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Original Research Article

# Ethnobotanical survey of medicinal plants in Koppal district, North Karnataka, South India: Traditional knowledge and therapeutic applications

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## Abstract

The study was conducted to document the ethno-medicinal plants used by traditional healers in selected villages of Koppal district, North Karnataka, South India. Ethnobotanical surveys were conducted in selected villages such as Gondabal, Naregal, and Kinnal using questionnaires and interviews with local practitioners. During this study, 53 medicinal plant species belonging to 29 families were recorded, with herbs (45%) being the most common growth form. Leaves (50%) were the most frequently used plant part. They have made different formulations to treat the patients, among them, concoction (43.5%), pounding/grinding (35.4%) and squeezing (21.1%) were the primary preparation methods. The plants used to treat 27 human ailments, with stomach complaints treated by the highest number of species. Polyherbal formulations were common, often incorporating additives like honey, jaggery and oils. Dosage and administration were personalized based on patient factors such as age, weight and health conditions. This study highlights the rich traditional medicinal knowledge in the region and provides a basis for further pharmacological research and conservation efforts.

**Keywords:** Ethnobotany, Formulations, Medicinal plants, Pharmacology, Traditional knowledge.

## Introduction

Traditional medicine, deeply rooted in cultural heritage and indigenous knowledge, has played a significant role in healthcare for centuries. It encompasses a wide range of practices, including the use of medicinal plants utilized to treat various ailments and maintain overall health. Despite the initial decline in popularity with the rise of modern allopathic medicine, traditional medicine has experienced a resurgence in recent years. This renewed interest is attributed to several factors, including concerns about the side effects and toxicity of synthetic drugs, the emergence of antibiotic-resistant microorganisms, and the limitations of modern medicine in addressing certain health conditions. The importance of traditional medicine is particularly evident in developing countries, where a substantial portion of the population relies on these practices for their healthcare needs. Makanur *et al*. (2024) reported it 45 plant species were used by the Siddhi tribe community in Haliyal taluk of Uttara Kannada district, Karnataka, for the treatment of various diseases of human beings. Ailments like dengue fever, snakebite, piles, diabetes, kidney stones and constipation cases found in human beings were well reported and documented. In another study by Bhandary *et al*. (1995) described 98 medicinal preparations, involving 69 species of plants, used by Siddis of Uttara Kannada in the state of Karnataka, were described based on an ethno-medical field study. The finding includes 40 hitherto unknown medicinal uses of known medicinal plants. Yogeesha and Krishnakumar (2023) collected the information of 143 plants used to treat neurological disorders in the Western Ghats region of Dakshina Kannada district in Karnataka. In this context, the present research work was undertaken to assess the medicinal plants used by traditional practitioners in the Koppal district of Karnataka. These surveys not only document the traditional knowledge passed down through generations but also provide a starting point for modern scientific research into the potential medicinal properties of various plant species. In India, where traditional medicine plays a significant

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role in healthcare, particularly in rural and urban areas, such surveys are especially important. The diversity of traditional practices across different regions of India makes it essential to conduct surveys in multiple locations to capture the full spectrum of medicinal plant usage. By focusing on these villages, the research can provide insights into the local flora and their perceived medicinal properties, as well as the traditional practices employed by practitioners in the region. This information can be valuable for preserving traditional knowledge, identifying potential leads for drug discovery, and understanding the cultural and ecological significance of medicinal plants in the Koppal area. Furthermore, such studies can help in the conservation of important medicinal plant species and promote sustainable use of natural resources in traditional healthcare systems.

## Materials and Methods

### *Study Site: Koppal revenue district*

The total recorded forest area in the Koppal division is 43,066 hectares, constituting approximately 7.64% of the division's geographical area of 5,630 km². Koppal is located in the northern part of the state and comprises seven taluks: Koppal, Yalburga, Ganagavati, Kustagi, Kanakagiri, Karatagi, and Kukanoor. It lies between 15°09′, 16°01′ north latitude, 75°46′, and 76°48′ east longitude. Koppal is one of the backward districts in the northern part of the state and is located in the Kalyana Karnataka region. The area falls within the Tungabhadra sub-basin of the Krishna basin. The total geographical area of the district is 5,52,495 ha, of which 3,80,721 ha is cultivable land. The present survey was conducted in three villages of Koppal district: Naregal, Gondabal, and Kinnal. These villages are located in close proximity to the district headquarters (Figure 1).

### *Methodology*

Field surveys were conducted in the study in three villages of Koppal district: Gondabal, Naregal, and Kinnal (Figure 1). Information regarding the use of medicinal plants for treating various ailments and diseases was collected directly from traditional healers through questionnaires. Plant specimens were collected with the help of traditional healers and identified using standard literature, including Flora of India and Legumes of India. Information was gathered through interviews, discussions, and field observations with herbal healers and knowledgeable elderly people using semi-structured questionnaires. The questionnaires covered information about plants, medicinal uses, parts used, and methods of drug preparation. The collected information was cross-checked with respondents and former patients residing in the same or neighboring villages. The information is organized under the following categories: name of diseases, plant parts used, family name and habit of the plant used. Details about the preparation of medicine and its administration against diseases are recorded. The information is documented disease-wise, noting the use of plants and plant parts for medicine preparation.

## Results

During the present study, overall 53 plants were reported as ethno-medicinal plants. In addition to their medicinal

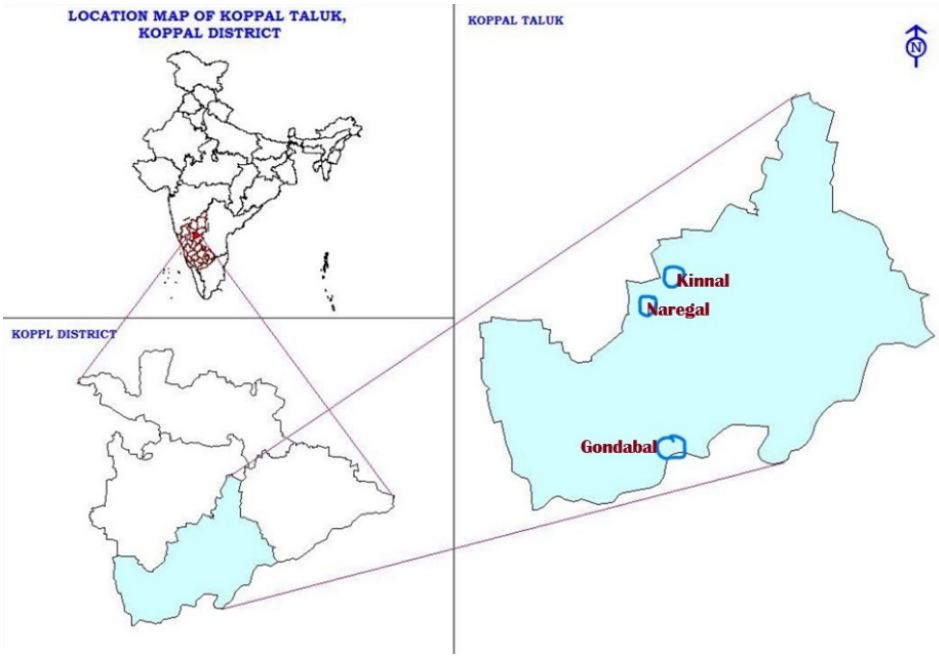


**Figure 1:** Study site map

values, the community utilizes these plants for other purposes. They are predominantly used as sources of medicinal remedies, food, construction materials, forage, and financial income. Of the 53 medicinal plant species recorded from the study sites, the local community uses 74% of the species as remedies for treating human ailments, while 16% species are used for curing livestock diseases. Additionally, 10% of species are used for treating both human and livestock diseases. The existence and utilization of such a large number of medicinal plants by the people of Koppal District demonstrate the dependency of local people on traditional plant remedies for treating both human and livestock health problems. Regarding growth forms, herbs comprised the largest proportion at 48%. Shrubs are found to make up the highest proportion of medicinal use, followed by herbs, in the Koppal district. Out of the 53 medicinal plant species recorded, 54% were collected from wild vegetation growing in bushy areas, while 30% harvested from other sources.

### *Taxonomic category of the identified medicinal plants*

Medicinal plants serve as primary remedies for treating various ailments in the Koppal District. The present study documented 53 plant species used to treat human ailments, belonging to 29 families. The families Fabaceae (7), Lamiaceae (5) and Amaranthaceae (4) comprised the highest species proportion, followed by Apocynaceae and Asteraceae (3 species each). Cucurbitaceae, Amaryllidaceae, Malvaceae, Poaceae, Rutaceae and Zingibaraceae contributed two species, while Aloaceae, Anacardiaceae, Apiaceae, Asparagaceae, Caricaceae, Celasteraceae, Combrataceae, Crassulaceae, Lytharaceae, Menispermiaceae, Moraceae, Myrtaceae, Phyllantaceae, Rosaceae, Sapindaceae and Zygophyllaceae represented by one species each (Table 1 and Figure 2A-B). All the herbaria prepared were kept in the Department of Botany, Shri Gavisiddeshwar Arts, Science and Commerce College, Koppal for future reference.

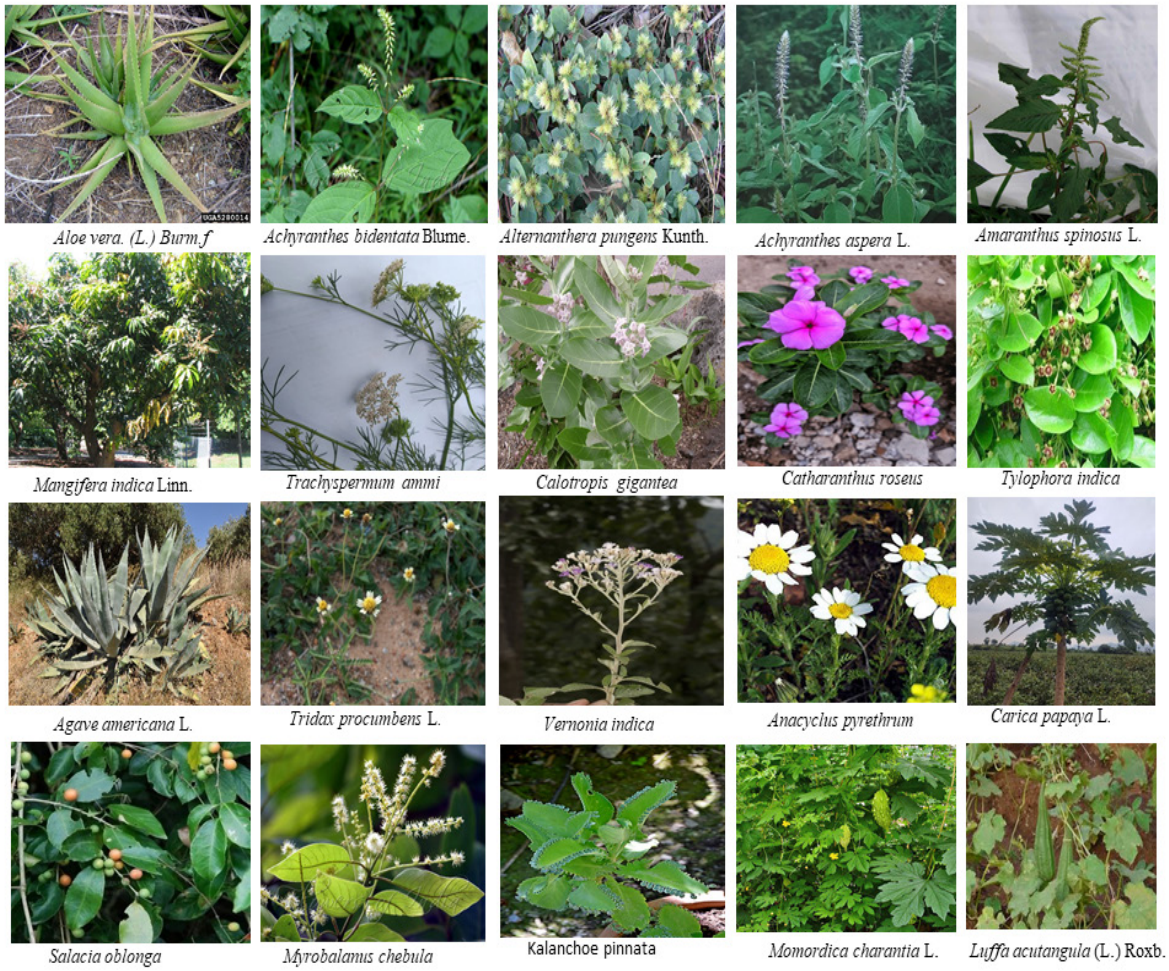


**Figure 2A:** Medicinal plants used by the traditional practitioners of Koppal district


**Figure 2B:** Medicinal plants used by the traditional practitioners of Koppal district

**Figure 3:** Traditional medicinal practitioner involved in treatment for bone injury

### *Plant parts used and methods in the preparation of plant remedies for the treatment of human ailments*

The local community predominantly uses leaves (50%). The traditional medicinal practitioners of Kinnal, Gondabal and Naregal are harvesting plant parts such as roots, rhizomes, bulbs, bark, stems, and leaves. Regarding preparation methods, concoction (43.5%) and pounding or grinding (35.4%) are the primary forms, followed by squeezing (21.1%). It was observed that medicinal plant remedies are often prepared from mixtures of several plant parts rather than being used alone, potentially improving the efficacy of the remedies in treating ailments, as per the experiences of the practitioners of the selected villages. They explained that concoction is widely used in their practices. It was observed that the use of additive substances such as coffee, honey, butter, water, sugar, salt, coconut oil, and sesame oil is sometimes necessary when preparing plant remedies. These substances can improve flavor, reduce adverse effects of remedies, decrease the likelihood of vomiting and abdominal discomfort due to some stronger remedies and enhance the healing power of the treatments.

Major human diseases and the corresponding number of plant species used for treatment are documented in the study area. A total of 55 human diseases and health issues (including injuries, Figure 3) were treated using 53 plant species. Of these, 74% ailments are treated using two or more medicinal plant species, while 26% ailments are treated using only one plant species. Stomach complaints

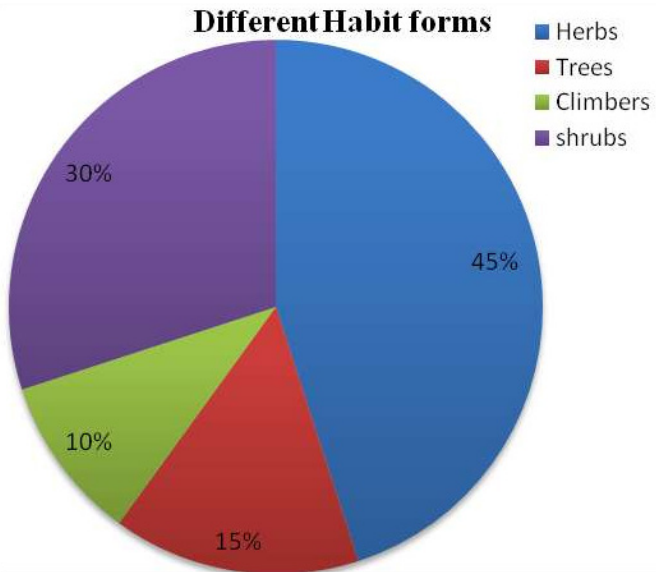


**Figure 4:** Habitat-wise distribution of medicinal plants used in traditional practices

are treated using the highest number of medicinal plants, followed by diarrhea and cold (Table 2).

### *Habitat-wise distribution*

The study area revealed a diverse array of medicinal plants, with herbs emerging as the predominant source of traditional remedies. These herbaceous plants constituted a significant 45% of the recorded species, displaying their widespread use and importance in local medicinal

**Table 1:** Medicinal plants used by the traditional practitioners in Koppal district

| *Sl. No.* | *Scientific name of the plant* | *Family* | *Part Used* | *Applications/Medicinal Uses of the plants* | *Herbarium Number* |
|---|---|---|---|---|---|
| 1 | *Aloe vera*. (L.) Burm.f | Aloaceae | Latex | Heal burns, improve digestive health, relives heart burns, relives anal fissures, and diabetes asphrodiastic | EBSGC2001 |
| 2 | *Achyranthes bidentata* Blume. | Amaranthaceae | Whole Plant | Decoction of whole plant used for diabeties leucorrhoea, anemia and dropsy. | EBSGC2002 |
| 3 | *Alternanthera pungens* Kunth. | | Whole Plant | Decoction given in gonorrhoea. | EBSGC2003 |
| 4 | *Achyranthes aspera* L. | | Leaves, roots | Used in treatment of cough and malarial fever dysentery asthma, hypertension and diabetes in digest in anaemia jaundice snake bite and scorpion sting. | EBSGC2004 |
| 5 | *Amaranthus spinosus* L. | | Leaves | Used for ulcers, swelling of the mouth or throat and high cholesterol | EBSGC2005 |
| 6 | *Mangifera indica* Linn. | Anacardiaceae | Fruits, bark, seeds | Fruits-Laxative and diuretic, bark used to treat a uterine haemorrhage and the seeds used in asthma, diarrhoea and indigestion | EBSGC2006 |
| 7 | *Trachyspermum ammi* (L.) Sprague | Apiaceae | seeds, leaves | Seeds are antibacterial and antifungal Lower blood pressure, cough, and combusts peptic ulcers and relieves indigestion. The leaves used for ear and toothache; to stop greying of hair, instant relief from acidity and indigestion. | EBSGC2007 |
| 8 | *Calotropis gigantea* (L.) Dryand. | Apocynaceae | Whole Plant | Piles, abdominal disorders, sterility in female, hematemesis, skin diseases, carminative rejuvenator. | EBSGC2008 |
| 9 | *Catharanthus roseus* (L.) G. Don. | | Leaves | Used to treat diabetes, high blood pressure, sore throat, cough, chest pain, water retention, diarrhea, virginal discharge. | EBSGC2009 |
| 10 | *Tylophora indica* (Burm. f.) Merr. | | Root, leaves | Spider poisoning, bronchitis and whooping cough | EBSGC2010 |
| 11 | *Agave americana* L. | Asparagaceae | Leaves, Rhizome | Used to treat wounds, skin problems. Leaves used as laxative | EBSGC2011 |
| 12 | *Tridax procumbens* L. | Asteraceae | Leaves | Dysentery, diarrhoea and restoring hair | EBSGC2012 |
| 13 | *Vernonia indica* Wall. ex C.B.Clarke | | Root | Root useful in the treatment of eruptive boils and leucorrhoea | EBSGC2013 |
| 14 | *Anacyclus pyrethrum* (L.) Lag. | | Roots | It is used for common cold, toothache, facial neuralgia | EBSGC2014 |
| 15 | *Carica papaya* L. | Caricaceae | Leaf, Fruit | The papaya leaf juice used to treat dengue fever and malaria; good for liver; supports digestion; lowers blood sugar levels; used to treat skin problems; promotes hair growth; reduces cancer risks. The fruit helps in body weight loss; boost immunity. | EBSGC2015 |
| 16 | *Salacia oblonga* Wall. ex Wight & Arn. | Celastraceae | Root | Used to treat diabetic joint pain, itching skin, gonorrhoea, losing weight, obesity and used for development of oxidative stress and cough. | EBSGC2016 |
| 17 | *Myrobalanus chebula* (Retz.) Gaertn. | Combretaceae | Fruits | Laxative and gastro-intestinal ailments, asthma | EBSGC2017 |

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| 18 | *Kalanchoe pinnata* (Lam.) Pers. | Crassulaceae | Leaves, Whole plant | Leaves are used to treat earache, burns, Ulcer, insect bites, Diarrhoea, hypertension and mainly for kidney stones. The whole plant used as anticancer; anti-inflammatory; Antifungal; analgesic. | EBSGC2018 |
| 19 | *Momordica charantia* L. | Cucurbitaceae | Fruit | Helps in maintaining blood sugar levels; to cure lung infections, good for eyes, lowers bad cholesterol level, boost immune system. Used for glowing skin and cleans the liver, helps in weight loss, antioxidant and act as anti-inflammatory. | EBSGC2019 |
| 20 | *Luffa acutangula* (L.) Roxb. | | Fruit, Whole plant | Enhances vision; promotes weight loss; relieves constipation; protects liver function; purify the blood; treatment of skin diseases. | EBSGC2020 |
| 21 | *Acacia ferruginea* DC. | Fabaceae | Bark, fruit | Diarrhoea, dysentery, piles, infestation, haemorrhage, cough. | EBSGC2021 |
| 22 | *Acacia sinuata* (Lour.)Merr. | | Pod, Leaf | Decoction of pods reveals biliousness and relief for constipation. | EBSGC2022 |
| 23 | *Caesalpinia pulcherrima* (L.) Sw. | | Bark, Leaves | Bark used as abortifacient, leaves are purgative. | EBSGC2023 |
| 24 | *Clitoria ternatea* L. | | Whole Plant | Used in skin diseases; constipation; retention of urine; anti-stress and seductive agent. | EBSGC2024 |
| 25 | *Trigonella foenum-graecum* L. | | Seeds, Leaves | The seeds balance cholesterol; suit upset stomach and digestive problems; reduce menstrual cramps; reduce fat mass; maintain liver and kidney health; The leaves helps to lowering blood sugar levels; boosting milk production in breast feeding mothers. | EBSGC2025 |
| 26 | *Cassia auriculata* L. | | Flowers, leaves, stem, root, Unripe fruit | Used in joint and muscle pain; pink eye; constipation; urinary tract diseases. | EBSGC2026 |
| 27 | *Abrus precatorius* L. | | Seed, powder and leaves | Used to treat scratches, sores and wounds caused by dogs, cats and mice. Leaves used to cure fever, cough and cold. Root powder is taken orally along with cow's milk to treat scorpion sting and snake bike | EBSGC2027 |
| 28 | *Leucas aspera* (Wild.). Link. | Lamiaceae | Leaves | Used to treat chronic skin eruption, psoriasis, cough; amenorrhoea; intermittent fever and ulcers. | EBSGC2028 |
| 29 | *Vitex negundo* L. | | Leaves, roots, fruits | Used as tonic, diuretic, antihelminthic, expectorant, rheumatism and used to treat enlargement of spleen, ulcers, wounds, skin diseases, bladder complaints, dysentery, piles, cholera, diarrhoea and joint pains. | EBSGC2029 |
| 30 | *Ocimum basilicum* L. | | Leaves | It helps to relax digestive system and its related issues such as diarrhoea and dysentery. It helps to reduce menstrual cramps, Used in the treatment of headache, cough, kidney malfunctions. Used to treat snake and insect bites, intestinal gas fluid retention. | EBSGC2030 |
| 31 | *Ocimum tenuiflorum* L. | | Leaves | Treating skin diseases; used as blood purifier; preventive against malaria and dengue fever; Tulsi leaves relieves cold and flu; anti-inflammatory; helpful in respiratory problems, antimicrobial; anti-allergic. | EBSGC2031 |

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| 32 | *Mentha arvensis* L. | | Leaves | Enhances mood, expels cough from the body. Keeps mosquitoes away, improve irritable bowel syndrome of the digestive system, improve brain function, decreases breastfeeding pain. | EBSGC2032 |
| 33 | *Allium cepa* L. | Amaryllidaceae | Bulb | Anti-inflammatory; reduce high blood pressure and reduce cholesterol levels; antibacterial; removing dead skin cells from lips, used to treat skin pigmentation. | EBSGC2033 |
| 34 | *Allium sativum* L. | | Leaves, Bulb | Used against a variety of problems including insect bites; intestinal worms headache; cough; cold; lowering the blood sugar levels and cholesterol; good to heart. | EBSGC2034 |
| 35 | *Lawsonia inermis* L. | Lytharaceae | Leaves, seeds | Diabetes, skin disease and internal haemorrhage | EBSGC2035 |
| 36 | *Abutilon indicum* (L.) Sweet | Malvaceae | Whole Plant | Whole plant used as antihelminthic and anti-inflammatory. Bark is a stringent. | EBSGC2036 |
| 37 | *Hibiscus rosa-sinensis* L. | | Flower, Leaf | Hibiscus tea used to lower body temperature; treat heart related and nerve diseases; Boost liver health; prevent premature skin aging. It helps to treat clap problems such as itching and dandruff. | EBSGC2037 |
| 38 | *Tinospora cordifolia* (Willd.) Miers. | | Stem, leaves | Used as tonic, anti-periodic; diuretic, blood purifier, hepatic stimulant, cold, urinary diseases, skin diseases, piles, bronchitis, shades impotency, jaundice, diarrhoea; malarial fever, eruptive boils and cough | EBSGC2038 |
| 39 | *Ficus religiosa* L. | Moraceae | Leaf, Bark, Seeds | The fruit used for appetite. The leaves used for skin diseases and snakebites, cracked heels. The seeds are used for blood purification | EBSGC2039 |
| 40 | *Eugenia jambolana* Lam. | Myrtaceae | Seeds, Leaves, fruits, bark | Seeds used for treat debits; diarrhoea and Dysentery. The fruit is very beneficial for keeping heart healthy and prevent for diseases like hypertension stroke and other cardio vascular diseases. The leaves contain antioxidants and have antivirus anti-inflammatory properties treating constipation and eliminating allergies. Bark used for diabetics. | EBSGC2040 |
| 41 | *Jasminum officinale* L. | Oleaceae | Flower | The flowers used to make medicine. It has been used for liver disease; drinking Jasmine tea lower risk of heart disease. | EBSGC2041 |
| 42 | *Nyctanthes arbor-tristis* L. | | Leaves | Used to treat fever; fungal skin infection; used as antibacterial, anti-inflammatory; betel leaves extract is used for the expulsion of round warm. Used as an antidote for reptile venoms and snake bite. | EBSGC2042 |
| 43 | *Phyllanthus acidus* (L.) Skeels | Phyllanthaceae | Fruit | The fruits used as blood purifier and appetite stimulant. It is also act as a liver tonic, control blood sugar; reduce intra-articular tension; prevent itching and watering of eyes. It helps in stimulating hair growth; help in increasing the clap circulation. | EBSGC2043 |
| 44 | *Piper nigrum* L. | Piperaceae | Fruit | Used as antihypertensive; anti-inflammatory, antiseptic, antidepressants. Used for snakebite treatment. | EBSGC2044 |
| 45 | *Vetiveria zizanioides* (L.) Nash | Poaceae | Root | Root used to treat fainting in digestion thrift Diarrhoea heart diseases and cough. | EBSGC2045 |

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| 46 | *Bambusa vulgaris* Schrad. | | Shoots and leaves | Used for cleaning wounds and healing infection. Used to treat respiratory disorder. Used for asthma, cough and treating hypertension. | EBSGC2046 |
| 47 | *Rosa indica* L. | Rosaceae | Flower | Rose petals are mildly seductive antiseptic anti-inflammatory and anti-parasitic mildly laxative a good supportive tonic for heart lowering cholesterol treatment for wounds bruises rashes and incisions glowing skin. | EBSGC2047 |
| 48 | *Limonia acidissima* L. | Rutaceae | Bark, Leaves, Fruit & Gum | Anoxia, Diarrhoea, vomiting, cough, bronchitis and cardiac debility | EBSGC2048 |
| 49 | *Murraya koenigii* (L.) Spreng. | | Leaves | Helps in weight loss, treating dysentery constipation and Diarrhoea. Relieves morning sickness and good for diabetic eyesight, reduce stress, and helps to keep heart healthy, reduce hair loss. | EBSGC2049 |
| 50 | *Cardiospermum halicacabum* L. | Sapindaceae | Leaves and seeds | Used to improve the energy level. | EBSGC2050 |
| 51 | *Zingiber officinale* Roscoe. | Zingibaraceae | Rhizome, | Nausea relief, digestive support, heals ulcers, boost immunity, improve diabetes, antifungal, and reduce pain. | EBSGC2051 |
| 52 | *Curcuma longa* L. | | Roots | It reduces hay fever symptoms such has sneezing, itching, runny nose. It reduces high levels of cholesterol and fat in the blood. It has the potential to reduce swelling, irritation. | EBSGC2052 |
| 53 | *Tribulus lanaginosus* L. | Zygophyllaceae | Whole Plant | Used to treat internal haemorrhage, rheumatism and kidney stones, used as rejuvenator, hair tonic and as aphrodisiac. | EBSGC2053 |

practices. Shrubs followed as the second most prevalent category, representing 30% of the medicinal plant species identified. Trees, while less numerous, still played a substantial role, accounting for 15% of the species utilized for their therapeutic properties. Climbers rounded out the distribution, comprising 10% of the medicinal plant species documented in the region (Figure 4). This varied distribution across different plant life forms highlights the rich biodiversity of the area and the traditional healers' comprehensive knowledge of their local flora.

### *Ingredients and preparation*

A sophisticated approach to remedy formulation characterizes the traditional healing practices observed in the study area. Healers frequently employed a multifaceted strategy, utilizing various plant parts in the preparation of medicines. This approach was not limited to treating single ailments but extended to addressing multiple health concerns simultaneously. The prevalent use of polyherbal treatments shows synergistic effects of combining different plant species on the disease. The complexity of these formulations reflects the accumulated wisdom and empirical knowledge passed down through generations of traditional healers. To further refine their remedies and improve both efficacy and palatability, healers often incorporated various additives such as natural sweeteners like honey and jaggery, which not only enhanced the taste but also contributed additional health benefits. Cow milk was another frequently used ingredient, valued for its nutritional properties and potential to aid in the absorption of certain plant-based compounds. Hot water is often employed as a simple yet effective medium for extracting and delivering the active components of medicinal plants. In addition to these additives, castor, coconut, and sesame oils were particularly favored for their perceived medicinal properties and their ability to serve as effective carriers for plant extracts. These oils are commonly used in the creation of medicinal pastes or as base ingredients for medicated oils, which are applied topically or ingested, depending on the specific treatment requirements.

The administration of these traditional remedies was not a one-size-fits-all approach but rather a carefully considered process tailored to each patient's needs. Local healers demonstrated announced understanding of plant pharmacology, selecting specific plant parts known for their potency in treating particular ailments. The determination of appropriate dosages was a critical aspect of their practice, taking into account various patient-specific factors to ensure both efficacy and safety. Age was a primary consideration in dosage determination, recognizing that children, adults, and the elderly may

**Table 2:** Number of plants used by the traditional medicinal practitioners in Koppal district for various diseases

| *Sl. No.* | *Diseases* | *Number of medicinal plants* |
|---|---|---|
| 1 | Hemorrhoid | 1 |
| 2 | Bleeding | 1 |
| 3 | Gonorrhea | 1 |
| 4 | Ascariasis | 1 |
| 5 | Malaria | 2 |
| 6 | Evil Eye | 2 |
| 7 | Wound sore | 2 |
| 8 | Common cold | 2 |
| 9 | Insect bite | 2 |
| 10 | Pneumatic | 2 |
| 11 | Swelling | 2 |
| 12 | Tonsillitis | 2 |
| 13 | Infection on swelling | 2 |
| 14 | Eye disease | 2 |
| 15 | Cold | 3 |
| 16 | Snakebite | 3 |
| 17 | Broken leg | 3 |
| 18 | Stomach complaints | 4 |
| 19 | Dysentery | 4 |
| 20 | Ulcers | 6 |
| 21 | Headache | 6 |
| 22 | Toothache | 6 |
| 23 | Asthma | 7 |
| 24 | Cough | 10 |
| 25 | Hepatitis | 11 |
| 26 | Febrile (Fever) | 12 |
| 27 | Diarrhea | 13 |

respond differently to the same treatment. Physical condition was another crucial factor, with healers adjusting doses based on the patient's overall health status, body weight, and the severity of their condition. This personalized approach to medicine administration reflects a sophisticated understanding of individual variability in response to treatments, a concept that aligns with modern principles of personalized medicine.

The methods of preparation and administration were diverse, ranging from simple infusions and decoctions to more complex formulations, medicated oils and pastes. Oral administration was common for many remedies, while others were applied topically or used in ritualistic healing practices. The frequency and duration of treatment are carefully prescribed, with some remedies requiring a single dose and others necessitating a prolonged course of treatment. This comprehensive approach to traditional medicine, encompassing a wide range of plant species, sophisticated preparation methods, and personalized administration protocols, underscores the depth of knowledge and the systematic nature of traditional healing practices in the study area. It highlights the potential value of these practices in informing modern pharmacological research and the development of new therapeutic approaches.

## Discussion

Local communities used globally medicinal plants in local health care and the knowledge and uses of folk medicine in regular treatment were documented. The present study reveals that the local traditional healers use different groups of medicinal plants as medicine to treat many diseases, among them herbs were the dominating group. The investigation revealed that the traditional healers used 53 species of plants belonging to 29 families to treat various diseases. The documented medicinal plants used to cure skin diseases, poison bites, stomachache and nervous disorders. These observations are similar to those of the research conducted by considering the practices of traditional healers in Kancheepuram district of Tamil Nadu, India (Muthu *et al*., 2006 and Singh *et al*., 2019).

The medicinal plants and their parts used to prepare various formulations were prevalent and are orally communicated from one generation to another, the discussions with local healers and villagers further revealed that the preferences in species to cure of ailments vary from one species to another species as a number of plants are used in cure of a particular ailment and the species, plant part used, formulation such as powder, paste, decoction, extract also vary from village to village in different local healers. Based on the present study findings that local healers had rich knowledge on herbal folk medicines and the distribution of plants around their habitat and used by them in the cure of various ailments (Ayyanar and Ignacimuthu, 2011; Ghatapanadi *et al*., 2011). Most commonly mentioned plants used by the general population have also been reported previously for similar uses from different regions of the state (Kariyajjanavar *et al*., 2016; Laddimath and Rao, 2016; Lakshmana *et al*., 2015 and Lingaraju *et al*., 2013). The results of plants used, formulations and dosages were different and not previously reported in any similarly conducted studies to document ethno-medicinal uses (Samar *et al*., 2020 and Rai, 2017).

## Conclusion

The study conducted in Koppal District reveals a rich tradition of ethno-medicinal practices, highlighting the community's reliance on plant-based remedies for both human and livestock health issues. It was noted

that 53 plant species belonging to 29 families, with Fabaceae, Lamiaceae, and Amaranthaceae being the most represented. This study underscores the importance of traditional knowledge in local healthcare practices and highlights the potential for further research into the pharmacological properties of the plants. The traditional medicinal practitioners of Kinnal, Gondabal and Naregal are harvesting plant parts such as roots, rhizomes, bulbs, bark and stems. It can seriously affect the survival of the mother plant in its habitat. Therefore, there is a need for the conservation of the valuable medicinal plant diversity of Koppal district, Karnataka.

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