



Original Research Article

Medicinal plants traditionally used for gastrointestinal disorders, dermatological disorders, and orthopedic disorders in Tripura, India

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Abstract

Ethnomedicinal plants play a crucial role in traditional healthcare practices and cultural traditions of different communities. This study aims to provide an overview of the ethnomedicinal plants found in Tripura and their traditional uses. A total of 98 plant species belonging to 54 families have been recorded, and plants belonging to the Asteraceae family have been mostly used. Over 47, 52 and 28 medicinal plants have been recorded for the treatment of gastrointestinal issues, dermatological disorders, and orthopaedic disorders, respectively. *Centella asiatica* is used widely in the study area to treat stomach disorders and the leaf of *Bambusa sps* is burnt, and the ash is applied on the skin to treat skin infection. The dominant plant part used was the leaf (62 plant species), followed by the roots. The knowledge of ethnomedicinal plants in Tripura has been passed down through generations and is an integral part of the cultural heritage of the state. The ethnomedicinal plants of Tripura hold immense value in the traditional healthcare practices of the indigenous communities.

Keywords: Ethnomedicinal, Indigenous tribe, North East India, Traditional, Tripura.

Introduction

Ethnomedicinal studies are of significant value to discovering modern medicines from indigenous medicinal plant resources, as they are appropriate sources of information collected from the indigenous people about the traditional uses of medicinal plants and the species can be conserved through management and domestication (Njoroge et al., 2004; Mahmood et al., 2013). The documentation of indigenous knowledge of the surrounding plant species has contributed to several essential drugs (Cox 2000; Gilani 2005). About 25% of herbal medicines in pharmaceutical companies are generated from plant-based, and many synthetic medicines are manufactured by extracting chemical substances from plants (WHO 2002). Natural products play an essential role in the development of new medicines (Verpoorte et al., 2006; Colvard et al., 2006; Cordell et al., 2012). Currently, ethnomedicine has drawn the attention of researchers to conserve and document the indigenous knowledge of medicinal plants and their uses. The study of ethnobotany relating to any tribe is in itself a very intricate or convoluted process (Sajem and

Gosai 2006). The traditional system of health care has been systematically used for over two thousand years to treat illnesses (Tripathi et al., 2013). Knowledge of herbs has been handed down from generation to generation and these drugs constitute a major part of traditional medicine systems, which have come to be of immense importance in our lives (Srivastav et al., 2011). Each ethnic community has its own healthcare system and ancient knowledge, sometimes referred to as ethno-therapeutics (Shil and Dutta Choudhury 2009). The plant-based traditional medical systems continue to provide primary health care to more than three-quarters of the world's populace (Choudhary et al., 2008). Apart from healthcare, medicinal plants are mainly an alternate income-generating source for underprivileged ethnic communities (Kala 2006).

The tribal people are settled agriculturists and have a very rich knowledge of plant-based resource utilization for their survival since time immemorial and they practice folk medicines to take care of their health. In India, it was officially recognized that 2500 plant species have medicinal value, while over 6000 plants are estimated

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to be explored in traditional, folk, and herbal medicine (Choudhary et al., 2008). Close observations of indigenous communities have led to the discovery of many modern medicines because indigenous communities, through their living in forest or semi-forest habitats, have over a long period accumulated considerable knowledge of the medicinal properties of various plants (Sarkar et al., 2012). North East India comprises eight states, namely Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Tripura, and Sikkim. North East India is part of both the Himalayas as well as Indo-Burma biodiversity hotspots in the world. Tripura is home to 8 million tribal populations with 225 tribal communities. Tripura is situated in the Indian sub-region of the oriental Zoo-geographic region. Local flora and fauna bear a very close affinity with the floral and faunal components of Indo-Malayan and Indo-Chinese sub-regions. Due to its richest reservoir of plant diversity, it is one of the biodiversity hotspots of the world (Chatterjee et al., 2006; Mao et al., 2009). It is a goldmine of medicinal plants and the use of different plants in tribal traditional health care systems has a long history. Tribes of Tripura have rich traditional knowledge of plant-based medicine (Sen et al., 2011).

Ethnobotany investigation in Tripura reveals that some well-known species have been used by the tribals of Tripura, mostly Tripuri and Reang (Das et al., 2009). The tribals of the state still depend on the traditional healers for their treatment, which is locally known as *Ochai* (Majumdar and Datta 2007).

Ethnobotanical studies have brought to light numerous plants having significant medicinal properties that were previously unknown to the scientific world (Schultes 1962). These tribal groups living in diversity-rich areas possess a wealth of knowledge and skills on the utilization and conservation of food and various medicinal plants (Ranganathan et al., 2012). The local tribal people of Tripura still believe and express their respect and honor to the knowledge of *Ochai* who does treatment with both mantra as well as herbal medicine, and a wide range of plants with ethnobotanical value against some very important diseases has been reported, but much larger folk medicine remained endemic to Tribal pocket in North East India (Majumdar and Datta 2007).

Indigenous medicinal practices are an important component of the indigenous knowledge system, which is widely practiced by tribal communities all across India, more particularly in the state of Tripura, North East India (Valan and Muthukumar 2022). Tripuris collect various plants from nearby forests for food, fodder, fuel, furniture, and handicrafts and for the treatment of different ailments traditionally, and depend on local medical practitioners, popularly known as *Ochoi* (Majumdar and Datta 2007). Over time, tribal communities have developed a great deal of knowledge on the use of plants and plant products in curing various

diseases and ailments (Valan and Muthukumar 2022).

The knowledge about the medicinal uses of plants is associated with all aspects of the socio-cultural life of tribals (Saha and Sahu 2012). The use of Ethno medicine shows how folk medicine plays a critical role in the present generation. Therefore, this paper shows documentation and utilization of medicinal plants used traditionally for gastrointestinal disorders, dermatological disorders, and orthopedic-related diseases in Tripura.

Materials and Methods

Study area

Tripura is located in the bio-geographic zone 9B-North-East Hills, with latitudes ranging from 22°56' to 24°32' N and longitudes ranging from 90°09' to 92°20' E. Tripura borders Bangladesh, and its geographical boundaries cross both international and national borders. The international boundary between Tripura and Bangladesh is 839 Km long in the north, west, and south-east periphery of Tripura, while the national boundaries with Assam and Mizoram are 53 and 109 Km long in the eastern periphery of Tripura, respectively (Majumdar and Datta 2007).

The study was carried out in Karbook, Gomati district of Tripura, which is a hilly range, with latitudes ranging from 22°56' to 23°32' N and longitudes ranging from 91°18' to 91°59' E. The total area of the district is 2,966 sq. km. There are 3 subdivisions in this district. Random sampling was carried out to select the villages for the survey. Annual rainfall is about 2000 mm, and the temperature varies between a maximum of 35.23 and a minimum of 7.43°C.

Data collection

Field explorations were carried out and the information was gathered from the tribal medicine men (herbal healers) and people of the tribal community who knew well about the surrounding plants, their local names, parts used and uses in different ailments and diseases. The ethno-medicinal survey was conducted within the indigenous tribes with the help of local medicine men, locally known as *boido* or *ochai*, as they were aware of the plant's therapeutic potential. Data was collected through a structured questionnaire and observations were made during the field visit. Over 32 herbal healers were interviewed during the study. They collect most of the medicinal plants from the surrounding nature or the deep jungle and some are cultivated in their home garden. The interviews were conducted in the local dialect to avoid translation problems. Plant identification was done by using regional flora and with the help of standard texts like the Flora of Tripura and taxonomists. The photographs taken during the survey have acted as a tool in the identification of plants.

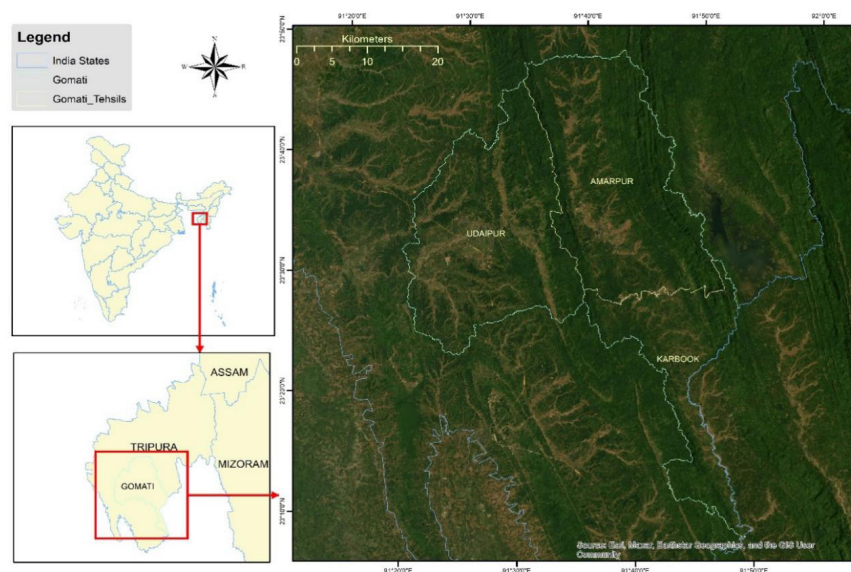


Figure 1: Map showing the study area

To reach this particular population, the snowball sampling approach was used for data gathering. This approach was used in order to take advantage of recommendations from important information sources (*boido*), ensuring the information was obtained from the most informed people (Naderifar, 2017).

Results and Discussion

Plants and humans have a long history together. It is believed that 25% of prescription medications contain active ingredients originating from higher plants, and plant dependence is still prevalent (Tiwari and Joshi, 1990; Das and Choudhuri, 2012). The indigenous people of Tripura use a wide variety of plants for food and medicine.

The current study shows the medicinal plants traditionally used for gastrointestinal disorders, dermatological disorders, and orthopedic disorders in Tripura. In this study, we have assessed 98 species of plants belonging to 54 families used by the indigenous people. Over 47, 52, and 28 medicinal plants are used in gastrointestinal disorders, dermatological disorders, and orthopedic disorders (Figure 2), and some of the species are repeated in treating these diseases.

Different plant parts of these species, such as leaf, stem, bark, fruit, seed, root and tuber were used in different forms like crude, powder, juice, decoction, infusion and paste for the management of various ailments as medicine. The drug usages are generally taken orally. Though pharmacological activities of several plants have been investigated and some of them are already incorporated in modern medicinal system based upon the traditional knowledge, it is found that many of those traditional medicinal plants used by the tribes of Tripura

are still a large untapped source of structurally novel compounds that might serve as lead for the development of novel drugs and have great potential to be developed as standard preparation for different disorders (Sen et al., 2011).

In the present study, the plant parts like leaves, roots, fruits, bark, seeds, whole plant, fruits, twigs, stems, shoots, rhizome, thorn, latex, tuber, underground stem, modified root, bulb, wood, and aerial parts were used. Leaves of 62 species are used as medicine and were dominant followed by roots (18 species), fruits (15 species), bark and seed (10 each), whole plant (8 species), flower and twig (6 species each), stem (5 species), shoot and rhizome (4 species each) and thorn, latex, tuber, modified root, bulb, wood, underground stem and aerial part (1 species each) (Figure 3).

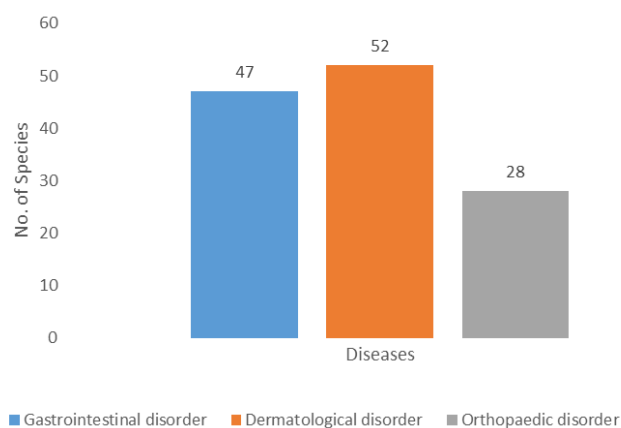


Figure 2: Number of species used in treating various diseases

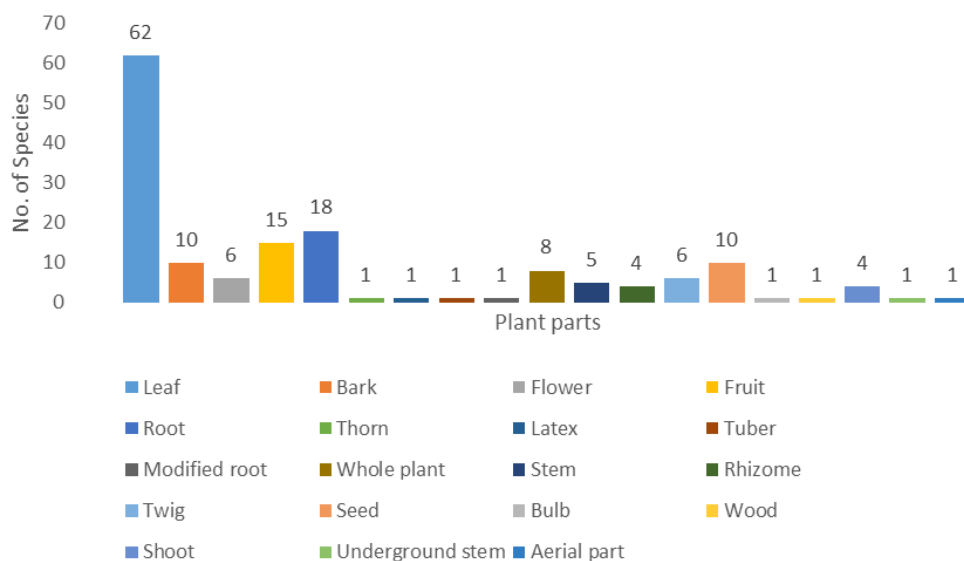


Figure 3: Plant used in ethnomedicine

As per the study conducted in the Mandwi area of Tripura, 21 species of medicinal plants used were herbs, followed by trees (17 species) and shrub (8 species). Climbers and ferns had 2 species each, and one grass was also used medicinally (Debbarma et al., 2017) and 59 plant species belonging to 42 families, with 37 trees, 11 herbs, 4 grasses, 3 climbers, and one shrub, vine, woody climber in villages of different blocks of West Tripura and Khowai districts of Tripura (Sharma et al., 2013).

Documentation of traditional ethnomedicinal plants in Tripura

The plants are used to treat different diseases, some of which are quite common, like wound healing, pain and inflammation and different species of plants are used daily. Some of the plant like *Azadirachta indica* and *Centella asiatica*, are used in daily life as food; *Allium sativum*, fruits of *Aegle marmelos*, and *Psidium guajava* are also common sources of food (Sen et al., 2011).

The medicinal value of plants was studied among the Chakma community of Tripura. Mostly, leaves are used for the formulation of folk medicine. An attempt has been made to document the ethnopharmacology to therapeutics and the folk claims of the plant parts used, along with their medicinal uses. The most frequently medicated claims were diarrhoea, dysentery, toothache, jaundice, bone fracture, cough and cold (Guha and Chakma 2015).

About 19 herbs used for treating gastrointestinal disorders and anti-hemorrhagic by the tribes of North Tripura have been documented and 59 species are used to treat around 33 ailments, the most common of which are diarrhea, dysentery, toothache, jaundice, bone fracture, cough, and cold in Tripura (Das and Dutta Choudhury

2010; Guha and Chakma 2015). Numerous studies have validated these plants' well-known anti-inflammatory, anti-ulcer, and digestive qualities (Singh et al., 2009; Prakash et al., 2011). According to Patel et al. (2012), the use of these plants is consistent with research from other regions of India where medicinal herbs are used to support digestive health. According to the study's findings, these plants might provide a sustainable and affordable way to treat gastrointestinal disorders in disadvantaged and rural areas.

A total of 24 plants were reported from the 5 different ethnic communities of Tripura state, used for multiple reasons (Das and Choudhury, 2012). The Kurumba tribe of Tamil Nadu recorded a similar study of 20 ethnomedicinally important plants, India (Alagesaboopathi, 2011). Similarly, the Chakma community residing in Arunachal Pradesh has reported 63 ethnomedicinal plants (Sarmah et al., 2008) and a record of 50 medicinal plants were also reported to be used by the Tripuri herbal healers (Majumdar and Dutta, 2007).

The present study shows that a total of 47 plant species (Table 1) were used for the treatment. Some of these are *Cassia occidentalis*, *Kalanchoe pinnata*, *Mangifera indica*, *Psidium guajava*, *Enhydra fluctans*, *Centella asiatica*, *Diplazium polypodioides*, which are used to treat gastrointestinal disorders such as dysentery, constipation, gastric and other stomach-related problems.

Table 2 shows that 52 plant species were used to treat dermatological disorders. *Cassia sophera*, *C. alata*, and *C. tora* are used against eczema and ringworm. *Bambusa sps*, *Mikania scandens*, are used against anti-hemorrhagic by the indigenous tribes. Additionally, common in the area are dermatological conditions like dermatitis, fungal infections, and wounds. The antibacterial, anti-

Medicinal plants for common disorders in Tripura

Table 1: List of medicinal plants used for treating gastrointestinal disorders

Sl. No.	Botanical name	Family	Local name	Part used	Ailment
1	<i>Abrus precatorius</i> L.	Papilionaceae	Sonakaich, takharichum	Seed, leaves, root	Joint, muscular and abdominal pain, poisonous bite
2	<i>Adhatoda vasica</i> L.	Acanthaceae	Basak, basakblai	leaf, aerial part	Cough, cold, dysentery, fresh wounds
3	<i>Aegle marmelos</i> (L.) Corre	Rutaceae	Bel	Fruit, Leaf	Asthma, diabetes, hepatitis, dysentery, indigestion, and typhoid
4	<i>Albizia lebbek</i> Benth.	Mimosaceae	Sirish, kadai, khurai bufang	Leaf, root, bark	Asthma, diarrhea, diseases of the gum
5	<i>Allium sativum</i> L.	Liliaceae	Rasun, risum	Bulb	Boils, gastritis, heart problems, skin disease, arthritis, colic pain, bronchitis
6	<i>Aloe indica</i> L.	Liliaceae	Ghrita kumara	Leaf	Stomach diseases
7	<i>Alocasia indica</i> L.	Araceae	Mann kachu, mania	Tuber, leaf	Rheumatism, habitual constipation
8	<i>Alpinia nigra</i> (Gertner) Burt	Zingiberaceae	Peitranga	Underground stem	Dyspepsia.
9	<i>Alternanthera philoxeroides</i> Griseb.	Amaranthaceae	Helencha, alancha	Whole plant	Stomach pain, diarrhea
10	<i>Aloe barbadensis</i> Mill.	Xanthorrhoeaceae	Dipty kainchan/ Ghritkanchan	Leaves	Dysentery, Skin
11	<i>Ananas comosus</i> (L.) Merrill	Bromeliaceae	Amortui	Leaf base	Against stomach disorders.
12	<i>Andrographis paniculata</i> (Burm.f.) Wall. Ex Nees.	Acanthaceae	Kala megh, kalmegh balai	Leaves	Stomach problem, dysentery, worm infection, fever
13	<i>Aphanamixis polystachya</i> (Wall.) R.	Meliaceae	Pitra	Bark, leaf	Stomach pain, skin disease
14	<i>Asparagus racemosus</i> Willd.	Liliaceae	Shatamuli	Root, leaf	Diarrhea, fever, measles, stomach pain
15	<i>Azadirachta indica</i> A. Juss.	Meliaceae	Neem	leaves	Stomach problems, cough, cold, pimples, fever, smallpox and chicken pox
16	<i>Bryophyllum calycinum</i> Salisbury	Crassulaceae	Khurojot	Leaves	Stomach disorders (dysentery & diarrhea).
17	<i>Cajanus cajan</i> Linn.	Fabaceae	Khokhlaing	Leaves and twigs	Stomach disorders (dysentery & diarrhea).
18	<i>Carica papaya</i> Linn.	Caricaceae	Paypay	Unripe fruit	Stomach disorders (stomachic).
19	<i>Cassia occidentalis</i> L.	Fabaceae	Kalkashunda	Leaves	Constipation, urinary disorder, skin infection; cough
20	<i>Centella asiatica</i> (L.) Urban	Apiaceae	Perup	Leaves	Stomach disorders (dysentery & diarrhea).
21	<i>Diplazium polypodioides</i> Blume	Athyriaceae	Muikhunchok	Leaves	Gastric and stomach problems, sore throat, and diabetes
22	<i>Enydra fluctuans</i> Lour.	Asteraceae	Elengcha	Shoot	Stomach, problems and skin disease
23	<i>Hibiscus rosa-sinensis</i> L.	Malvaceae	Khum boiragi	Leaves	Gastro intestinal disorder
24	<i>Holarrhena antidysenterica</i> (L.) Wall. Ex G.Don.	Apocynaceae	Kuchima	Leaves	Dysentery, diarrhea, and as anthelmintic
25	<i>Ipomoea gigante</i> Forsk.	Convolvulaceae	Kalmi	whole plant	Skin disease, dysentery
26	<i>Kalanchoe pinnata</i> (Lam.)	Crassulaceae	Kwsa kwthang	Leaves	Stomach disorder, wound, bleeding, fever, kidney stone, jaundice

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27	<i>Leucas aspera</i> (Willd.) Link.	Lamiaceae	Dhongkolosho	Leaves and flower	Gastric problems, and joint pain with swelling
28	<i>Mangifera indica</i> Linn.	Anacardiaceae	Thaihai	Stem Bark	Stomach disorders (dysentery)
29	<i>Mentha</i> sp.	Lamiaceae	Sabrang	Leaves	Stomach disorders (blood dysentery and dyspepsia)
30	<i>Mimosa pudica</i> L.	Mimosaceae	Lajuriher	Fruits	Fruits are used for Dysentery, Diarrhoea, and emetic
31	<i>Momordica charantia</i> Linn.	Cucurbitaceae	Gangrauk	Raw fruits and leaves and twigs	Stomach disorders (worms and dyspepsia)
32	<i>Ocimum basilicum</i> L.	Lamiaceae	Tolosi	Leaves, bark	Rheumatism and to induce deep sleep, gastric and stomach problems
33	<i>Ocimum sanctum</i> L.	Labiatae	Tulsi, tulsikosom	leaf, seed	Bronchitis, malaria, diarrhea, dysentery, skin diseases
34	<i>Oxalis corniculata</i> L.	Oxalidaceae	Amlati, amchukai	whole plant	Dysentery, stomach disorders, rheumatism, toothache
35	<i>Parkia javanica</i> (Lam.) Merr.	Fabaceae	Wakkre	Fruits	Gastric problems
36	<i>Phyllanthus acidus</i> L.	Euphorbiaceae	Harbarai, leur, iheri	leaf, fruit	Smallpox, stomach, and liver disorders, rheumatism
37	<i>Piper betle</i> Linn.	Piperaceae	Phatui bulai	Leaves	Stomach disorders (carminative)
38	<i>Polycarpon prostratum</i> (Forrk.) Asch. & Schweinf. Ex Asch.	Caryophyllaceae	Ghima	whole plant	Diabetes, sore throat, gastric and stomach problems
39	<i>Psidium guajava</i> Linn.	Myrtaceae	Sapri	Young twigs	Stomach disorders (dysentery).
40	<i>Rauvolfia serpentina</i> (L.) Benth	Apocynaceae	-	Root	Gastrointestinal disorders
41	<i>Scoparia dulcis</i> Linn.	Scrophulariaceae	Naipungchewk	Shoot part	Stomach disorders (anthelmintic)
42	<i>Solanum indicum</i> L.	Solanaceae	Khamkha	Fruits	Dysentery and diarrhea
43	<i>Spilanthes paniculata</i> Wallich ex. DC.	Asteraceae	Ansha	Leaves	Stomach disorders (dyspepsia)
44	<i>Spondias pinnata</i> (L.f.) Kurz.	Anacardiaceae	Amra	bark, fruit, leaf	Dysentery, skin disease
45	<i>Stephania</i> sp.	Menispermaceae	Thandamanik	Leaf	Stomach disorders (stomach ache).
46	<i>Streblus asper</i> Lour.	Moraceae	Saruwa	leaves	Dysentery
47	<i>Terminalia chebula</i> Retzius	Combretaceae	Bukhala buthai	Fruits	Stomach disorders (stomachic).

inflammatory, and wound-healing qualities of these herbs have long been known (Kirtikar & Basu, 2005). The study supports previous findings that demonstrate these plants' medicinal potential in dermatological treatment. The focus on the plants that have been thoroughly investigated for their dermatological use also increases the possibility that pharmacological research in the future may be able to identify and confirm active chemicals that could be used in contemporary dermatological therapies.

Table 3 shows that a total of 28 plant species are used to treat orthopaedic disorders such as bone injury/fracture,

arthritis, rheumatism and body pain. *Acorus calamus*, *Allium sativum*, *Averrhoa carambola*, *Michelia champaca*, *Tinospora cordifolia*, *Vitex negundo* are used against arthritis and *Aporosa octandra*, *Bombax ceiba*, *Cissus quadrangularis*, *Euphorbia hirta*, *Litsea glutinosa*, *Microcos paniculata*, *Mimosa pudica* are used against bone injury/fracture. These plants are well-known for their analgesic, bone-strengthening, and anti-inflammatory properties (Saxena et al., 2011; Sharma & Majeed, 2015). The effectiveness of these conventional treatments for orthopedic problems may be supported by more clinical research.

The study's findings demonstrate the richness and

Medicinal plants for common disorders in Tripura

Table 2: List of medicinal plants used for treating dermatological disorders

Sl. No.	Botanical name	Family	Local name	Part used	Ailment
1	<i>Adhatoda vasica</i> L.	Acanthaceae	Basak, basak blai	Leaf, aerial part	Cough, cold, dysentery, fresh wounds
2	<i>Ageratum conyzoides</i> L.	Asteraceae	Khomorocheuk	Leaf and twig	Anti-hemorrhagic.
3	<i>Albizia lebbeck</i> Benth.	Mimosaceae	Sirish, kadai, khurai bufang	Leaf, root, bark	Skin disorder
4	<i>Allium sativum</i> L.	Liliaceae	Rasun, risum	Bulb	Boils, gastritis; heart problems, skin disease, arthritis, colic pain, bronchitis
5	<i>Aloe barbadensis</i> Mill.	Xanthorrhoeaceae	Dipty kainchan/ Ghritkanchan	Leaves	Burned skin, pimples
6	<i>Aphanamixis polystachya</i> (Wall.)	Meliaceae	Pitra	Bark, leaf	Stomach pain, skin disease
7	<i>Artocarpus heterophyllus</i> Lam.	Moraceae	Hattol	Latex	Skin disease
8	<i>Azadirachta indica</i> A. Juss.	Meliaceae	Neem	Leaf	Skin diseases like leprosy, skin infections, chickenpox, diabetes, and respiratory disorders
9	<i>Bambusa</i> sp.	Poaceae	Waa Epahang	Shoot epidermis, leaves	Anti- hemorrhagic, skin infection
10	<i>Cassia alata</i> L.	Caesalpiniaceae	Dattalong pada	Leaf	Eczema and ringworm
11	<i>Cassia occidentalis</i> L.	Caesalpiniaceae	Kalkashunda, masinga	Leaf, seed, Root	Constipation, urinary disorder, skin infection, cough
12	<i>Cassia sophera</i> L.	Caesalpiniaceae	Ijji gach	Seed	Eczema and ringworm
13	<i>Cassia tora</i> L.	Caesalpiniaceae	Latha	Seed	Odurated skin diseases, ringworm, itching
14	<i>Coccinia grandis</i> L.	Cucurbitaceae	Telakuchi pata	whole plant	Diabetes, scabies, skin infection
15	<i>Chromolaena odoratum</i> (L.) King & Robinson	Asteraceae	Cheikhmarimshiekh	Leaves	Anti-hemorrhagic
16	<i>Crinum asiaticum</i> (L.)	Amaryllidaceae	Khobaron	Root	Boils
17	<i>Clerodendrum viscosum</i> Vent.	Verbenaceae	Bait gach	Root, Leaf	Inflammation, infection, skin disease, cough
18	<i>Coccinia grandis</i> L.	Cucurbitaceae	Telakuchi pata, Takhahaichumu	whole plant	Diabetes, scabies, skin infection
19	<i>Curcuma aromatica</i> L.	Zingiberaceae	Ban halud, halk, lairu	Rhizome	Flatulence, skin infection
20	<i>Curcuma longa</i> L.	Zingiberaceae	Halud, swtwi	Rhizome	Skin infection
21	<i>Cuscuta reflexa</i> Roxb.	Cuscutaceae	Sannalata	Stem	Cough, viral infection, itchy skin
22	<i>Cynodom dactylon</i> (L.) Persoon	Poaceae	Durpa	Leaves and twigs	Anti-hemorrhagic
23	<i>Enydra fluctuans</i> Lour.	Asteraceae	Elengcha	Shoot	Stomach, problems and skin disease.
24	<i>Eupatorium odoratum</i> L.	Asteraceae	Mugujuher	Leaf	Cuts and wounds
25	<i>Euphorbia hirta</i> L.	Euphorbiaceae	Dara dudhi, shyamkhai	Leaf, stem, flower	Skin disease, cough, pimples, gonorrhea
26	<i>Gmelina arborea</i> L.	Verbenaceae	Gamari gach	Seed	Skin itching

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27	<i>Hippeastrum puniceum</i> (Lam.)	Amaryllidaceae	Kalaful	Leaf	Body swellings, skin infection
28	<i>Ichnocarpus frutescens</i> R.Br.	Apocynaceae	Dugdha lata,	Root, flower, leaf	Bleeding in the gum, skin disease, fever, kidney disease
29	<i>Ipomoea carnea</i> Jacq.	Convolvulaceae	Kalmi	Whole plant	Skin disease, dysentery
30	<i>Jatropha curcas</i> L.	Euphorbiaceae	Ban verenda, keron	Root, twig, leaf	Skin diseases, rheumatism, in the cleaning of teeth
31	<i>Kalanchoe pinnata</i> (Lam.)	Crassulaceae	Kwsa kwthang	Leaf	Stomach disorder, wound, bleeding, fever, kidney stone, jaundice
32	<i>Lawsonia inermis</i> L.	Lythraceae	Minti pada	Leaf	Hair fall and to remove dandruff
33	<i>Leucas lavandulaefolia</i> Rees	Labiatae	Halkusa, dono kolos	Root, stem, leaf	Wound, skin infection, anxiety
34	<i>Mangifera indica</i> L.	Anacardiaceae	Aam, thaichuk	Fruit, bark, leaf	Jaundice, dental disease, dermatological disorder
35	<i>Meriandra benghalensis</i> (Konig ex Roxb.) Benth.	Labiatae	Bangal sage	Whole plant	High blood pressure, diabetes, skin disease; tonsillitis conditions
36	<i>Meyna spinosa</i> Roxb.	Rubiaceae	Man kata, gaittara	Fruit	Skin disease, peptic ulcer, diabetes, hepatic disorder
37	<i>Michelia champaca</i> L.	Magnoliaceae	Chapa	Bark, flower, fruit	Skin disease, cough, arthritis
38	<i>Mikania scandens</i> (L.) Willd.	Convolvulaceae	Libuji lota	Entire shoot part	Anti-hemorrhagic
39	<i>Mimosa pudica</i> L.	Mimosaceae	Lazzabati, samsunduru	Root, leaf	Leprosy, burning sensation, fever
40	<i>Momordica charantia</i> L.	Cucurbitaceae	Gangwla	Leaf and fruit	Hand pimples or foot pimples ('Bishojonom')
41	<i>Ocimum sanctum</i> L.	Labiatae	Tulsi, tulsikosom	Leaf, seed	Bronchitis, malaria, diarrhea, dysentery, skin diseases
42	<i>Piper betel</i> L.	Piperaceae	Phatui bulai	Leaf	Wounds and toothache
43	<i>Phyllanthus acidus</i> L.	Euphorbiaceae	Leheri	Leaf, fruit	Chicken pox, stomach, and liver disorders, rheumatism;
44	<i>Ricinus communis</i> L.	Euphorbiaceae	Bheron, letok	Seed, leaf	Cough, asthma, toothaches, leprosy
45	<i>Santalum album</i> L.	Santalaceae	Swet chandan, chandan kufur	Wood, seed	Urinary infection, skin infections, pimples
46	<i>Saraca asoca</i> (Roxb.) Willd.	Fabaceae	Ashok, khumbaikang	Bark, flower	Menstruation pain, skin disease
47	<i>Sesamum indicum</i> L.	Pedaliaceae	Til, siping	Leaf	Shampoo for dandruff, cholera, cough, skin infection
48	<i>Sesbania grandiflora</i> L.	Fabaceae	Bakful	Bark, flower, leaf	Cough, smallpox
49	<i>Smilax zeylanica</i> L.	Smilacaceae	Komarialata, koyarma	Root, leaf	Hepatitis, urinary disease, skin disease
50	<i>Solanum melongena</i> L.	Solanaceae	Begun, fantok	Fruit, root	Inflammation, sores
51	<i>Spondias pinnata</i> (L. f.) Kurz.	Anacardiaceae	Amra	Bark, fruit, leaf	Dysentery, skin disease
52	<i>Vernonia cinerea</i> Less.	Asteraceae	Siyalmutra, debpari	Root, leaf	Abdominal pain, diarrhea, skin infection

Medicinal plants for common disorders in Tripura

Table 3: List of medicinal plants used for treating orthopedic disorders

Sl. No.	Botanical Name	Family	Local Name	Part used	Ailment
1	<i>Abrus precatorius</i> L.	Papilionaceae	Sonakaich, takharichum	Seed, leaves, root	Joint, muscular and abdominal pain, poisonous bite
2	<i>Acorus calamus</i> L.	Araceae	Langkhreng	Rhizome	Arthritis
3	<i>Allium sativum</i> L.	Liliaceae	Rasun, risum	Bulb	Boils, gastritis; heart problems, skin disease, arthritis, colic pain, bronchitis
4	<i>Alocasia indica</i> Schultes	Araceae	Mann kachu, mania	Modified root	Rheumatism.
5	<i>Aporosa octandra</i> (Buch.-Ham. Ex D. Don) Vickery	Phyllanthaceae	Amang	Leaves	Serious bone injury
6	<i>Averrhoa carambola</i> L.	Averrhoaceae	Kamranga	Fruit, leaf	Arthritis, jaundice
7	<i>Basella alba</i> L.	(Basellaceae)	Mungfrai	Leaves	Body pain and joint problem
8	<i>Bombax ceiba</i> L.	Bombacaceae	Shimul, borchuk	Root, leaf	Body pain, bone fracture
9	<i>Calotropis gigantea</i> (L.) Dryand.	Asclepiadaceae	Angond	Leaves	Rheumatism
10	<i>Cissus adnata</i> Roxb.	Vitaceae	Bhaitya lata	Root, leaf	Bone fracture, pain
11	<i>Cissus quadrangularis</i> L.	Vitaceae	Harbhanga	Whole plant	Bone fracture, indigestion
12	<i>Clerodendrum indicum</i> (L.) Kuntze	Verbenaceae	Brahma jasthi, asubahang	Root, leaf	Tooth decay, asthma, cough, rheumatism
13	<i>Datura stramonium</i> L.	Solanaceae	Datura, dhatarā	Leaf, seeds	Anxiety, rheumatism, body pain
14	<i>Euphorbia hirta</i> L.	Euphorbiaceae	-	Bark	Bone injury
15	<i>Flacourtia jangomas</i> (Lour.) Raeusch.	Salicaceae	Supra	Thorn and seeds	Pain in ribs and bones
16	<i>Jatropha curcas</i> L.	Euphorbiaceae	Ban verenda, keron	Root, twig, leaf	Skin diseases, rheumatism
17	<i>Leucas aspera</i> (Willd.) Link.	Lamiaceae	Dhongkolosho	Leaves and flower	Pain relief, gastric problems, and joint pain
18	<i>Litsea glutinosa</i> Lour.	Lauraceae	Borshrap	Bark, leaf	Bone fracture, muscle pain, and injury
19	<i>Magnolia champaca</i> (L.) Baill. ex Pierre	Magnoliaceae	Chapa	Bark, flower, fruit	Skin disease, cough, arthritis
20	<i>Microcos paniculata</i> L.	Tiliaceae	pitchla, ashar bufang	Leaf, fruit	Bone fracture, cold, typhoid fever
21	<i>Mimosa pudica</i> L.	Mimosaceae	Lajuriher	Stem	Bone fracture
22	<i>Ocimum basilicum</i> L.	Lamiaceae	Tolosi	Leaves, bark	Rheumatism, gastric, stomach problems
23	<i>Oxalis corniculata</i> L.	Oxalidaceae	Amlati, amchukai	Whole plant	Dysentery, stomach disorders, rheumatism, toothache
24	<i>Phyllanthus acidus</i> L.	Euphorbiaceae	Harbarai, leur, liheri	Leaf, fruit	Smallpox, stomach, and liver disorders, rheumatism
25	<i>Ricinus communis</i> L.	Euphorbiaceae	Letak	Leaves	Swellings and rheumatism
26	<i>Tinospora cordifolia</i> (Thunb.) Miers	Menispermaceae	Gulancha, duksa sungdari	Whole plant	Urinary disorders, arthritis, diabetes
27	<i>Vitex negundo</i> L.	Verbenaceae	Nishinda	Leaf	Arthritis
28	<i>Zingiber officinale</i> Roscoe	Zingiberaceae	Aada, haching	Rhizome	Nausea, asthma, loss of appetite, ear pain, rheumatism

diversity of indigenous knowledge as well as the possibility of incorporating these age-old treatments into contemporary healthcare systems.

Conclusion

The present study concluded that the indigenous people of Gomati district possess rich knowledge on ethnomedicinal uses of valuable plants, which could enhance the potential of these medicinal plants for the future generation of the community. It provides an overview of the ethnomedicinal plants found in Tripura and their traditional uses. A total of 98 plant species belonging to 54 families have been recorded, and plants belonging to the Asteraceae family have been mostly used. 47, 52 and 28 medicinal plants have been recorded for the treatment of gastrointestinal issues, dermatological disorders, and orthopaedic disorders, respectively. The dominant plant part used was the leaf (62 plant species), followed by roots.

The study suggests that documentation of these medicinal plants and associated indigenous knowledge can be helpful for the conservation and sustainable use of medicinal plants in this area and the validation of these plant preparations in treatment. The dependency on herbal treatments for healthcare is due to widespread faith and the unavailability of healthcare services in the villages or nearby areas. Therefore, intervention of the scientific community to improve the healthcare system with the help of locally available resources, and documentation of the ethnomedicinal plants is the need of the hour to retrieve the knowledge orally transmitted by *Boido* or *Ochai*, as it might vanish soon. It may open avenues of opportunity for scientific validation, creating awareness and improving the economy of indigenous communities.

Author Contributions

IR has conducted the field work and drafted the manuscript. AT has contributed in finalization of the manuscript.

Conflict of Interest

Authors declare no conflict of interest.

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APPENDICES

Appendix 1: Questionnaire used for Ethnobotanical study

1. Date
2. Name.....
3. Gender: Male [] female []
4. Age: 20- 40 yrs [] 41-60 yrs [] above 60 []
5. Occupation: herbalist Any other specific ? ()
6. Any formal training ? yes [] No []
Any other (specify).....
7. How was the training done ? teacher [] practice []
8. Purpose of practice ? occupation [] part time []
Any other (specify)
9. What are the disease treatment provided by you ? Any particular or general ? Disease
10. Plants used.....
11. Plant parts used in medicine preparation: Root [] leaf [] bark [] Stem [] internode [] flower [] seed []
rhizome [] fruit [] Twig []
12. How plants parts are used: Dried [] fresh []
13. Method of preparation: powder form [] mixed with water [] Paste [] tablet form []
14. Mode of administration.....
15. Dosage.....
16. Other ingredients with which the plant is used:
17. Signature and address of the informants giving information about the medicinal plants
.....
18. Any other information regarding other medicinal plants.....