



Documentation of Medicinal Plants from the Undivided Area of Puri District, Odisha, India

Mita Mohanty¹, Suraj Kumar Behera¹, Sangeeta Dash¹ and A. Leelaveni^{1*}

¹*Department of Botany, Berhampur University, Berhampur, Odisha- 760007, India.*

Authors' contributions

This work was carried out in collaboration between all authors. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/EJMP/2018/43170

Editor(s):

- (1) K. Himakar Reddy, Department of Advanced Research Center, Narayana Medical College & Hospital, India.
(2) Marcello Iriti, Professor, Plant Biology and Pathology, Department of Agricultural and Environmental Sciences, Milan State University, Italy.

Reviewers:

- (1) M. Fawzi Mahomoodally, University of Mauritius, Mauritius.
(2) A. Papazafiropoulou, Tzaneio General Hospital of Piraeus, Greece.
Complete Peer review History: <http://www.sciencedomain.org/review-history/25998>

Original Research Article

Received 25th May 2018
Accepted 31st July 2018
Published 25th August 2018

ABSTRACT

The present study was done to record the ethnobotanical information from hill-dwelling aboriginal tribes of the undivided Puri district (Khurda and Nayagarh), Odisha, India. The aim was also to gather the information on medicinal uses of plants by conducting personal interviews with socio-economically backward tribals and to record the accumulated knowledge with the snowball technique. Plants were identified by the users on forest floor and were botanically classified. This study recorded the use of different parts of 52 plant species belonging to 51 genera of 28 different flowering plant families, against 61 human ailments, with special reference to Asthma, Stomach disorder, and Fever. The healers use these plants to cure several diseases like asthma, stomach disorder, skin diseases, piles, constipation, diabetes, fever, cough, toothache, wound healing, headache, leucorrhea, infertility in women, mouth ulcer, heart pain, pimples, indigestion, snake bites, ring worms, thirst, eczema, dysentery, diarrhoea, blood purification, high blood pressure and sore throat. These plants are used as herbal healing sources as a part of cultural practice of local traditional healers down the ages. Among these plants, many are specific to the climate identified zone of the hilly forest patches of the district. The present record of ethnomedicinal data indicated that the backward local ethnic people use plants from their surroundings, as healing sources for all possible ailments. It was revealed from the study that the commonly used plants for the treatment of asthma and malaria, are *A. vasica*, *A. marmelos*, *A. galangal*, *C. crista*, *C. sepiaria*, *N. arbor-tristis*, *R. dumentorum*, *S. indicum* and *V. negundo*.

*Corresponding author: E-mail: leela_a2001@yahoo.co.in;

Keywords: Ethnobotany; medicinal plant; tribal people; Puri.

1. INTRODUCTION

Ethnobotany is mainly used in linguistics for identifying the language in jotting down the name of plants, with correct phonetics and etymology. Ethnobotanical studies assume great importance in enhancing the knowledge about the plants grown and used by tribal communities, the rich diversity assembled by them and different means adopted by them for the conservation. Plants are used as food, medicine, spices, condiments, colouring agents in religious ceremonies, worshiping the deities and for miscellaneous uses such as masticatories, detergents, nutritive fodder, etc. [1]. In many tribal communities, plants are used in abstract form in songs, proverbs, stories folk tales, poetry, etc. There are many plants worshipped in India like *Cynodon dactylon* (durva, darbh grass), *Ficus religiosa* (peepal) *Ocimum sanctum* (tulsi), which are the highly venerated plants. Ethnobotanists gather data mainly from people in hope to gather a view of their indigenous knowledge as well as an understanding of the use of plants.

These ethno medicinal plants have been used for many centuries as a source of drugs for the treatment of many diseases, upheaval and aid of good health [2] and still provide the first line of primary health-care even in the present age to major component of the population of worldwide [3]. According to WHO [4], it is estimated that up to 80% of the population depends entirely on plants for their health and healing. The information and folk knowledge regarding the medicinal uses of these indigenous plant materials have been passed from generation to generation through oral communication [5]. As modernization progresses, however, the use of traditional medicinal plants has been threatened in many parts of the world mainly due to the natural environmental destruction. Due to modernization, natural vegetation is being destroyed for the building of infrastructures that regale to the industrialization needs of the locale. Other concerns are over-harvesting of the plants causing their cessation and decrease in population [6]. Introduction of western medicines has resulted in the gradual replacement of traditional practices [6]. This is evident, nowadays, in the younger generations who do not possess as much knowledge of medicinal plants as the older generations [7].

India is proud to be rich in biodiversity by possessing about 8% of the estimated biodiversity in the world with around 12600 species. It is one of the 12 mega biodiversity centers with 2 hot spots biodiversity in the Western Ghats and North – eastern region. It is also rich in ethnic diversity; there are about 67.37 million tribal people belonging to 537 tribal groups living in different geographical locations with various subsistence patterns. These tribal groups living in diverse rich areas, possess a wealth of knowledge and skills on the utilization and conservation of food and medicinal plants. It is often noted that 25% of all drugs prescribed today come from plants and this estimation suggests that the plant -derived drugs contribute to a significant segment of natural product-based pharmaceuticals. In India as well as all over the world there exist a number of traditional systems of medicine as well as traditional practices for human and animal treatment. Researchers might identify a few of them as globally important, depending on the prolong experience [8].

In Odisha, many districts have sizeable populations of aborigines, which are economically marginalized and socially backward. The study was done in Khurda and Nayagarh of undivided Puri district, which is situated at coastal area. Khurda and Nayagarh are located at north and west side, respectively. These districts are rich in vegetation and around 40% of the district population are aborigines living in forest. The undivided Puri district has been recognized as the home for many medicinal plants. The objective of this study was to record the ethnomedicinal information from the tribals of undivided puri district, which would help to preserve the ethnomedicinal plants under threat and save the potential treasure of knowledge. The present work describes uses of plants by 8 aborigine castes. The recorded information is anticipated to generate new scope for work on antimicrobial activities of plants and biochemical work with active compounds of these plants.

2. MATERIALS AND METHODS

2.1 Study Area

The present work is the outcome of extensive survey of different tribal villages in undivided area of Puri district (khurda and Nayagarh) during 2016- 2017 to collect information on the

medicinal uses of different plant species. Khurda district with an area of 2813 sq km is bounded between latitudes 19°40'N and 20°27'N and longitudes 84° 56'E and 86°05'E. It is bounded at the north and northeast by Cuttack district, west and southwest by Nayagarh and Ganjam districts, and southeast by Chilika Lake and Puri district. According to the Köppen–Geiger climate classification system the climate of Puri is classified as Aw (Tropical savanna climate). The city has moderate and tropical climate. Humidity is fairly high throughout the year. Undivided Puri district has people of a different ethnic groups with several socioeconomic categories of both backward castes (scheduled castes) and aborigine tribes (scheduled tribes) living together. The tribes were santal, saora, khond and Sabar. They were originally nomadic community, but today they are living in tribal hamlets, each consisting of 10-25 families disbursed in patches in the forest. Their language is not the Odishi

language, i.e., Oriya. Every tribal group has a tribal chief/head. As per the 2011 census, the population is 0.35% of the total population (district population of about 2,246,341 approximately) of Khurda district and Nayagarh had a population of 17,030.

2.2 Data Collection

During several visits to the villages, interviews were taken and information were recorded randomly from head-men, traditional healers, priests, housewives and patients, irrespective of sex, castes or tribe. Selection of plants from Puri district was based on the interviews in hamlets with both schedule castes and schedule tribes. All the information on medicinal plants reported by them were collected taking the help of traditional healers, and the plant specimens were botanically identified and authenticated with help of valid reference [9]. A literature

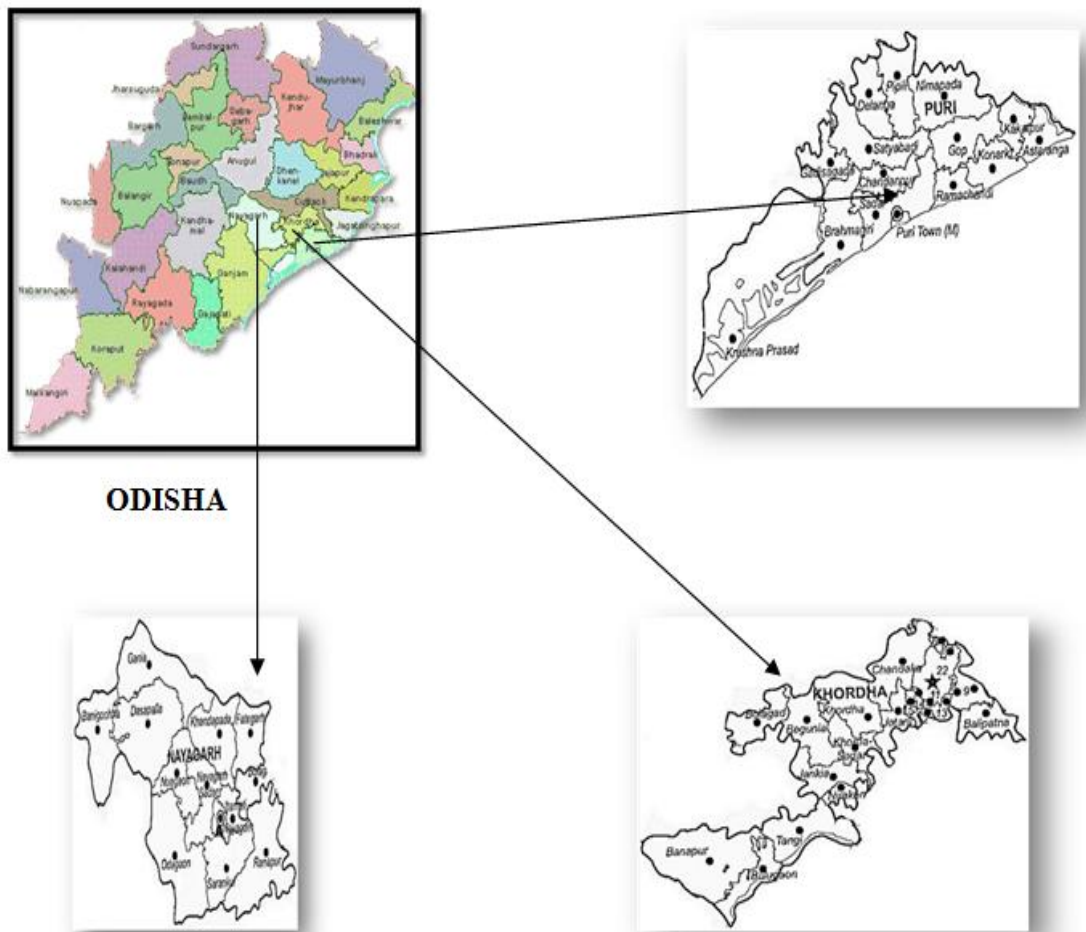


Fig. 1. Index map of undivided area of Puri district

survey was carried out on the study area before the commencement of the field work [10-15]. Photographs and voucher specimens (herbaria) were preserved at P.G. Department of Botany, Berhampur University, Berhampur. A survey of about 20 hamlets in the districts was done with a questioner and personal interview. The methods used in harvesting the plant materials from the wild were also recorded. Plant specimens were prepared and identified. Descriptive statistics were used to analyse the collected ethnomedicinal data.

3. RESULTS

List of plants has been presented alphabetically with botanical names, family and local vernacular names in Table 1. Brief information on the plant parts used as medicines against ailment(s) is given in Fig. 3. The present record of

ethnomedicinal data are for 52 plant species belonging to 51 genera of 28 families. These plants are used against stomach disorder, skin diseases, piles, constipation, diabetes, fever, cough, toothache, wound healing, headache, leucorrhoea, infertility in women, mouth ulcer, heart pain, pimples, indigestion, snake bites, ring worms, thirst, eczema, dysentery, diarrhoea, blood purification, high blood pressure, sore throat etc. (Table 1). Herbal medicines prepared by these tribes are from both single plants and a combination of many plant parts, as combinations have better activity. Generally, the fresh plants are used for preparation of medicines but in the absence of fresh plant parts, sun-dried plant parts are used. Among all the plant families, Fabaceae, Rutaceae and Asteraceae include the largest number of plants used for the treatment of different diseases.

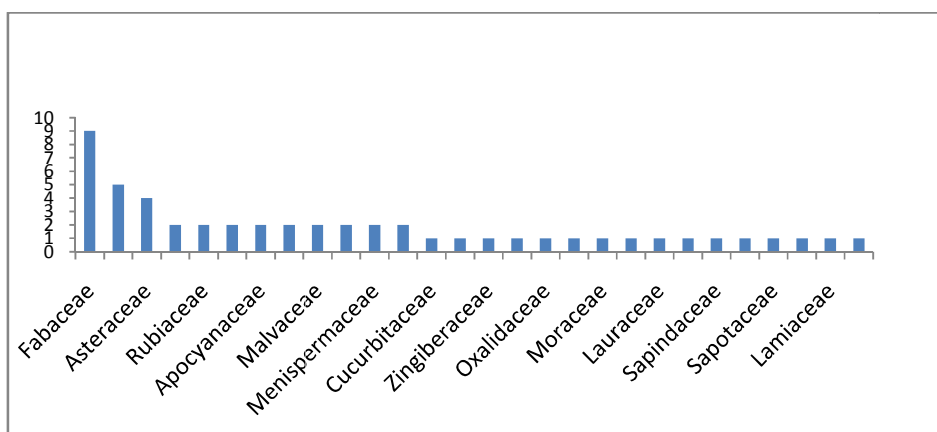


Fig. 2. Distribution of plants among families

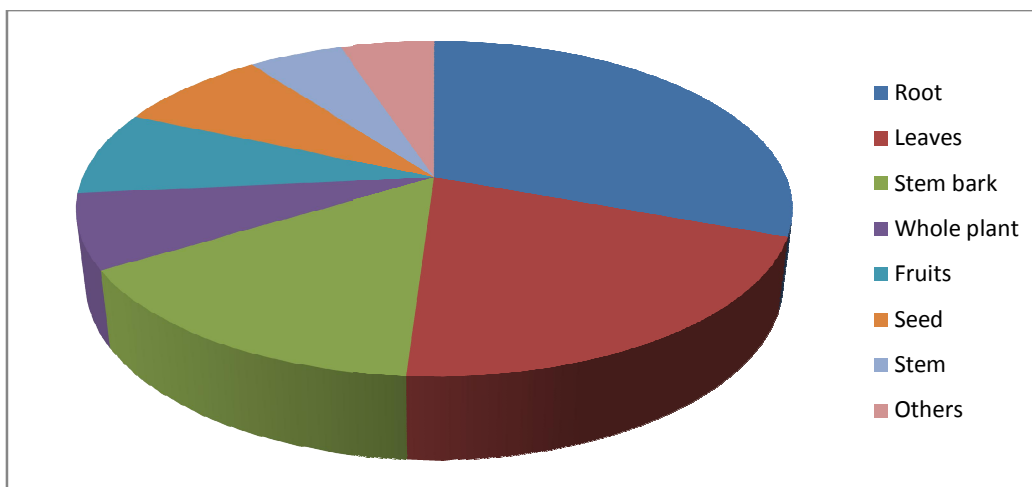


Fig. 3. Parts of the plant used by therapeutic agent

Table 1. Ethnomedicinal information of plants of Undivided Puri District

Plant name	Family	Vernacular name	Medicinal uses and mode of administration
<i>Abroma augusta</i> (L.) L.F	Malvaceae	Olatakamala	Half tea spoon of fresh leaf powder is taken orally once a day for curing gonorrhoea. Decoction prepared with 5 gm of bark powder, 1gm of black pepper with one glass of water and is given daily for seven days before menstruation to cure menstrual disorder.
<i>Abrus precatorius</i> Linn.	Fabaceae	Kaincha	The paste of dried leaves of the plant is taken orally and also applied on cuts as well as on swellings to cure cuts and swellings.
<i>Adhatoda vasica</i> L.	Acanthaceae	Basanga	Fresh leaves and stems of <i>Adhatoda vasica</i> are taken in idli maker or steamer: the steamer mixture is taken in hand and crushed to get juice. The mixture of one spoon of juice and honey is given to children to get relief from cough. Inhalation of 9 to 10 dried leaves gives relief from asthma.
<i>Aegle marmelos</i> (L.) Correa	Rutaceae	Bela	Mixture of 5 gm of <i>Aegle marmelos</i> leaf with one teaspoon of honey is taken, thrice a day to cure Asthma. One teaspoon of raw fruit pulp is taken twice a day to stop vomiting during pregnancy
<i>Ageratum conyzoides</i> L.	Asteraceae	Pokasungha	2 to 3 drops of leaf juice is applied in the nostrils, once per a day to cure Epilepsy.
<i>Alpinia galanga</i> (L.) Wild	Zingiberaceae	Malayabacha	3 grams of rhizome powder and some sugar is taken at bed time with hot milk to cure cold, cough and fever. Half teaspoon of rhizome stock powder in 250 ml of water is left for 4 hours and again one teaspoon of honey is added, is taken twice per a day for cure Asthma.
<i>Andrographis paniculata</i> (Burm.F.) Wall	Acanthaceae	Bhuin limba	The decoction of whole plant given twice per a day to reduce chronic fever. Boil the mixture of one gm of <i>Andrographis paniculata</i> leaves, 1 – 2 gm of <i>P. niruri</i> fruit powder and 2 gm of <i>T. cordifolia</i> fruit powder in 200ml water and the decoction is given 3 times per a day to cure liver related problems. Decoction prepared by 2 gm of <i>A. paniculata</i> and 2 gm of <i>T. cordifolia</i> in 400 ml water and is given to cure indigestion.
<i>Averrhoa carambola</i> L.	Oxalidaceae	Karamanga	The paste of 5 to 6 leaves are applied externally, thrice a day to cure chickenpox. . The decoction is prepared with one to two flowers and two cup of water and is given twice a day to cure malaria.
<i>Barringtonia acutangula</i> (Linn.)	Lecythidaceae	Hijjala	10 to 12 ml of fresh leaf juice with honey is given to cure diarrhoea . Seeds rubbed down on stone and are applied over sternum for chest colds.

Plant name	Family	Vernacular name	Medicinal uses and mode of administration
<i>Bixa orellana</i> L.	Bixaceae	Sinduri	6 to 9 boiled leaves are applied over the forehead to reduce fever. 5 to 6 pounded leaves are mixed with 1ml of coconut oil and are applied on the forehead to cure headache. 5 to 6 crushed leaves are used against snake bites.
<i>Boerhavia diffusa</i> Linn.	Nyctagraceae	Artikopadi	One tablespoon of roasted seeds is given as a tea with or without sugar and milk for kidney stones. 30 ml of whole plant juice is given, once per day to cure urinary tract infections.
<i>Caesalpinia crista</i> L.	Fabaceae	Paikera	<i>Caesalpinia crista</i> seeds are soaked for overnight and are taken with water during the morning time for 15 days to cure diabetes. The powder of both bonduct nut and black pepper in 2:1 ratio is taken 4 gms twice a day to cure malaria
<i>Calotropis procera</i> (Aiton) W.T. Aiton	Asclepiadaceae	Arakha	The flower powder is mixed with triphala churna in 1:4 proportion and one tsp of the mixture is taken along with honey, thrice a day for forty days to cure Asthma. One drop of mustard oil is smeared on a leaf warmed and is applied over the abdomen for immediate relief from stomach pain Boiled mixture of latex and turmeric powder in 1 ml of sesame oil is applied on the joint to cure arthritis.
<i>Capparis sepiaria</i> L.	Capparaceae	Kantikapali	Caper leaf juice with small amount of honey up to ratio 2 /3 is given to cure fever. The paste of fried caper root with 1 tsp of ghee is applied orally, twice a day until the piles diseases is cure
<i>Cassia fistula</i> L.	Fabaceae	Sunari	Approximately 50 gms of the pulp is soaked in water for overnight, then 25 gm of sugar is added and taken twice a day for 5 days to cure constipation. Inhalation of the burning <i>Cassia fistula</i> root is done to cure common cold.
<i>Celastrus paniculatus</i> Wild	Celastraceae	Pengu	13 gms of the Celastrus seed powder is taken in empty stomach during morning time everyday for improving memory. 23gm of Celastrus seeds is taken twice a day with lukewarm water or milk to cure Arthritis.
<i>Clitoria ternatea</i> L.	Fabaceae	Aparajita	Boiled small piece of root with a cup of water is given to reduce stress and to act as a mild sedative. 10 grams root is soaked in 2 cups of water for 5 hours and is given twice a day for 3 days to cure constipation.
<i>Coccinia grandis</i> L.	Cucurbitaceae	Kunduri	The juice of root or leaves or fruits is given thrice a day to cure diabetes. Boiled 2 teaspoon of root powder with 150 ml of water is given thrice a day to cure urine blockage.

Plant name	Family	Vernacular name	Medicinal uses and mode of administration
<i>Coccolus hirsutus</i> (L. Diet)	Menispermaceae	Dahidahika	3gms of leaf powder with some Crystallized sugar lumps is taken to cure spermaorrhoea.
<i>Coleus aromaticus</i> (Lour.)	Lamiaceae	Hemmakedara	The leaves, some cloves and flower of <i>Myristica fragrans</i> are boiled in water and this decoction is taken repeatedly to cure chlorea. The leaf juice is given to children 3 times a day to reduce fever.
<i>Datura stramonium</i> L.	Solanaceae	Dudura	The brunt leaves are inhaled to cure asthma. 120 mg of flower powder is mixed with honey and is taken twice a day for 10 days after menstruation for infertility in women.
<i>Desmodium gangeticum</i> (L. DC)	Fabaceae	Salopani	The extracted root juice with a pinch of salt is taken 2-3 times per day to cure diarrhoea and dysentery. 5 to 6 leaves paste is applied in the area of eczema. Half cup of root juice is taken orally as anti dot to cure snake bite.
<i>Eclipta alba</i> L.	Asteraceae	Bhrungaraj	¼ to ½ a glass of leaves juice is taken twice a day to cure urinary infections. Eating 5 to 6 fresh leaves in the morning time cure constipation. Boiled 15 ml of leaf juice in 20 ml of cow milk is taken during the morning time to cure blood pressure.
<i>Feronia limonia</i> L.	Rutaceae	Kaitha	3 – 6 gm of powder of dried tender leaves is given twice a day to cure diarrhoea. 10 g of ripe fruit is given once a day for 1 month to cure diabetes. 7 – 14 ml leaves juice is taken, twice a day for 1 month to cure kidney stone.
<i>Ficus racemosa</i> Linn.	Moraceae	Dimiri	Grinded small dark coloured eruptions leaves in 3 – 4 gm of milk and some honey is given twice a day to cure chicken pox. 10 – 15 gm of fresh bark is coked in 250 ml of water, then 1 tsp of sugar and 1.5 gm white cumin seed powder are added and is given twice a day to cure metrorrhagia.
<i>Glycomis pentaphylla</i> (Retz.)	Rutaceae	Chauladhua	Mixture of leaf and a bit of ginger paste is applied on affected area thrice a day for 1 week to cure eczema .Leaf juice is used to cure fever.
<i>Gymnosporia montana</i> (Roth.) Benth.	Celastraceae	Baincha	Chewing of 4 to 5 no of leaves, twice a day reduces thirst. 25 gm root powder in 1 glass of water is taken, twice a day for blood purification.
<i>Lawsonia inermis</i> L.	Lythraceae	Manjuati	Henna leaves are soaked in water and is taken to cure cracking of nails. A paste of dried leaves with water is applied on the forehead to reduce headache.
<i>Litsea glutinosa</i> (Lour.) C. B. Rob	Lauraceae	Garuda gobinda	5 gm of roots powder is boiled in 140 ml of water, 4 slices of fresh leaves are added and is taken twice a day to cure diabetes.
<i>Mimusops elengi</i> (Linn.)	Sapotaceae	Baula	7 – 14 ml of leaf juice is taken twice daily with honey to cure eyesight weakness. The dried flower powder is used a snuff in case of headache.

Plant name	Family	Vernacular name	Medicinal uses and mode of administration
			The paste of the bark and unripe fruit is applied over the local area to get relief from effect of poison.
<i>Murraya koenigii</i> (L.) Sprengi	Rutaceae	Bhursunga	3 – 4 gm of dried leaf powder is taken daily in the morning. It helps to reduce blood sugar level. The paste of fresh leaves is used to massage as face pack which helps to remove pimples and gives glowing skin. 3 – 4 spoons of fresh leaf juice with one cup of added water is given to control acidity
<i>Neolamarckia cadamba</i> (Roxb.) Bosser.	Rubiaceae	Kadamba	5 teaspoon of powder of each plant: Arjuna, blackberry, caraway and cadamba is boiled in half litre of water is given twice a day for one month to cure diabetes. 10 – 15 ml of fresh leaf juice is given to cure leucorrhea and increased menstrual flow.
<i>Nyctanthes arbortristis</i> L.	Oleaceae	Parijata	Powder of 3-4 number of leaf is boiled with water and is taken twice a day to cure sciatica. Decoction of 5gm of leaf or bark or flower in 200 ml of water is applied in aching joints externally to cure Arthritis. 3 gm bark, 2 gm leaf with 2 – 3 leaves of tulsi are boiled in water is given 2 times per a day to cure Fever.
<i>Polyalthia longifolia</i> Sonn	Annonaceae	Kastadaru	The paste of stem bark powder with few amount of butter is applied on genital region for cure gonorrhoea the decoction of bark and gargle is used thrice a day to cure mouth ulcers.
<i>Pongamia pinnata</i> (L.) Piere	Fabaceae	Karanja	A paste of 5 gm each of the bark of Drumstick, Indian beech and the root of golden shower in some urine of cow is applied on the affected area to cure swelling.
<i>Punica granatum</i> Linn.	Lythraceae	Dalimba	The fruit juice maintains blood flow in the body for cure Heart problem. The decoction of leaves and fruit is prepared and taken to cure the digestive problems.
<i>Putranjiva roxburghii</i> Wall.	Euphorbiaceae	Putrajivah	The seed paste is useful against headache. Half teaspoon of Putranjiva and cucumber seed powder is given 2 times per day for 3 months to cure infertility.
<i>Randia dumetorum</i> L.	Rubiaceae	Madanaphala	The bark powder of <i>Randia dumetorum</i> and <i>calotropis procera</i> is given 2 grams, twice a day to get relief from asthma. The mixture of 1 teaspoon of seed powder, 6 grams salts, and 1 grams of pippali powder is prepared in hot water and is given to induce vomiting
<i>Rouwolfia serpentine</i> (L.) Benth	Apocyanaceae	Patalgaruda	Mixture of half a tablespoon each of dry coriander, Indian snakeroot and rock candy (mishri) is given once per a day for cure high blood pressure.

Plant name	Family	Vernacular name	Medicinal uses and mode of administration
			Mixture of 1 to 2 pinches of Indian snakeroot powder and cardamom powder and is given two times a day for 2 weeks to cure insomnia. One teaspoon of dried Indian snakeroot with a glass of warm water is given once a day for 3 to 4 days to cure leucorrhoea.
<i>Sapindus trifoliatus</i> L.	Sapindaceae	Aristak	Soapnut is soaked in water for a night and crushed in the same water in the morning and is used for washing hair and scalp, to cure dandruff. 1 to 2 teaspoons of fruit powder in a glass of water is mixed, stirred well and scalp is washed with this water to promote hair growth
<i>Saraca indica</i> L.	Fabaceae	Ashoka	The juice of 1-2 flowers with water is prepared and 15-60 drops of juice is taken to get relief from dysentery. 90 grams of bark is boiled in 360 ml of water, then 30 ml of milk is added and is given by two to three doses, each day to cure piles. 2 tsp of seed paste is given once per a day to cure urine retention.
<i>Sesbania grandiflora</i> (L.) poiret	Fabaceae	Agantee	The decoction of leaves and flowers is given thrice a day to cure constipation. The decoction of Agantee leaf, tulsi leaf and black pepper is prepared, then 1 spoon of sugar rock candy and milk are added and this mixture is taken twice a day to reduce fever.
<i>Sida cordifolia</i> L.	Malvaceae	Bajramuli	An amount of 5 to 6 gm of root powder of both <i>Asparagus racemosus</i> and <i>Sida cordifolia</i> is consumed orally thrice a day to cure throat disorder. Infusion of <i>Sida cordifolia</i> and <i>Withania somnifera</i> oil in equal proportion is massaged over the affected area daily to cure paraplegia.
<i>Solanum indicum</i> Linn. S. Ferox L.	Solanaceae	Bhurhati	Take 5 to 6 leaves and gargle with the juice extract, twice a day to cure mouth ulcer also chewing 1 to 2 leaves for sometimes for a week to hit mouth ulcers. A mixture of 5-6 dried leaves are prepared with 1-2 dried fruits and then added with 1 glass of warm water. It is taken thrice a day to cure fever.
<i>Tephrosia purpurea</i> (L.) Pers.	Fabaceae	Kolathia	14 – 28 ml of fresh leaf juice is taken twice a day to dropsy. Boil 5 to 10 gm of powder of whole plant in 1 glass of water and then filtered and is given thrice a day for blood purifying.
<i>Terminalia chebula</i> Retz.	Combretaceae	Harida	One chebulic fruit per day is consumed with salt to cure constipation. 2 tablespoon of chebula is mixed in ½ a bucket of water and the buttocks and hips are immersed in the water for 10 minutes. This is done before bath for getting relief from piles.

Plant name	Family	Vernacular name	Medicinal uses and mode of administration
<i>Terminalia bellerica</i> (Gaerts)	Combretaceae	Bahada	Equal quantity of licorice root, long pepper and bahada (after removing the seed) are finely powdered , then 1 tsp of this powder is boiled in 500 ml of water and is taken 2 times a day, morning and evening to cure indigestion ,cough and asthma.
<i>Thevetia nerrifolia</i> Jan.	Apocyanaceae	Karavira	100-200 mg of root bark is taken after small meals. It causes heavy urination, which cures the heart pain. The root of oleander is ground with cold water and then warmed and applied externally to cure piles.
<i>Tinospora cordifolia</i> (Thurb.)	Menispermaceae	Guluchi	2 tablespoon of whole plant juice is consumed once a day for 1 month to cure Anaemia. Half teaspoon of stem extract, twice a day for cure allergy. One pinch of stem powder is boiled, then 2 pinches of ginger powder is added with it in a cup of water. It is taken once a day to cure joint pain.
<i>Toddalia asiatica</i> (Linn.) Lam	Rutaceae	Tundapuda	5 to 6 leaves are chewed daily to cure stomach disorders. 1 to 2 dried leaves are boiled in a cup of water, 1 tsp of honey is added and is taken twice a day for 3 days to cure cough.
<i>Tridax procumbens</i> L.	Asteraceae	Bishalyakarani	A whole plant is squeezed between the palms of two hands to obtain juice and it is applied on wounds twice a day for 3-4 days to cure the wound healing. Extraction of 5 to 6 no. of leaves is applied on the affected area thrice a day to cure skin disease.
<i>Vitex negundo</i> L.	Lamiaceae	Nirgundi	2 – 4 gm powder of its fruits is taken 2 – 3 times per day to cure disorders of nasal passages and mind. The root is tied in a child neck for early teething 20 gm leaf is boiled in 400 ml water, and then 2 gm peepal powder is added with it. and 10 – 20 gm is given to the patient for 2 – 3 times a day to cure fever.

Among all the plants, herbs (31% species) were found to be the most used plants followed by trees (29% species), shrubs (26%) and climbers (3%). Different parts of different medicinal plants are used as medicines by the local traditional healers. Among the different plant parts, the root is the most frequently used part for the treatment of diseases followed by leaves, fruit, stem, bark, seed, flower, whole plant, seed oil and latex. The modes of preparation of medicine fall into five categories, viz. Juice extracted from the fresh plant parts (32%), powder made from dried plant parts (22%), plant parts applied as a paste (20%), some fresh plant parts (18%), decoction (4%) and essential oil (4%). Water is used exclusively in the preparation of medicines.

4. DISCUSSION

The present study revealed that 52 ethnomedicinal plant species distributed in 51 genera belonging to 28 different plant families are frequently used for the treatment of various diseases in the undivided area of Puri district. Traditional healers are using these plants to cure different diseases such as asthma, stomach disorder, skin diseases, piles, constipation, diabetes, fever, cough, toothache, wound healing, headache, leucorrhoea, infertility in women, mouth ulcer, heart pain, pimples, indigestion, snake bites, ring worms, thirst, eczema, dysentery, diarrhoea, blood purification, high blood pressure, sore throat etc. The plants, which are used exclusively in the preparation of medicines are listed in Table 1. The present study gives special attention towards the ethnomedicinal practices related to asthma and malaria. Both have become most pressing public health problems. Globally 0.7% and 0.6% of the world population is suffering from these diseases, respectively. Of the 19 plant species recorded for their use in the management of Asthma and malaria, most commonly used plant species are *A. vasica*, *A. marmelos*, *A. galangal*, *C. crista*, *C. sepiaria*, *N. arbor-tristis*, *R. dumentorum*, *S. indicum* and *V. negundo*. Out of the 11 medicinal plants reported for the treatment of asthma and malaria fever, 9 plants have been reported earlier by different authors.

This ethnomedicinal study is a baseline work for further research. There are the need of phytochemical and pharmacological investigation of the folk prescriptions used by the traditional healers to prove their safety and efficacy for the treatment of the diseases. It is required to develop sustainable conservation plan for the medicinal plants which are becoming threat

because of the biological, ecological and social pressure.

As per the literature from different parts of the world, the first categories of plant-drugs are simple crude extracts [16]. These plant-extracts still await the validation of scientific evaluation, but many are very popular and are used by the local healers without any evaluation. It is estimated that plant materials based medicines are comparatively safer than synthetic alternatives. Sometimes several phytochemicals may have both known and unknown toxic effects on the human body and these should be properly extracted, prepared and consumed. There are still a large number of herbal drugs in practice, which need scientific authentication through biochemical analysis, clinical trials and other laid down parameters [17].

5. CONCLUSION

During this present investigation about 52 plants species were collected from the undivided (Khorda and Nayagarh) area of Puri district, Odisha and their therapeutic information were gathered. It is evident that still a large number of villages of Puri district, rich in their old customs and culture have adopted herbal therapy for the majority of disease because of strong belief on the local practitioners. Their uses were documented exclusively along with their medicinal properties, their preparation, storage or dose administration and efficiency against ailment. It is evident from the above mentioned discussion that the herbal therapy and other details are almost in conformity with the previous workers with a little difference. The efficacy and safety of all the reported ethnomedicinal plants needs to be evaluated for phytochemical and pharmacological studies. The commonly used plants for the treatment of asthma and malaria, such as *A. vasica*, *A. marmelos*, *A. galangal*, *C. crista*, *C. sepiaria*, *N. arbor-tristis*, *R. dumentorum*, *S. indicum* and *V. Negundo* should be given priority to carry out the bioassay and toxicity studies.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

ACKNOWLEDGEMENTS

The authors are grateful to the tribals of undivided area of Puri District, Odisha for sharing

their indigenous knowledge throughout the field study. This research would not had been possible without their active participation. The authors are also thankful to the Head of the Department, Botany Department, Berhampur University, Berhampur for his kind help and support throughout the study.

COMPETING INTERESTS

All authors declare that there were no conflicts of interest in relation to the work described in this paper.

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