	0	5	10.86
	Male	12	26	38	82.60
	Transgender	0	3	3	6.52
	Primary	8	22	30	65.21

Educational Qualification	Secondary	5	6	11	23.91
	Higher Secondary	1	1	2	4.34
	Above	3	0	3	6.52
Income	<50000	5	16	21	45.65
	50000-1lakh	8	13	21	45.65
	>1 lakh	4	0	4	8.69
Acquisition of Traditional Knowledge	From Master	7	16	23	50
	From Father	9	10	19	41.30
	Other(Book)	1	3	4	8.69
Nature of Practices	Full time	12	9	21	45.65
	Part time	5	20	25	54.34
Nature of Record	Yes	6	22	28	60.86
	No	11	7	18	39.13

The Ethano botanical data collection has been done by interviewing 46 traditional healers of different blocks of Dhenkanal and Balangir district, Odisha. Among them 17 healers were from Dhenkanal 29 are from Balangir. Most of the healers interviewed are male (82.60%). However, their educational background can vary widely, with 65.21% having only a primary level of education. Secondary education was attained by 23.91%, while higher secondary and above were limited to a combined 10.86%, suggesting that formal education is not a prerequisite in this field.

From an economic perspective, Most of the healers interviewed during the study period belong to the lower economic section of society. Annual income of most healer for both districts are less than fifty thousand. Very few number of healers had reported that their annual income exceeded one lakh.

Out of the total 46 traditional healers surveyed across both districts, 50% acquired their knowledge through mentorship under a master. Meanwhile, 41.30% inherited their traditional healing practices from their fathers. The remaining healers (8.69%) gained their knowledge from other sources, such as books and written materials. Among the total number of healers, 45.65% practice traditional healing as their full-time occupation, while the remaining 54.35% are engaged in it on a part-time basis. Approximately 60.86% of the healers maintain records of their practices, whereas the remaining 39.14% do not keep any documentation.

3. RESULT AND DISCUSSION

During the ethnobotanical study, a total of 124 medicinal plant species were documented as being used by traditional healers in Balangir district. Similarly, in Dhenkanal district of Odisha, 101 medicinal plant species were reported to be used for traditional healing practices.

This brings the combined total to 225 plant species utilized across both districts for medicinal purposes. Among these, 40 plant species were found to be common to both Balangir and Dhenkanal districts. Therefore, the number of unique plant species used by traditional healers in the two districts is 185.

3a. Vegetation Characteristics

Out of the total 124 plant species reported from Balangir district, 65 species are herbs (Fig-1), which constitutes approximately 52.41% of the total medicinal plants recorded in the district. In comparison, Dhenkanal district reported a total of 101 plant species. While the number of herbs and trees documented in Dhenkanal is lower than that of Balangir, the number of shrubs is comparatively higher. This suggests a variation in vegetation patterns and usage across the two districts, possibly influenced by local ecological conditions and traditional knowledge systems.

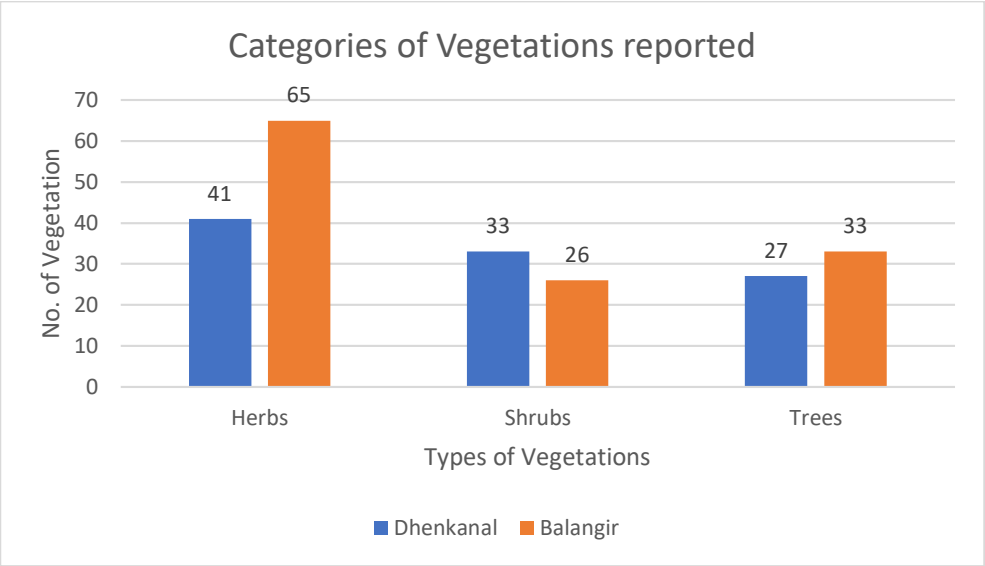


Figure 1: Categories of Vegetation Reported

While traditional medicine practices have historically dependent up on local availability of plants, traditional healers also use their networks to acquire some plant that are non-local. Out of the 185 documented plant species, 97 were identified as local, while 88 were considered non-local. Interestingly, the species *Lunisaga* was regarded as both local and non-local, depending on the context. A total of 40 plant species were found to be common to both Balangir and Dhenkanal districts. However, differences in local classification were observed between the two regions. Several plant species that were considered local in Balangir were classified as non-local in Dhenkanal. Examples include *Amari*, *Gangasiuli*, *Jamu*, *Kuchla*, *Methi*, *Patalgaruda*, *Puruni*, *Sarpagandha*, *Sunari*, and *Talamuli*. Conversely, some species considered local in Dhenkanal—such as *Bahada*, *Bhuin Limba*, and *Brahmi*—were regarded as non-local in Balangir. These discrepancies reflect regional variations in vegetation and ethnobotanical knowledge and the perception of plant origins among traditional healers in different cultural landscapes.

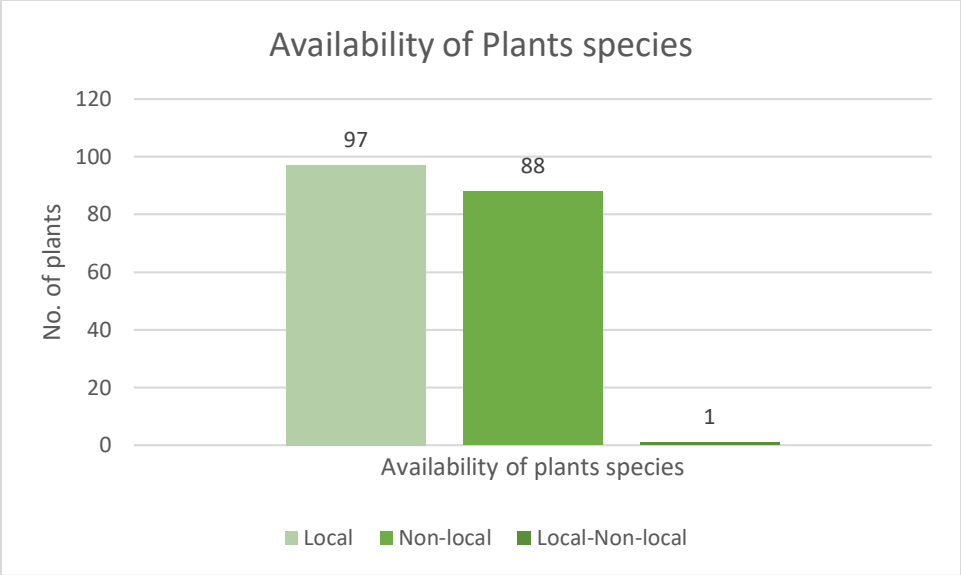


Figure 2: Availability of Plant Species

A majority of the plants were identified as wild, while a smaller portion were cultivated (fig 3). Interestingly, some species—such as *Amba*, *Anla*, *Aparajita*, *Basachandan*, *Brahmi*, *Mayaa*, *Nilagiri*, *Rakta Chandan*, *Rasna*, and *Sarpagandha*—were found both in wild and cultivated forms, depending on the context. Several species regarded as wild in Balangir were considered cultivated in Dhenkanal, including *Amla*, *Bhuin Limba*, *Brahmi*, *Gangasiuli*, *Javetri*, *Mutrichera*, *Puruni*, *Satabari*, *Sunari*, *Talamuli*, and *Yasthi Madhu*. Notably, *Amla* and *Brahmi* were recognized as both wild and cultivated in Balangir. Conversely, *Amarpoi* was classified as wild in Dhenkanal but cultivated in Balangir, reflecting regional differences in plant management and classification.

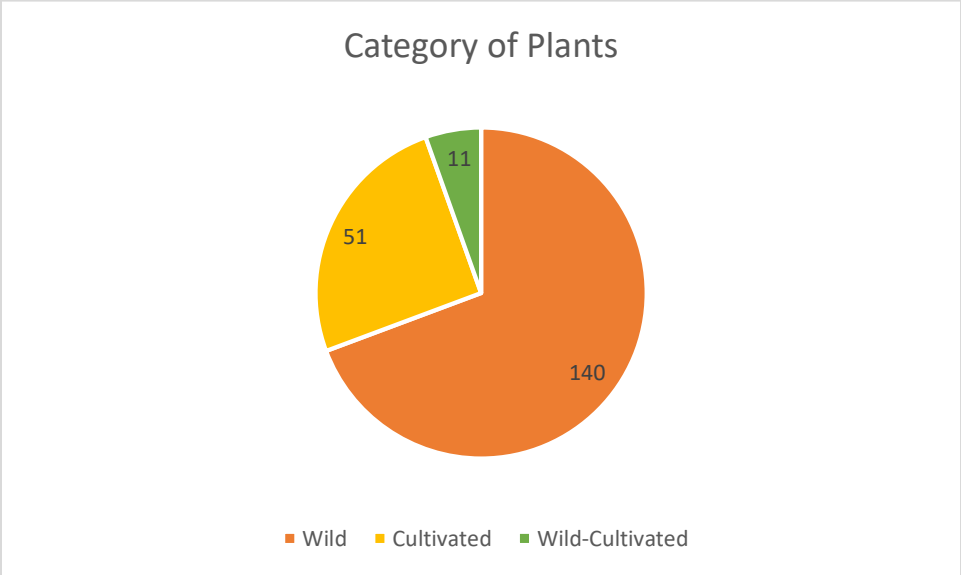


Figure 3: Category of plants

In Dhenkanal, a total of 101 plant species belonging to 36 families were reported to be used by traditional healers for medicinal purposes. In Balangir, 124 medicinal plant species were documented, representing 69 plant families. Altogether, 105 distinct plant families were identified across both districts. Among these, 40 families were found to be common to both regions, as illustrated in Figure 2.2. The most frequently

cited medicinal plant family in both districts was *Fabaceae*, followed by *Apocynaceae*, *Asteraceae*, *Combretaceae*, and *Rutaceae*.

Several plant families found in Balangir were not reported in Dhenkanal, indicating a notable regional variation in floristic composition. These families include *Amaranthaceae, Anacardiaceae, Annonaceae, Apiaceae, Asclepiadaceae, Asphodelaceae, Bignoniaceae, Boraginaceae, Bromeliaceae, Caesalpiniaceae, Capparaceae, Caprifoliaceae, Celastraceae, Convolvulaceae, Cornaceae, Cucurbitaceae, Daisy, Iridaceae, Lauraceae, Leguminosae, Loganiaceae, Lygodiaceae, Lythraceae, Moraceae, Myristicaceae, Nightshade, Oxalidaceae, Papaveraceae, Plantaginaceae, Portulacaceae, Primulaceae, Punicaceae, Rassulaceae, Santalaceae, Spiderworts, Sterculiaceae, Tectariaceae, Tiliaceae, Urticaceae, Verbenaceae, and Vitaceae.*

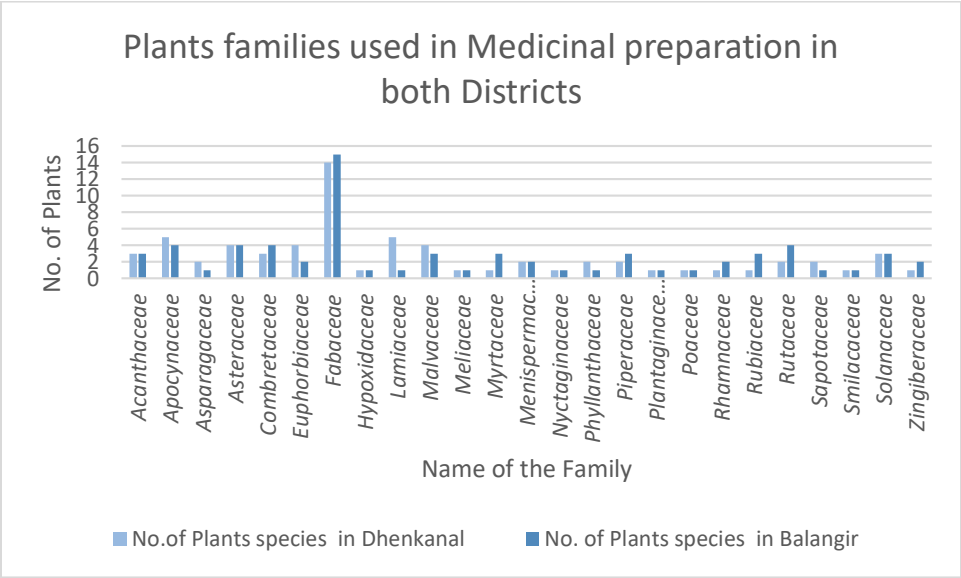


Figure 4:Families of the plants used in preparing Medicine

3c. Pattern of Uses of Plant for Medicine

Different parts of medicinal plants are used as medicine by the traditional healers. Leaves and roots are the most frequently used plant parts in both regions. In Balangir, leaves are slightly less used than in Dhenkanal, but both regions show a high dependency on them. This emphasizes that leaves are the most accessible and sustainable part of the plant for medicinal use. They are easier to harvest without harming the plant. Similarly, roots are also widely used, particularly in Balangir, where their usage is notably higher than in Dhenkanal — approximately 40 uses compared to about 25.The use of whole plants ranks next in frequency, especially in Balangir, where it appears around 25 instances, compared to Dhenkanal's slightly lower usage (around 20).Other plant parts such as barks, stems, flowers, fruits, and seeds show moderate use. For instance, barks and fruits appear to be used in almost equal proportions in both regions, ranging between 10–15 instances. Similarly, the 'Others' category, which might include plant, gums, or latex, peel, is used rarely, showing minimal contribution to medicinal preparation in both areas.

When comparing the two regions overall, Balangir shows a higher total use of most plant parts except leaves and flowers, where Dhenkanal slightly leads. This might reflect variations in local vegetation, traditional practices, or availability of specific species in each region.

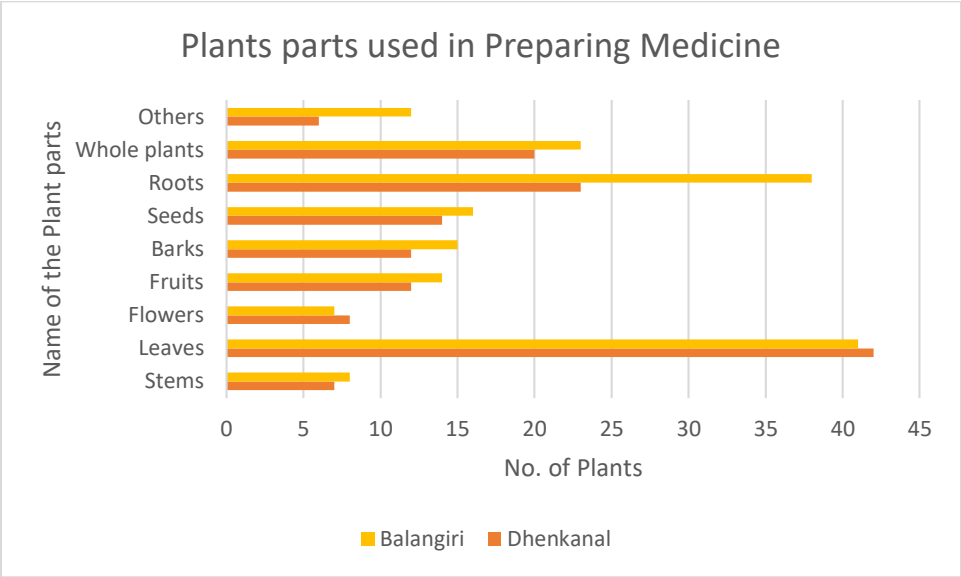


Figure 5: Plant parts used in Preparing Medicines

3d: Types of Disease Treated

The study revealed a rich diversity in the use of medicinal plants by traditional healers in both Dhenkanal and Balangir districts, where 27 common diseases were treated using varying numbers of plant species. In Dhenkanal, the highest number of plants was used for cold, cough, and fever (16 species), followed by wounds and cuts (14), skin diseases (14), and cholesterol control (14). Other ailments with notable plant use included stomach disorders (13), urinary tract infections (13), diarrhoea (11), piles (11), and menstrual problems (11). Moderate use was seen for conditions like mental retardation, respiratory problems, headache, insomnia, asthma, and ulcer (each with 9 species), while fewer plants were employed for heart disease, malaria, typhoid, sexual disorders, tuberculosis, jaundice, bone fracture, and ascites. In Balangir, the greatest number of plant species were used for skin diseases (22), followed by stomach ailments (20) and cold, cough, and fever (17). Other frequently treated conditions included wounds and cuts (12) and diabetes (10), while moderate numbers were used for menstrual problems, snakebite, urinary tract infections, mental enhancement, and jaundice. Fewer species were used for headache, asthma, diarrhoea, heart and respiratory diseases, malaria, sexual problems, and insomnia, with only one or two plants reported for nose bleeding, cholesterol control, typhoid, bone fracture, and ascites. Overall, Dhenkanal showed greater diversity of plant use for internal and chronic ailments, whereas Balangir demonstrated higher plant use for skin, digestive, and infectious diseases.

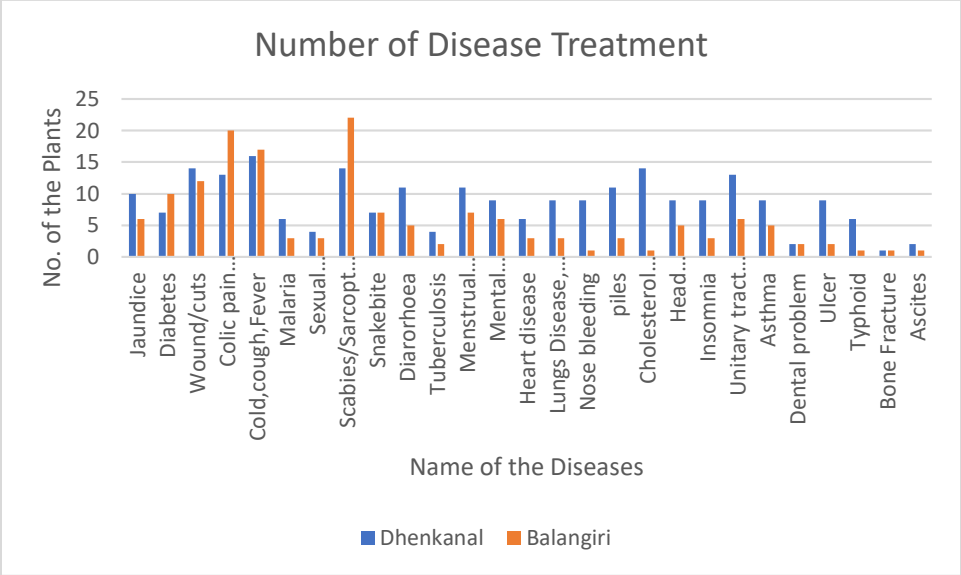


Figure 6: Number of Disease Treatments

The traditional healing system was well established in both districts, and a total of forty-six traditional healers were identified as practising in these areas. Collectively, these healers were found to treat sixty-two different diseases using indigenous knowledge and traditional medicinal practices. Among these, twenty-seven diseases were commonly treated by healers in both districts. These commonly treated ailments included jaundice, diabetes, wounds and cuts, colic pain or stomach pain or gastritis, cold, cough, fever, malaria, sexual diseases and pregnancy-related problems, scabies or sarcoptic and other skin diseases, snakebite, diarrhoea, tuberculosis, menstrual problems, mental retardation and memory enhancement, heart disease, lung diseases and breathing problems, nose bleeding, piles, cholesterol control, headache, anxiety and depression, insomnia, urinary tract infection, asthma, dental problems, ulcer, typhoid, bone fracture, and ascites.

In addition to these commonly treated diseases, there were several ailments that were found to be treated exclusively by traditional healers in the Balangir district. These included sore throat, kidney stones, bowel syndrome, ringworm, constipation, burns, arthritis or joint pain, dog bites, blood purification, “Siklin” (a local term for a specific ailment), body pain, anti-inflammatory conditions, paralysis, body weakness, fungal infections, chickenpox, eyesight problems, blood pressure, muscle spasms, and cholera. The treatment for these diseases was not found among the traditional healers in the Dhenkanal district during the study period.

Similarly, there were certain diseases that were exclusively treated by the traditional healers in the Dhenkanal district, and these were not reported among the healers in Balangir. These diseases included chronic disease conditions, conjunctivitis, dengue, dysentery, elephantiasis and leprosy, epilepsy, haemoptysis and vomiting, hair fall, hair growth and alopecia, lactation-related problems, leucorrhoea, nerve disorders, placenta removal, rejuvenation-related treatments, scorpion sting, and thyroid disorders.

4. WEAKNESS OF TRADITIONAL KNOWLEDGE

After interviewing the traditional healer, we conclude that almost all of the healers are facing financial problems and do not get any kind of help from the government. Not all people are coming to them because all people want quick treatment, and even if people come to them, they pay less fees. According to the healer, the weakness of this knowledge is the modernised mindset; it takes a long time to heal, people hardly believe in this practice, it can't be used for instant treatment.

Fourteen traditional healers said that as traditional medicine takes a long time to heal, people don't want to prefer this. 12 traditional healers said that the modernize mindset low the value of this knowledge as everyone believe on scientific medicine and want instant treatment in less time. 7 traditional healers said that lack of believe of people in traditional medicine is the reason that people are not prepare to use it. Another 3 healers stated that, unfortunately, this medicine does not show a quick reaction, so it can't be used if the patient is in a serious condition.

5. STRENGTH OF TRADITIONAL KNOWLEDGE

In recent years, there has been a growing inclination among people toward Ayurvedic and traditional forms of medicine as alternatives to modern allopathic treatments. This shift is primarily due to the widespread belief that Ayurvedic medicines are natural, chemical-free, and have minimal or no side effects compared to modern pharmaceuticals. Traditional knowledge systems, being largely independent of formal education, enable even illiterate individuals to treat themselves and others using locally available medicinal plants and indigenous practices. Such treatments are believed to cure diseases from their root, offering long-term healing rather than temporary relief.

According to traditional healers, many patients turn to traditional medicine after losing hope in allopathic treatments. Although traditional remedies may not provide instant relief, healers assert that they have successfully treated numerous patients and helped them regain good health and happiness. Elderly people, in particular, continue to place strong faith in traditional healing systems and often prefer Ayurvedic remedies over allopathic drugs. The popularity of traditional medicine has also increased because it is considered safe, affordable, and accessible, especially for economically weaker sections who cannot bear the high cost of modern medical care. Moreover, the longstanding cultural belief that traditional medicines eradicate diseases permanently has further strengthened public trust in these systems.

Among the 46 traditional healers interviewed from both districts, 16 healers reported that traditional medicines involve no chemical adulteration, 13 healers stated that these medicines have no side effects, 7 healers highlighted their low cost, 5 healers emphasized that the medicines are prepared through herbal and natural processes, and another 5 healers mentioned that traditional medicines cure diseases from their root. These perceptions collectively explain the increasing interest and confidence of people in Ayurvedic and traditional healing practices, which continue to hold significant relevance in rural healthcare systems.

6. METHODS OF PRESERVATION

Preservation of traditional knowledge is not merely an act of cultural continuity but a strategic investment in sustainable development. Traditional wisdom embodies the harmonious relationship between humans and their environment, emphasizing biodiversity conservation, sustainable resource use, and ecological balance. Medicinal plants, integral to indigenous healthcare systems, are increasingly threatened by overexploitation, habitat loss, and modernization. Most traditional healers in the study areas expressed the urgent need to document and preserve their ethnobotanical knowledge through proper record-keeping and awareness initiatives. They suggested promoting this knowledge via public outreach and social media to increase community engagement. Additionally, they emphasized active conservation strategies such as cultivating medicinal plants, protecting forest resources, and controlling overgrazing in forested areas. Strengthening such community-driven conservation practices can ensure the long-term survival of medicinal plant species while safeguarding the traditional wisdom that sustains them.

7. CONCLUSION

The present ethnobotanical investigation conducted across the Balangir and Dhenkanal districts of Odisha underscores the profound interdependence between indigenous communities and their surrounding flora. The study highlights not only the exceptional diversity of medicinal plant species—225 in total, including 124 from Balangir and 101 from Dhenkanal—but also the intricate web of traditional knowledge that governs their identification, classification, and therapeutic use. This knowledge, transmitted orally through generations, serves as a living repository of ecological wisdom, cultural identity, and sustainable healthcare practices.

Despite the regional variations observed in species composition and plant usage patterns, both districts reflect an enduring cultural reverence for nature. Balangir's healers, for instance, demonstrated a higher reliance on herbs and roots, while those in Dhenkanal made broader use of shrubs and leaves. Such differences reveal the adaptability of indigenous healthcare systems to local environmental conditions and available plant diversity. The predominance of the **Fabaceae, Apocynaceae, Asteraceae, and Combretaceae** families in both districts further illustrates the ecological richness and medicinal potential of the region's flora. The cross-regional overlap of 40 common species emphasizes the shared ethnobotanical foundation that unites diverse tribal groups within Odisha.

The study also sheds light on the social and economic dimensions of traditional healing. Most healers belong to economically marginalized communities and practice medicine either part-time or without institutional recognition. Despite limited formal education, these healers possess an in-depth understanding of phytotherapy, dosage, and disease-specific formulations—knowledge refined over centuries through observation and experience. However, modernization, urban migration, and the growing dependence on allopathic medicine are gradually eroding this invaluable heritage. Younger generations show limited interest in learning traditional practices, and the absence of systematic documentation threatens the continuity of this knowledge base.

Furthermore, the findings reveal a set of systemic challenges that hinder the preservation and recognition of traditional medicine. A lack of governmental support, absence of standardized treatment protocols, and

limited scientific validation continue to marginalize traditional healers. Environmental pressures—such as deforestation, overgrazing, and climate change—further exacerbate the depletion of medicinal plant resources. These challenges underscore the urgency of implementing policies that bridge traditional and modern healthcare systems while ensuring fair benefit-sharing and intellectual property protection for indigenous communities.

Nevertheless, the research also uncovers the resilience and strengths of traditional medicine. Many healers and patients continue to trust and prefer herbal remedies for their perceived safety, affordability, and effectiveness. Unlike modern pharmaceuticals, traditional medicines are believed to target the root cause of illness, fostering holistic healing that integrates physical, mental, and spiritual well-being. The increasing public interest in Ayurveda and natural therapies reflects a global recognition of this ancient wisdom's relevance in contemporary health and sustainability discourse.

The preservation of ethnobotanical knowledge, therefore, is not merely an act of cultural conservation—it is an ecological and ethical imperative. Documenting traditional practices, promoting sustainable cultivation of medicinal species, and integrating indigenous knowledge into community-based conservation programs can ensure the continuity of this heritage. Educational initiatives that involve local youth, coupled with digital archiving and government-backed research collaborations, can revitalize interest in ethnomedicine and strengthen its role in rural healthcare systems.

The traditional healers of Balangir and Dhenkanal districts stand as custodians of an irreplaceable legacy that bridges humanity's relationship with nature. Their wisdom offers not only remedies for disease but also profound insights into sustainable living and biodiversity conservation. Preserving and promoting this knowledge is essential to fostering a more inclusive, sustainable, and culturally enriched future—one in which traditional wisdom and modern science coexist in harmony to safeguard both human health and ecological balance.

Acknowledgments section

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