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# Ethnomedicinal investigation on Primitive Tribal Groups of Eastern Ghats, Koyyuru Mandal, Visakhapatnam District, South India

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**ABSTRACT**

*The awareness of ethnomedicine is significant from the tribal inhabitants, but the information is limited owing to lack of scientific substantiation. The aim of the present study is to enumerate the ethnomedicinal information from PTGs (Primitive tribal groups) of Koyyuru Mandal, Visakhapatnam District, North Coastal Andhra Pradesh, India. Ethnomedicinal plant information has been collected through several field trips and also by means of personal interviews from local tribal people/doctors. Based on the conference from the local tribal doctors and through discussions with them, a total number of 74 ethnomedicinal plant species with 70 genera of 43 families used to treat a total number of 59 diseases were collected. A small number of plants were used as medicine directly and remaining plants are used in mix together with other plant species. The significant use of each ethnomedicinal plant was obtained in consideration of available information from the local tribal doctors. Most frequently the plant leaves were used for preparing ethnomedicine. It is evident that the collected ethnomedicinal plants have significant medicinal value for one or more diseases. Fewer plants were noticed intended for healing two or more therapeutic values.*

**Key words:** Ethnomedicinal plants; Disease; Leukorrhea; Mucuna pruriens; Premature ejaculation; Jaundice

## Introduction

Since many years, the researchers have focused on the significant use of medicinal plant materials to cure different contagious diseases throughout the world. Plant-based compounds could heal the diseases without any side effects against the use of synthetic drugs. Further, there is a modest possibility of resistance improvement with the plant materials as medicine [1,2]. According to the old century of ISM (Indian System of Medicines), there are 400 different types of plants which are in production to use as tribal, Unani, Siddha, and Ayurvedic medicines [3]. India is one of the extra-large diversity countries with around 18,000 flowering plant species owing to an extensive variety of climate and habitat, but approximately 7500 of those plants are properly documented in Indian system of medicine [4]. The extensive variety of ethnomedicinal development could be familiarized against artificial medicines intended for economic benefits, intellectual competence, and usefulness of the nation. Hence, it is necessary to develop freshness in drugs successfully [5,6]. The medicinal plants in India dwell the significant place in religious, socio-culture, and medicinal ground of the rural populace [7]. The knowledge of ethnobotany is documented in various regions of India and the confined residents have used numerous plant species and herbs as ethnomedicine with the purpose of healing the disorders of human beings [8]. Accordingly, diverse confined groups in the country especially tribal communities have experiences in different ethnomedicinal plants and they are well aware of classifying plants and their parts to treat the diverse diseases. The tribal communities have oral knowledge of medicinal plant usage and have collective economic tribulations on account of altering ecological circumstances [9,10]. Elizabeth et al [11] have carried out the significant ethnomedicinal information on polyherbal medicine for tuberculosis in five different communities in Amathole District in South Africa. They noticed that a total number of nine pyroherbal medicinal plants were collected and observed the significant medicinal value of every plant. Muniappan et al [12] carried out an ethnomedicinal survey for the enumeration of plant species in Kalakad Mundanthurai Tiger reserve, Southern Western Ghat, India. They revealed form their study that, a total number of 350 medicinal plant species were collected for healing different

disease. Joydeb et al [13] carried out a field survey for the ethnomedicinal plans used by Bengali communities in Tripuri northeast, India. From their search, they have identified 93 plant species with 52 families and 83 genera. Also, they reported that 55 various diseases of human and 6 diseases of livestock could be cured. Raju et al [14] have studied the importance of folk medicine for women's diseases used by tribal konda reddis of Andhra Pradesh, India. From their studies, 37 plant species related to 28 families were used to heal different women diseases. Aruna et al [15] studied the influence of different ethnomedicinal plants used by Jatapu women in Eastern Ghats of Andhra Pradesh, India. They have concluded that a total number of 63 traditional plants of 40 families were documented as medicine. Padal et al [16] carried out the ethnomedicinal survey in Visakhapatnam district of Kondadora tribes, India. They have collected 68 traditional medicine plant species belong to 63 genera of medicinal value. Chiranjibi et al. [17] have conducted an ethnobotanical study among the Dadayi community in Malkangiri District of Orissa, India. They have discovered that a total number of 53 ethnomedicinal plants with 34 families were documented for the healing of various diseases. The present study focused to carry the ethnomedicinal investigation on Primitive Tribal Groups of Koyyuru Mandal, Visakhapatnam District. Koyyuru is the part of Eastern Ghats in Andhra Pradesh in South India covered with dense forest. It has 136 villages with the total rural population of 50,589 (25,148 male and 25,441 female population). Apart from various literature surveys, the ethnobotanical surveys including ethno-medicine survey have not been carried out thus far in Koyyuru. Hence, the present study is carried out to collect and document different ethnomedicinal information from the Primitive Tribal Groups (PTGs).

## Methods and Methology

### *Study region*

Koyyuru Mandal (**figure 1**) located between a Latitude and Longitude of 17°40′00″N and 82°14′00″E in the part of Eastern Ghats in Visakhapatnam District in South India. Vegetation of this area is a tropical dry deciduous forest [18] with an enormous ethnomedicinal plants species practicing by local tribes. In this study area, the tribal population with different communities in the vein of Bagatha, Gadaba, Goudu, Kammara, Konda Dora, Valmiki, Khonds, Kotia, Mali, Muka Dora, Porja, Jatapu, Savara, and Konda Kammara are living. Among the above tribes Kondu (T1), Nuka dora (T2), Porja (T3), Gadaba (T4) and Malis (T5) are treated as Primitive Tribal Groups. They are the oldest inhabitants of their native place. They live in confined, restricted, remote and unfriendly areas such as hills and forests. Their source of revenue is based on primitive cultivation, low level of the closed financial system with a near to the ground rank of technology. They possess a lower literacy rate and inferior health. The tribal people are habitually depending on traditional plants as medicine for their difficulties from various diseases. Further, they have developed their individual unique culture, language communication, and religious conviction.

### *Methodology*

The field survey was carried out to collect different medicinal plants and the significance of ethnomedicinal plants were recorded through interviews from diverse traditional doctors and local tribal people during the period of 2018-

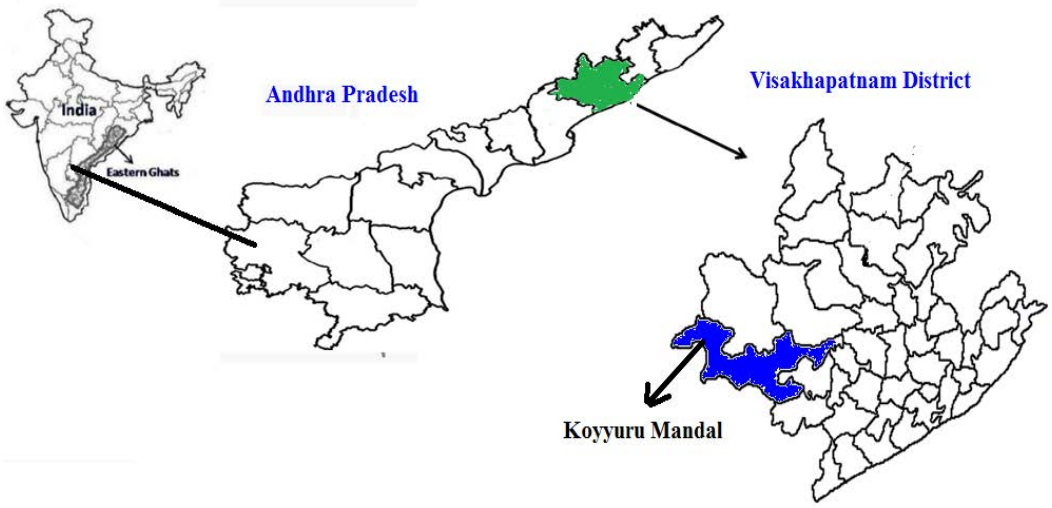


**Figure 1.** Representation of field study location.

2019 covered monsoon, pre-monsoon, and post-monsoon periods. Also, the information as regards different ways of using medicinal plants for curing the disease was gathered and instant healing of medicinal plants were collected. To get detailed information concerning the medicinal plant field works were carried out at different Villages and met different tribal traditional doctors. The data which was collected from the local tribal doctors of different villages were cross-checked and validated for the better utilization as medicine. Also, the information on different ways of using the plants and their parts as medicine from different experts in the study region. This information related to medicinal values was collected from tribal doctors, village elders, personal interviews, and group discussions included men and women of PTG. All the plats were identified up to species level using floras and literature [19-22] and all the plants were provided in **Table 1** with their habit, family, local names, preparation of mode of administration, etc. Some of the important species were prepared herbarium and deposited in Andhra University Herbarium (AUH). The

**Table 1** Enumeration of medicinal plants species in Koyyuru Mandal, Visakhapatnam District, Andhra Pradesh, India.

| S.No. | Scientific name | Family | Local name | Habitation | Part used | Disease treated | Preparation and mode of administration |
|---|---|---|---|---|---|---|---|
| 1 | *Abrus precatorius* L. | Fabaceae | Guliminda | Cl (Climber) | Leaves | Chest pain<br>Gastric pain | Leaf paste is blended with jaggery and taken orally to heal chest and gastric pains. |
| 2 | *Abutilon indicum* (L.) Sweet | Malvaceae | Athibhala | H (Herb) | Root | General debility | Take 1/4 th of roots and make thick paste with 1 liter milk and boil for half an hour. The thick of this is taken orally twice a day. |
| 3 | *Andrographis paniculata* (Burm.f.) Nees | Acanthaceae | Nelavemu | H | Leaves | Fever<br>Boil<br>Scabies | Make the paste of 5 or 6 leaves with pepper and water. Take three spoons in the morning and night in day. |
| 4 | *Argemone mexicana* L. | Papaveraceae | Pichhi kusuma | H | Root and Sap | Diabetes<br>Amblyoia (eye problems) | Root paste with water is used for diabetes by taking internally and the plant sap is used for eye related issues. The plant milk can be used directly in the eyes. |
| 5 | *Buchanania lanzan* Spreng | Anacardiaceae | Yegesi | T (Tree) | Bark | Coronary heart disease<br>Bone and joints pain | The bark juice with water mixture is used orally once in the morning and evening. |
| 6 | *Argyreia nervosa* (Burm. f.) Bojer | Convolvulaceae | Kukkithi | Cl | Fruit | Cancer | The pate of grinded Fruit with water and cumin powder is used. |
| 7 | *Aerva lanata* (L.) Juss. | Amaranthaceae | Kondapindi | H | Leaves | Chronic kidney disease (melting of stones in kidney) | The leaves are cooked with water for half an hour and cool it. It is taken orally to cure kidney issues. |
| 8 | *Aegle marmelos* (L.) Correa | Rutaceae | Maredu | T | Bark | Fever<br>Cold<br>Snake bite. | Bark paste with pepper is used for fever and cold. The blend of bark paste and salt is used to heal snake bite. |
| 9 | *Aristolochia indica* L. | Aristolochiaceae | Nalla eswari | Cl | Tuber, leaves | Low blood pressure<br>Diabetes<br>Ssnake bite | By making Juice of tuber and leaves with water. The 50 ml of this juice is taken twice a in a single day. |
| 10 | *Datura metel* L. | Solanaceae | Nalla ummetha | H | Leaves | Boil<br>Alopecia | Leaves are crushed and mixed with oil and apply directly on the effected area of body. |
| 11 | *Diplocyclos palmatus* (L.) C.Jeffrey | Cucurbitaceae | Sarlikkudu padu | Cl | Leaves | Boil<br>Uulcer. | Leaves are crushed with water or oil separately and apply on the effect area. |
| 12 | *Capparis sepiaria L.* | Capparaceae | Nalla Ippa | Sh (Shrub) | Tuber | Rheumatism | The tuber bark is pasted with water and used. |
| 13 | *Calotropis gigantea* (L.) Dryand. | Asclepidiaceae | Thella jilledu | H | Leaf wax | Leucorrhoea | The small quantity of outer layer of leaf wax (or) leaf pore is mixed and pasted with butter. This paste is taken directly twice in a day. |

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| 14 | *Capparis zeylanica* L. | Capparaceae | Thella ippa | Cl | Root | Premature ejaculation | The root is pasted with water and used by taking orally. Daily twice with small quantity. |
| 15 | *Chloroxylon swietenia* DC. | Rutaceae | Billa | T | Bark | Ringworm | Bark paste blended with water is applied directly on affected area 3 to 4 times in a day. |
| 16 | *Mucuna pruriens* (L.) DC. | Fabaceae | Doolagundu | Cl | Seed | Premature ejaculation | The paste of the plant seed, almond, dates, cashew, honey, and Raisins with small quantity of water. It is taken twice daily. |
| 17 | *Xanthium strumarium* L. | Asteraceae | Thithiri | H | Fruit | Sore Ulcer Vulnerary | The mixture of fruit and pepper paste is applied externally on affected area to heal the disease. |
| 18 | *Globba marantina L.* | Zingiberaceae | Basika | H | Rhizomes | Antipyretic Febrifuge Cold | Two spoons of rhizomes and water paste is taken three times in a day. |
| 19 | *Cryptolepis buchananii* Roem. & Schult | Apocynaceae | Sarpa gadda | Cl | Leaves | Piles | The paste of leaf, Asafoetida , and water taking twice daily in the morning and evening with the quantity of two spoons. |
| 20 | *Senna occidentalis* (L.) Link | Fabaceae | Nalla kasiminda | H | Root | Epilepsy | Root and pepper mixture paste with hot water. It is taken once in a day. |
| 21 | *Curculigo orchioides* Gaertn. | Hypoxidaceae | Nela thati | H | Tuber | Epilepsy Pits | The mixture of pepper, dal, water, and tuber of the plant is used by taking internally twice a day. |
| 22 | *Strychnos nux-vomica* L. | Loganiaceae | Musima | T | Seed | Arthritis | Preserve seeds for one week. The outer layer of the seed is crushed and mixed with milk and ginger. This paste is taken two spoons at a time daily 2 times. |
| 23 | *Pterocarpus marsupium* Roxb. | Fabaceae | Jarikemanu | T | Bark | Blood pressure control | The paste of bark and water is taken daily twice with quantity of 2 spoons. |
| 24 | *Gymnosporia montana* (Roth) Benth. | Celastraceae | Chinni | T | Leaves | Ulcers | The 3 to 4 leaves of the plant can be chewed daily twice to heal ulcer. |
| 25 | *Pongamia pinnata* (L.) Pierre | Fabaceae | Ganugu | T | Bark | Vermicide Vermifuge Paralysis | The paste of crushed white jaggery and plant bark is taken 2 spoons daily orally. |
| 26 | *Urena lobata L.* | Malvaceae | Konda benda | H | Leaves | Burning issues | The leaf and water crushed paste is applied directly on effected area twice a day. |
| 27 | *Smilax perfoliata* Lour. | Smilacaceae | Pedda kummaribaddu | Cl | Root | Leucorrhoea | The paste of root and pepper is taken one spoon at a time by repeating three times a day. |
| 28 | *Tephrosia purpurea* (L.) Pers. | Fabaceae | Nuliyempali | H | Leaves | Heart pain | Two spoons of oil and leaf past is used to reduce the pain in the heart. It is used twice in a day. |
| 29 | *Pergularia daemia* (Forssk.) Chiov. | Asclepidiaceae | Ditti | Cl | Root | Mensurational pain control | By taking the root paste daily twice at a quantity of 1 spoon, the pain controls. |
| 30 | *Solanum torvum* Sw. | Solanaceae | Adavi vankaya | Sh | Fruit | Asthma | Fruit and pepper mixture paste is taken 3 times at quantity of two spoons is taken to cure disease. |
| 31 | *Eclipta alba* (L.) Hassk. | Asteraceae | Gunta galagaralu | H | Leaves | Hair problems Jaundice | By taking the paste of plant leaf with water and milk is used 2 spoons daily. |
| 32 | *Tephrosia villosa* (L.) Pers. | Fabaceae | Noogi thuppa | H | Leaves | Asthma | Grinded leaf with water is taken to cure the heal. It is used three times daily. |
| 33 | *Jatropha curcas* L. | Euphorbiaceae | Pedda amudam | Sh | Sap | Joint pain | Plant sap with small quantity of camphor is used for healing joint pains. It is orally used two times in a day. |

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| 34 | *Gloriosa superba* L. | Liliaceae | Vanka vajjaram | Cl | Tuber | Cancer | Tuber paste of turmeric and water mix is used twice in a day. The 3 spoons of this paste can be used. |
| 35 | *Mimosa pudica* L. | Fabaceae | Siggu | H | Root | Rheumatism | The paste of root and milk is used by taking 2 to three spoons in a entire day. |
| 36 | *Euphorbia tithymaloides* L. | Euphorbiaceae | Rabbaru | H | Leaves | Joint pains | The leaf milk is taken and applied externally on the affected area. |
| 37 | *Acacia chundra* (Rottler) Willd | Mimosaceae | Chendri | T | Bark | Skin disease | Bark is pasted with water and taken by adding small amount of sugar. It is taken twice a day. |
| 38 | *Helicteres isora* L. | Sterculiaceae | Thada | Sh | Bark | Skin cuts | Paste of bark with water and apply directly on affected area on the body. |
| 39 | *Xantolis tomentosa (Roxb.) Raf.* | Sapotaceae | Kakkathi | Sh | Bark | Tongue | Salt and plant bark paste is made and apply on the tongue directly . This is done 2 to 3 three times daily. |
| 40 | *Zingiber zerumbet* (L.) Roscoe ex Sm. | Zingiberaceae | Pedda peeda | H | Rhizomes | General debility Stomach ache | The rhizomes are grinded and used by mixing with water. This is repeated three times in a day. |
| 41 | *Dregea volubilis* (L.f.) Benth. ex Hook.f. | Asclepidiaceae | Sarpa theega | Cl | Bark | Snake bite | The bark is pasted with water and taken to treat snakebite. The repetition should be continued twice a day. |
| 42 | *Gmelina arborea* Roxb. | Verbenaceae | Gummidi | T | Bark | Leucorrhoea | The bark and turmeric paste is taken orally 3 times daily with the quantity of 2 spoons. |
| 43 | *Oroxylum indicum* (L.) Kurz | Bignoniaceae | Dakki | T | Bark | Leucorrhoea Jaundice | The bark and turmeric paste is taken orally 3 times daily with the quantity of 2 spoons for one week. |
| 44 | *Alstonia scholaris* (L.) R. Br. | Apocynaceae | Edakulapala | T | Bark | Throat infections Aphrodisiac Blood pressure Sugar | The mixture of bark, turmeric, pepper, and campur should be used by taking orally 2 times in a day. |
| 45 | *Dichrostachys cinerea* (L.) Wight & Arn. | Fabaceae | Eluthuri | T | Leaves | Haemorrhage To prevent vomiting | Leaf and garlic mixture juice is used for healing vomiting while the leaf and turmeric paste is taken for treating Haemorrhage. It is repeatedly taken twice in a day. |
| 46 | *Ziziphus rugosa* Lam. | Rhamnaceae | Parimi | Sh | Bark | Cough (bechic) | Paste of bark and pepper by making small balls. These balls are used by taking orally 3 to 4 times in a day. |
| 47 | *Erythroxylum monogynum* Roxb. | Erythroxylaceae | Jiruguri | Sh | Bark | Loose motions and vomiting | Salt and bark paste is used to heal the disease. Daily it is used twice. |
| 48 | *Biophytum reinwardtii (Zucc.) Klotzsch* | Oxalidaceae | Kunukudu | H | Whole Plant | Insomina (sleeplessness) | Apply the paste of whole plant and water on face before sleeping. |
| 49 | *Smilax zeylanica* L. | Smilacaceae | Chinna kummari baddu | Cl | Root | Leucorrhoea, Jaundice. | Root, turmeric, and pepper are pasted and taken twice in a day for healing the disease jaundice while the paste of root and cumin is used for Leucorrhoea. |
| 50 | *Albizia odoratissima* (L.f.) Benth. | Fabaceae | Nalla thummi | T | Bark | Hysteria General ability Stomach ache | The bark and pepper paste is used orally with the quantity of 3 spoons. |
| 51 | *Soymida febrifuga* (Roxb.) A. Juss. | Meliaceae | Somithi | T | Bark | Leucorrhoea | Juice of bark and water by taking thrice daily. |

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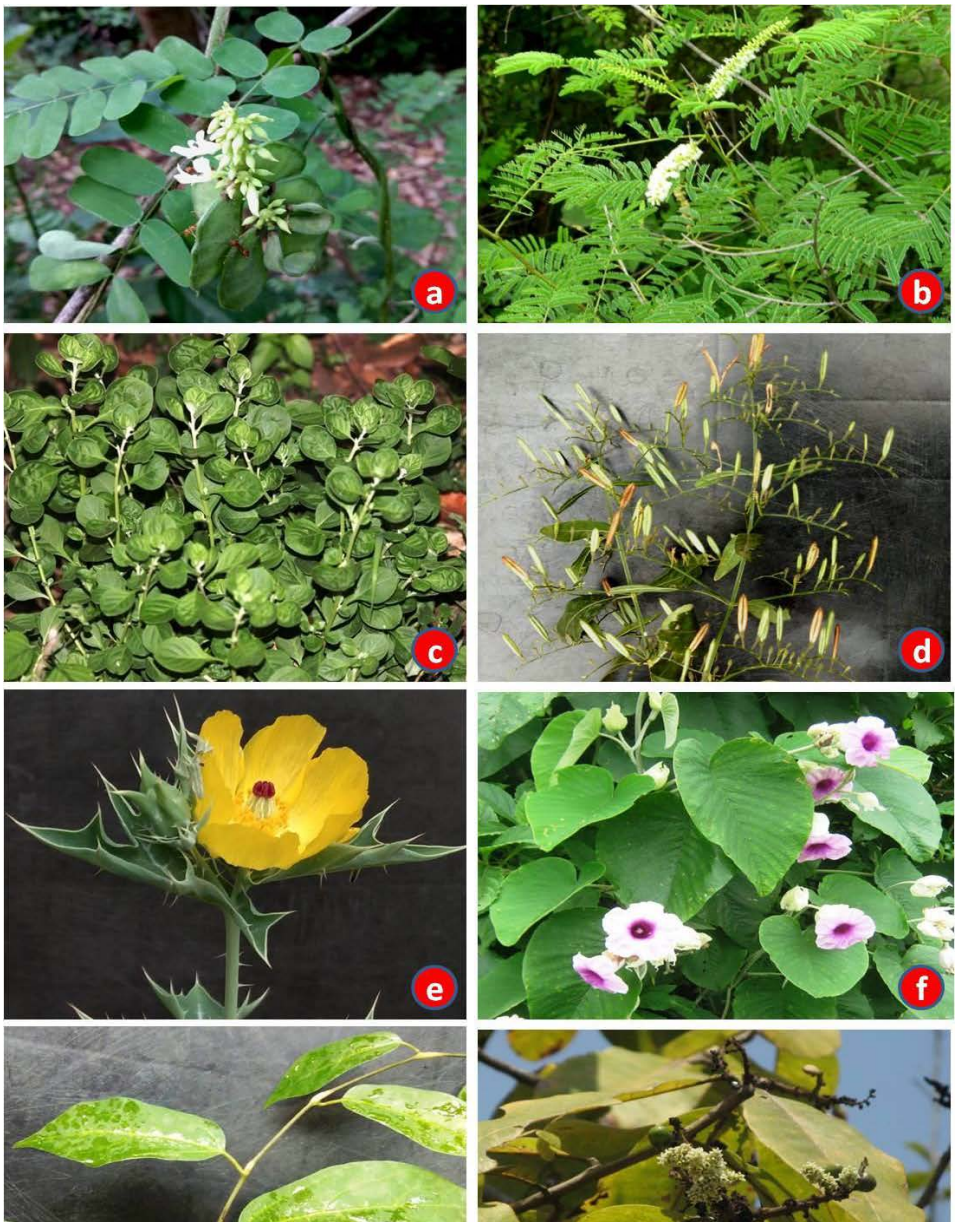
| 52 | *Asparagus racemosus* Willd. | Liliaceae | Seethamma jada | Cl | Tuber | Jaundice | Tuber and small quantity of water is mixed to make small pieces of balls. These ball are taken daily 3 times. |
| 53 | *Dillenia pentagyna* Roxb. | Dilleniaceae | Galimanu | T | Bark | All body parts pain killer | The low wet balls of the plant bark and water is used to cure the disease. The totally 4 to 5 balls are used daily. |
| 54 | *Cyperus iria* L. | Cyperaceae | Thunga musthulu | H | Inflorescence | Haemorrhage Eye problems | The Inflorescence paste and urine mixture is directly added to eye to cure the heal. Also, the paste of Inflorescence and water is taken orally 3 times in a day. |
| 55 | *Cocos nucifera* L. | Arecaceae | Kobbari | T | Flower | Leucorrhoea | The flower, sugar, and water paste is used internally 2 times daily. |
| 56 | *Oryza sativa* L. | Poaceae | Vari | H | Seed | Leucorrhoea | The soaked rice water is taken directly 3 timed in a day. |
| 57 | *Curcuma caesia* Roxb. | Zingiberaceae | Nalla pasupu | H | Rhizomes | Asthma, piles Ttumors Ttuberculous glands of the neck. | The rhizomes are pasted with water and taken 2 to 3 spoons daily. |
| 58 | *Amaranthus spinosus* L. | Amaranthaceae | Mullu kura | H | Leaves | Swelling in the body parts | By externally applying the paste of water and leaf, the disease can be healed. |
| 59 | *Holoptelea integrifolia* Planch. | Ulmaceae | Erra gadha | T | Bark | Dysmenorrhea pains | By taking the bark paste with jaggery 2 times in a day, the disease can be cured. |
| 60 | *Pueraria tuberosa* (Willd.) DC. | Fabaceae | Modiga baddu | Cl | Bark | Jaundice | The bark paste with jaggery and pepper can be used by taking 3 times per day. |
| 61 | *Borreria hispida* L. | Rubiaceae | Modinika kada | H | Root | Scorpion bite | Paste of water and root cab be taken internally twice in a day. |
| 62 | *Cardiospermum halicacabum* L. | Sapindaceae | Botta boruga | Cl | Leaves | Headeache | The leaves of two plants were crushed and pasted with water. This paste is applied on the head 2 times. |
| 63 | *Cleome monophylla* L. | Cleomaceae | Vetakura | H | Leaves | | |
| 64 | *Achyranthes aspera* L. | Amaranthaceae | Uthareni | H | Root | Haemorrhage | The root of one plant and tuber of another plant are grinded and made juice with water. It is taken 50 ml per day for 3 times. |
| 65 | *Mirabilis jalapa* L. | Nyctaginaceae | Ambati | H | Tuber | | |
| 66 | *Momordica charantia* L. | Cucurbitaceae | Kakara | Cl | Leaves | Jaundice ( hepatitis) | Leaves of two plants are pasted with pepper and taken to heal jaundice. It is used two times daily. |
| 67 | *Phyllanthus amarus* Schumach. & Thonn. | Euphorbiaceae | Nela usisri | H | Leaves | | |
| 68 | *Acacia leucophloea* (Roxb.) Willd. | Mimosaceae | Mugisi | T | Bark | Infections during pregnancy | The bars paste of these two plants a are mixed with pepper and used orally by taking morning and evening daily. |
| 69 | *Diospyros melanoxylon* Roxb. | Ebenaceae | Thumma | T | Bark | | |
| 70 | *Aristida junciformis* Trin. & Rupr. | Poaceae | Poothika | H | Root | Haemorrhage | The bark and root paste of all the plants with water are taken daily three times. Every times 2 to three spoon s need to be taken. |
| 71 | *Imperata cylindrica* (L.) Raeusch. | Poaceae | Inela | H | Root | | |
| 72 | *Heteropogon contortus* (L.) P.Beauv. ex Roem. & Schult. | Poaceae | Dabbagaddi | H | Root | | |
| 73 | *Celastrus paniculatus* Willd. | Celastraceae | Giringodi | Cl | Bark | | |
| 74 | *Casearia tomentosa* Roxb. | Flacourtiaceae. | Pedin | Sh | Bark | | |

herbarium numbers intended for few plants namely *Abrus precatorius* L., *Acacia chundra* (Rottler) Willd, *Aerva lanata* (L.) *Juss*., *Andrographis paniculata* (Burm.f.) *Nees*, *Argemone mexicana* L., *Argyreia nervosa* (Burm. f.) *Bojer, Aristolochia indica* L., *Buchanania lanzan Spreng*., *Celastrus paniculatus* Willd., *Chloroxylon swietenia* DC., *Curcuma caesia* Roxb., *Dichrostachys cinerea* (L.) Wight & Arn., *Gloriosa superba L., Gmelina arborea Roxb., Gymnosporia montana* (Roth) *Benth., Mimosa pudica L. Mucuna pruriens* (L.) DC., *Oroxylum indicum (L.) Kurz, Pterocarpus marsupium Roxb*., *Solanum torvum Sw*., *Soymida febrifuga* (Roxb.) *A. Juss., Xanthium strumarium L., Xantolis tomentosa* (Roxb.) Raf., and *Zingiber zerumbet* (L.) Roscoe ex Sm were DCV-AUV:24001,DCV-AUV:24003, DCV-AUV:24006, DCV-AUV:24008, DCV-AUV:24011, DCV-AUV:24013,DCV-AUV:24017, DCV-AUV:24019, DCV-AUV:24022, DCV-AUV:24025, DCV-AUV:24027,DCV-AUV:24029, DCV-AUV:24031, DCV-AUV:24032, DCV-AUV:24035, DCV-AUV:24037, DCV-AUV:24038, DCV-AUV:24039, DCV-AUV:24042, DCV-AUV:24045, DCV-AUV:24046, DCV-AUV:24049, DCV-AUV:24051, and DCV-AUV:24054.

## Results

In the study area (Koyyuru Mandal), the gender sharing was 50.28% and 49.72% intended for male and female respectively, and the literacy rate was 48.83%. Numerous ethnomedicinal plants were collected through the field works during different seasons. The present result makes known that the PTGs of the study region have superior awareness of their health care by using the ethnomedicinal plant species. Based on the information available from the local tribal doctors, a total of 74 different plants of 43 families with 70 genera were collected and reported from Primitive Tribal Groups of Koyyuru mandal. The medicinal plant details with different families and its significance were depicted in Table 1. Further, a few of the pictorial plant views were made available in **Figure 2. Table 2** represents the thorough information of number of plant species used by different Primitive Tribal Groups.

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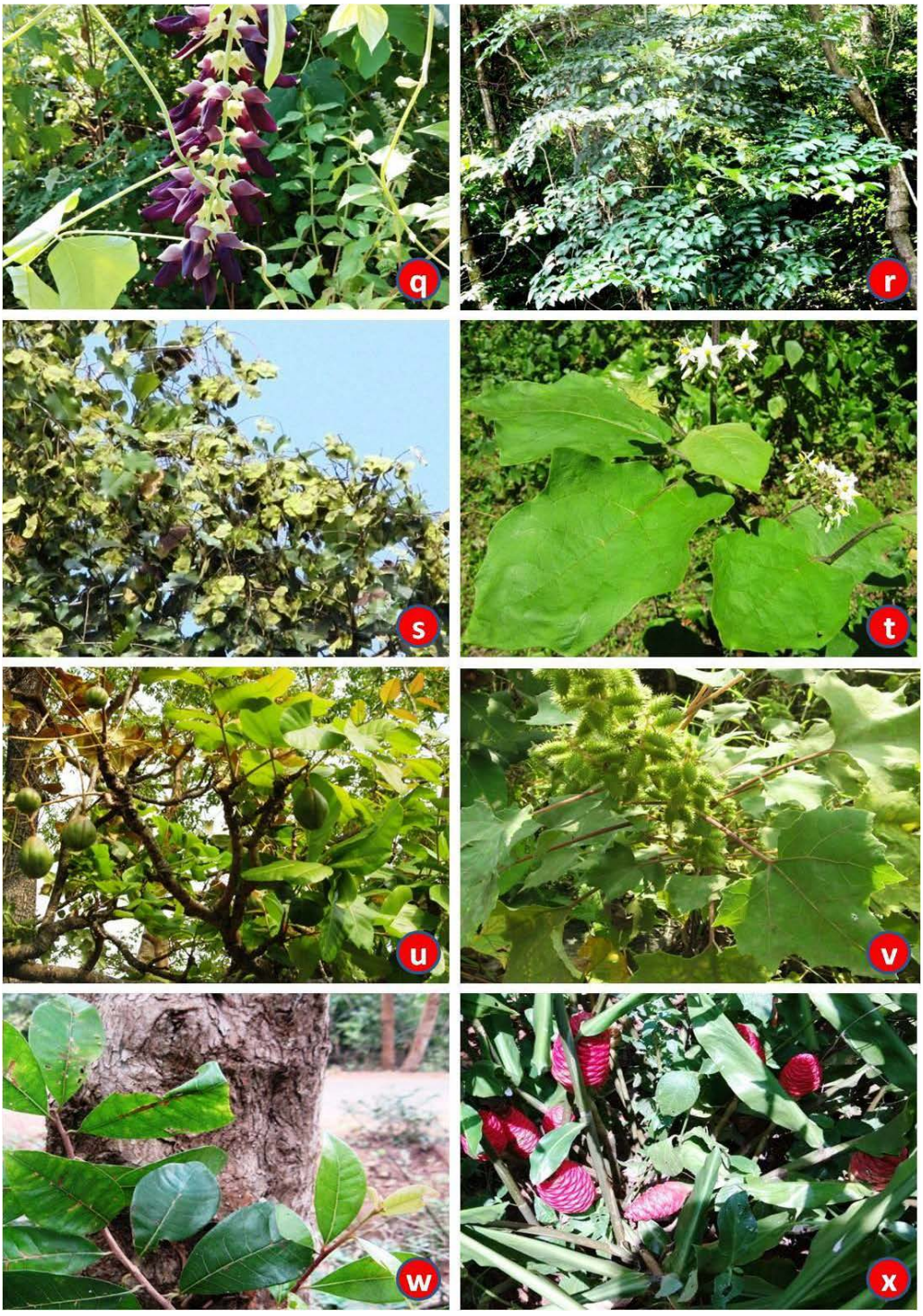


**Figure 2** a) *Abrus precatorius* L., b) *Acacia chundra* (Rottler) Willd, c) *Aerva lanata* (L.) Juss., d) *Andrographis paniculata* (Burm.f.) Nees, e) *Argemone mexicana* L., f) *Argyreia nervosa* (Burm. f.) Bojer, g) *Aristolochia indica* L., h) *Buchanania lanzan* Spreng i) *Celastrus paniculatus* Willd., j) *Chloroxylon swietenia* DC., k) *Curcuma caesia* Roxb., l) *Dichrostachys cinerea* (L.) Wight & Arn., m) *Gloriosa superba* L., n) *Gmelina arborea* Roxb., o) *Gymnosporia montana* (Roth) Benth., p) *Mimosa pudica* L. q) *Mucuna pruriens* (L.) DC., r) *Oroxylum indicum* (L.) Kurz, s) *Pterocarpus marsupium* Roxb., t) *Solanum torvum* Sw., u) *Soymida febrifuga* (Roxb.) A. Juss., v) *Xanthium strumarium* L., w) *Xantolis tomentosa* (Roxb.) Raf., x) *Zingiber zerumbet* (L.) Roscoe ex Sm.

**Table 2** Detailed information of number of plant species used by 5 Primitive Tribal Groups.

| S.No. | Botanical Name | Usage of ethnomedicinal plants of Primitive tribal groups | | | | | |
|---|---|---|---|---|---|---|---|
| | | T1 | T2 | T3 | T4 | T5 | Total |
| 1 | *Abrus precatorius* L. | ✓ | ✓ | ✓ | ✓ | ✓ | 5 |
| 2 | *Abutilon indicum* (L.) Sweet | ✓ | ✓ | - | ✓ | - | 3 |
| 3 | *Acacia chundra* (Rottler) Willd | - | ✓ | - | ✓ | - | 2 |
| 4 | *Acacia leucophloea* (Roxb.) Willd. | ✓ | - | ✓ | ✓ | - | 3 |
| 5 | *Achyranthes aspera* L. | ✓ | | - | - | ✓ | 3 |
| 6 | *Aegle marmelos* (L.) Correa | - | - | ✓ | - | ✓ | 2 |
| 7 | *Aerva lanata* (L.) Juss. | ✓ | ✓ | ✓ | ✓ | - | 4 |
| 8 | *Albizia odoratissima* (L.f.) Benth. | - | - | ✓ | - | ✓ | 2 |
| 9 | *Alstonia scholaris* (L.) R. Br. | ✓ | - | - | ✓ | - | 2 |
| 10 | *Amaranthus spinosus* L. | ✓ | ✓ | ✓ | ✓ | ✓ | 5 |
| 11 | *Andrographis paniculata (Burm.f.) Nees* | ✓ | - | ✓ | ✓ | - | 3 |
| 12 | *Argemone mexicana* L. | - | - | - | ✓ | - | 1 |
| 13 | *Argyreia nervosa* (Burm. f.) Bojer | ✓ | - | ✓ | - | ✓ | 3 |
| 14 | *Aristida junciformis* Trin. & Rupr. | - | ✓ | - | ✓ | - | 2 |
| 15 | *Aristolochia indica* L. | ✓ | - | | - | ✓ | 3 |
| 16 | *Asparagus racemosus* Willd. | - | - | ✓ | - | - | 1 |
| 17 | *Biophytum reinwardtii (Zucc.) Klotzsch* | ✓ | ✓ | - | - | - | 2 |
| 18 | *Borreria hispida* L. | ✓ | | ✓ | ✓ | ✓ | 5 |
| 19 | *Buchanania lanzan* Spreng | - | ✓ | - | - | - | 1 |
| 20 | *Calotropis gigantea* (L.) Dryand. | - | - | - | ✓ | - | 1 |
| 21 | *Capparis sepiaria L.* | ✓ | ✓ | - | - | ✓ | 3 |
| 22 | *Capparis zeylanica* L. | - | - | ✓ | - | - | 1 |
| 23 | *Cardiospermum halicacabum* L. | - | - | - | ✓ | - | 1 |
| 24 | *Casearia tomentosa* Roxb. | ✓ | - | ✓ | - | - | 2 |
| 25 | *Celastrus paniculatus* Willd. | ✓ | - | ✓ | - | ✓ | 3 |
| 26 | *Chloroxylon swietenia* DC. | - | ✓ | - | ✓ | ✓ | 3 |
| 27 | *Cleome monophylla* L. | ✓ | - | ✓ | - | - | 2 |
| 28 | *Cocos nucifera* L. | ✓ | ✓ | ✓ | ✓ | ✓ | 5 |
| 29 | *Cryptolepis buchananii* Roem. & Schult | ✓ | - | - | ✓ | ✓ | 3 |
| 30 | *Curculigo orchioides* Gaertn. | - | - | ✓ | - | - | 1 |
| 31 | *Curcuma caesia* Roxb. | ✓ | - | - | - | ✓ | 2 |
| 32 | *Cyperus iria* L. | - | - | ✓ | ✓ | - | 2 |
| 33 | *Datura metel* L. | - | ✓ | - | - | - | 1 |
| 34 | *Dichrostachys cinerea* (L.) Wight & Arn. | - | - | - | ✓ | ✓ | 2 |
| 35 | *Dillenia pentagyna* Roxb. | ✓ | - | - | - | - | 1 |
| 36 | *Diospyros melanoxylon* Roxb. | - | - | ✓ | - | - | 1 |
| 37 | *Diplocyclos palmatus* (L.) C.Jeffrey | ✓ | ✓ | - | ✓ | - | 3 |
| 38 | *Dregea volubilis* (L.f.) Benth. ex Hook.f. | - | - | ✓ | - | - | 1 |
| 39 | *Eclipta alba* (L.) Hassk. | ✓ | ✓ | - | ✓ | - | 3 |
| 40 | *Erythroxylum monogynum* Roxb. | - | - | - | ✓ | - | 1 |
| 41 | *Euphorbia tithymaloides* L. | ✓ | - | ✓ | - | ✓ | 3 |
| 42 | *Globba marantina L.* | - | - | - | ✓ | ✓ | 2 |
| 43 | *Gloriosa superba* L. | ✓ | - | ✓ | - | - | 2 |
| 44 | *Gmelina arborea* Roxb. | - | - | ✓ | - | - | 1 |
| 45 | *Gymnosporia montana* (Roth) Benth. | ✓ | | - | ✓ | ✓ | 4 |
| 46 | *Helicteres isora* L. | - | ✓ | - | - | ✓ | 2 |
| 47 | *Heteropogon contortus* (L.) P.Beauv. ex Roem. & Schult. | ✓ | | - | ✓ | - | 3 |
| 48 | *Holoptelea integrifolia* Planch. | - | - | ✓ | - | - | 1 |
| 49 | *Imperata cylindrica* (L.) Raeusch. | ✓ | - | - | ✓ | | 3 |
| 50 | *Jatropha curcas* L. | - | ✓ | | ✓ | - | 3 |
| 51 | *Mimosa pudica* L. | - | - | - | ✓ | - | 1 |
| 52 | *Mirabilis jalapa* L. | ✓ | ✓ | - | - | ✓ | 3 |
| 53 | *Momordica charantia* L. | - | ✓ | - | ✓ | ✓ | 3 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 54 | *Mucuna pruriens* (L.) DC. | - | ✓ | ✓ | - | - | 2 |
| 55 | *Oroxylum indicum* (L.) Kurz | ✓ | - | - | ✓ | ✓ | 3 |
| 56 | *Oryza sativa* L. | ✓ | ✓ | ✓ | ✓ | ✓ | 5 |
| 57 | *Pergularia daemia* (Forssk.) Chiov. | - | ✓ | - | ✓ | - | 2 |
| 58 | *Phyllanthus amarus* Schumach. & Thonn. | ✓ | ✓ | ✓ | ✓ | ✓ | 5 |
| 59 | *Pongamia pinnata* (L.) Pierre | - | - | - | ✓ | ✓ | 2 |
| 60 | *Pterocarpus marsupium* Roxb. | - | ✓ | | - | ✓ | 3 |
| 61 | *Pueraria tuberosa* (Willd.) DC. | - | ✓ | - | - | - | 1 |
| 62 | *Senna occidentalis* (L.) Link | ✓ | ✓ | ✓ | ✓ | ✓ | 5 |
| 63 | *Smilax perfoliata* Lour. | - | - | ✓ | - | - | 1 |
| 64 | *Smilax zeylanica* L. | ✓ | | - | - | ✓ | 3 |
| 65 | *Solanum torvum* Sw. | ✓ | ✓ | ✓ | - | ✓ | 4 |
| 66 | *Soymida febrifuga* (Roxb.) A. Juss. | ✓ | - | ✓ | ✓ | - | 3 |
| 67 | *Strychnos nux-vomica* L. | - | - | ✓ | - | - | 1 |
| 68 | *Tephrosia purpurea* (L.) Pers. | ✓ | ✓ | ✓ | ✓ | - | 4 |
| 69 | *Tephrosia villosa* (L.) Pers. | ✓ | | - | - | - | 2 |
| 70 | *Urena lobata L.* | - | ✓ | ✓ | - | ✓ | 3 |
| 71 | *Xanthium strumarium* L. | ✓ | - | - | ✓ | - | 2 |
| 72 | *Xantolis tomentosa (Roxb.) Raf.* | ✓ | ✓ | ✓ | ✓ | - | 4 |
| 73 | *Zingiber zerumbet* (L.) Roscoe ex Sm. | - | ✓ | ✓ | ✓ | - | 3 |
| 74 | *Ziziphus rugosa* Lam. | ✓ | - | ✓ | ✓ | - | 3 |

## Discussions

Ethnomedicinal study has exposed that most of the plant species were extremely older and showed better efficacy for healing the diseases. The informants in the region of ethnomedicinal study area have used numerous plant species to cure diverse diseases with blending with a little natural additive or with other plant species. An entirely a total of 59 various diseases were treated with no side effects from the gathered 74 ethno medicinal plants. It can be perceived from the Table 1 that the *Acacia, Capparis, Smilax*, and *Tephrosia* genus were with 2 species while left over a total of 70 genera were with single species. The medicinal preparation for treating dissimilar variety of diseases were attained from bark (30% medicinal preparation), leaves (25% medicinal preparation), and root (17% medicinal preparation) of the ethnomedicinal plants. The contribution of leftover parts of the ethnomedicinal plants was not as much of bark, leaves, and roots. For the remedial of several diseases, the habitation of plant species were maximum in number with herbs (30 species) out of 74 plant species compared to trees (19 species), shrubs (8 species), and Climbers (17 species). The observation made from this analysis was that there are 43 families for plant species in which Fabaceae (11 species) has the highest occupancy and poaceae (4 species) dwell in the second maximum occupancy. Among a total of 74 ethnomedicinal plants, 53 plant species were used for a single disease, 12 plant species were for 2 diseases, 6 plant species were for 3 diseases, and 3 plant species for 4 diseases. The ethnomedicinal practice among all 5 Primitive Tribal Groups (PTGs), the utmost number of plants were used by T1 (40 Species) and T4 (40 Species) followed by T3 (39 Species), T2 (36 Species), and T5 (31 Species). The present study demonstrated superior contribution with gathering a total of 74 medicinal plants from the limited tribal people than other related investigations resembling Raju et al [14], Aruna et al [15], and Padal et.al [16].

## Conclusions

The present study concludes that plenty of ethnomedicinal plants were originated in favor of healing numerous diseases with different preparations. A total number of 74 plant species with 43 families have been documented and used for healing practices associated to a total of 59 diseases. Further, an additional medicinal value was obtained for a few plant species which as tabulated in Table 1. The complete understanding of ethnomedicinal plants, quantitative analysis, and phytochemical analysis need to be carried out further as future scope.

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## Conflict of interest

The authors declare no conflict of interest.

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