



## **Traditional uses of Ethno-medicinal Plants in Chittagong Hill Tracts (CHTs), Bangladesh: A Review**

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### **Authors' contributions**

*This work was carried out in collaboration among all authors. Authors KC and MMA Equal contribution. Author KC conceptualized and designed the study, wrote the original draft of the manuscript. Author MMA wrote the original draft, reviewed and edited the manuscript. Author DC collected data and wrote the original draft. Author RHB reviewed and edited the draft. All authors read and approved the final manuscript.*

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### **ABSTRACT**

**Objective:** Traditional medicines are of great importance to villagers and also now a day to modern drugs. Scientists are trying to explore new drug resources along with the modern drugs to support drug treatment strategy to be more effective and merely natural. Nature is the rich source of many essential bioactive compounds with more specificity and less side effects and thus, traditional medicines are got attention to the pharmacists. There are lots of medicinal plants with scientific evidences in Chittagong Hill Tracts (CHTs) region, but all that information have not yet been compiled as a review. Keeping this in mind, a review attempt has been taken by focusing on traditional medicine used mostly by the indigenous population of Chittagong Hill Tracts region,

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which is also a rich source of biodiversity of Bangladesh.

**Methods:** Research articles based on various traditional medicines focusing CHTs region were taken in consideration to compile the data sources in this review article.

**Results and Conclusion:** Peoples in CHTs are using various types of medicinal plants obtained from their surroundings and have been using from long since with traditional reputation. In this review, we focused on such medicinal plants along with their scientific evidences, which would attract lots of scientists to work more to unveil a new research avenue in drug development.

*Keywords: Medicinal plants; Chittagong hill tracts; traditional medicine.*

## ABBREVIATIONS

*CHTs: Chittagong Hill Tracts*  
*WHO: World Health Organization*  
*TM: Traditional Medicine*  
*UTI: Urinary Tract Infection*  
*Ben: Bengali*  
*C: Chakma*  
*M: Marma*  
*Mro: Mro*  
*Ton: Tonchangya*  
*Mur: Murong*  
*P: Pangkhao*  
*R: Rakhine*

## 1. INTRODUCTION

Medicinal plants have been using for healing since the beginning of time. The association between man and quest for drugs in nature dates back thousands of years. The capacity of pharmacists and physicians to react to the problems that have arisen with the extent of specialized services in the help of man's existence has increased as knowledge of the growth of ideas related to the use of medicinal plants as well as the evolution of consciousness has increased [1]. In medicinal plants, phytochemicals are important compounds found that are not needed for normal human body function but are active and have health-promoting or disease-relieving properties [2]. World Health Organization (WHO) emphasized the importance of medicinal plants through including one of the components in WHO Traditional Medicine Strategy 2002–2005 that "Protection of medicinal plants, promote sustainable use and cultivation of medicinal plants." Though this strategy and project was finished a decade before but this strategy still insists research into the most effective herbal medicines, and encouraging governments to develop strategies for protecting wild populations of medicinal plants and sustainable cultivation of such plants in many developing countries [3]. In

many developing countries, medicinal plants play an important role in primary health care. Some of these plants have been linked to scientific evidence, but further research is needed to validate their effectiveness and protection [4,5].

Since it is deeply rooted within broader belief systems, Traditional Medicine (TM) is also very common in many developing countries. For the world's poorest patients, TM is also the only affordable source of health care [3]. Health policy-makers worldwide are recognizing that traditional medicine and the use of herbal medicinal plants continue to be a strong part of a country's culture, history, and values, and those traditions should be analyzed as part of the country's health system in most cases [3,6]. Traditional medicine is used by a major portion of the population in developing countries for primary health care, and the key components of traditional medicine are derived from plant extracts [2,3].

In many rural areas of Bangladesh, the use of medicinal plants as herbal remedies is part of the cultural heritage. Over the centuries the indigenous people in Chittagong Hill Tracts (CHTs) are predominately dependent on alternative plant medicines. They prefer to take locally prepared herbal (plant) medicines against different diseases developing indigenous knowledge of use of plant resources [7-10]. In addition to marked ameliorative effects of medicinal plants; religious-cultural faith, weak economy, inaccessibility and lack of modern medicinal facilities in the CHTs villages seem to be the reasons of dependency on these medicinal species [8,11,12]. Many poor people in CHTs used medicinal plants for treatment of different diseases as they cannot avail treatment cost in hospitals or healthcare centers. The aim of this review is to gather information on the traditional uses of medicinal plants of CHTs by the ethnic communities for the treatment of different ailments. Here we focus on the

published reports of the medicinal plants of CHTs, Bangladesh.

## 2. THERAPEUTIC PROSPECTS OF MEDICINAL PLANTS IN CHITTAGONG HILL TRACTS (CHTS)

The Chittagong Hill Tracts (CHTs) are distinct region from the rest of Bangladesh in terms of racial, cultural, and environmental diversity and is located in the southeast of the country, which cover about 13,295 square kilometers, or about one-tenth of Bangladesh's total land area [13]. The ethnic communities of the CHTs region have been successfully using medicinal plants for a long time and are almost reliant on them for their care. These medicinal plants should be protected in a scientific manner so that they can be used commercially. The majority of Ayurvedic medicinal plants are harvested from wild sources in Bangladesh. The problem is exacerbated by the loss of local resources as a result of habitat destruction and overharvesting. If the current situation persists, essential medicinal plants will become extinct in the world, putting the conventional treatment method in jeopardy [8]. Although exploration of the medicinal plants in the CHTs region was initiated in 1972, there are still many areas which are yet to be explored for better utilization of the rich medicinal plants of CHTs regions [14]. Beside this, now a days many

traditional medicines are in use as ayurvedic drugs in modern medicine due to their less toxicity and least side effects [15].

As a traditional medicine, various parts of the medicinal plants are being used for example bark, root, stem, leaf, fruit, flower, and sometimes, whole plants of various categories are also being used. In this review, mostly used plant parts are leaf, root, whole plant, fruit and stem; the percentages are 41%, 16%, 9%, 8% and 7% respectively. But the parts used in lower percentages are bark (6%), seed (5%), rhizome (3%), flower (2%) and others (3%). Others parts included tuber, bulb, twig, petiole, shoot, bulbil, nodule, vine etc (Fig. 1). Their formulation methods are also different depending on the application. Based on this literature review, in CHTs, the most commonly used preparation protocol of the drugs are infusion and decoction. Maceration in water and/or alcohol at room temperature, sometimes the powder forms are mixed with oil-honey-milk, boiled in water, sometimes the raw plant parts were taken directly and external use were also evidenced. The growth habit of the plants used in CHTs as medicinal plant are evaluated here (Fig. 2). The advanced uses plant types are herb, shrub, tree and climber and their percentages are 31%, 30%, 20% and 14% respectively. Other types of plants included creeper, fern, and epiphytes.

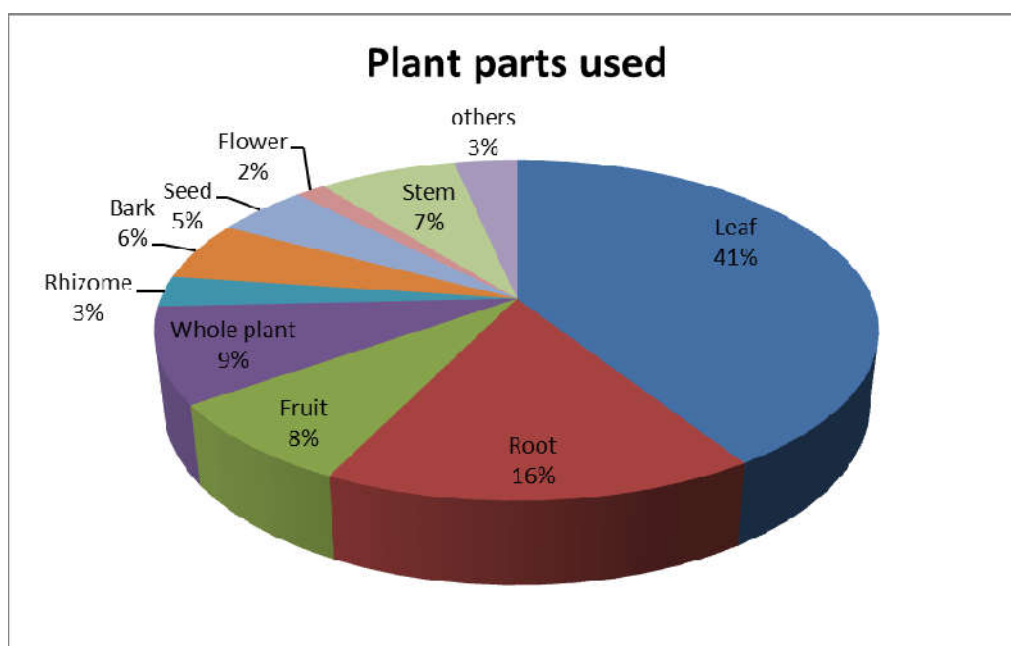
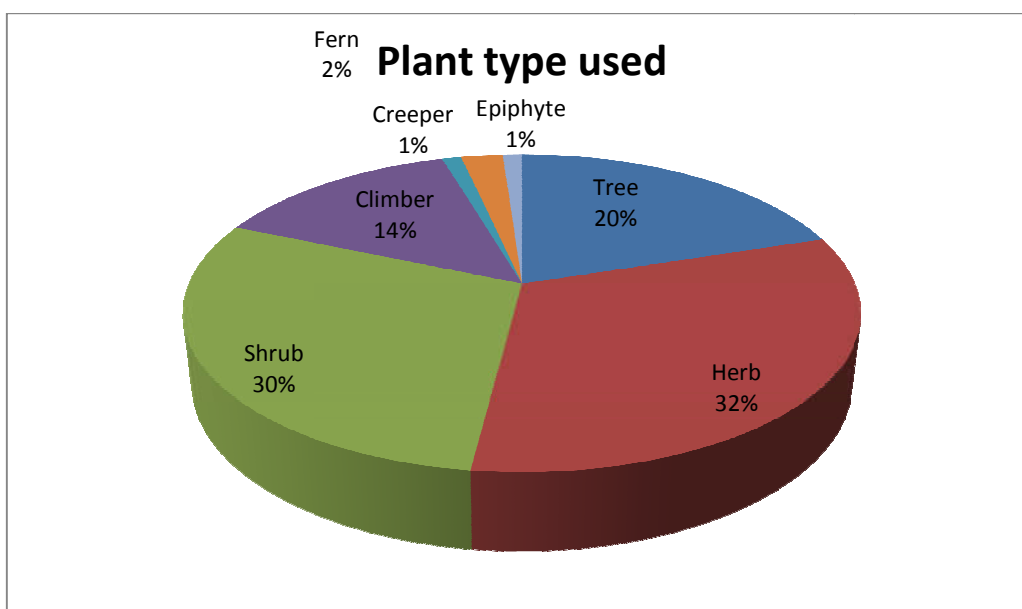


Fig. 1. Plant parts used for the treatment of different ailments



**Fig. 2. Plant categories used as medicinal plant in CHTs**

A summary of ethno-medicinal data on medicinal plants used in the CHTs, Bangladesh has been mentioned in Supplementary Table 1. Few examples of the uses of these medicinal plants are discussed here. As it has been mentioned in the previous text that these plants are being used in various forms like boiled in water, soaked in aqueous form or in oil, mixed in milk or honey and sometimes directly externally used, we highlighted some examples of plants with common relevant disease treatment.

### 2.1 Diabetes

Diabetes affects every population and every region of the world, including rural areas in low- and middle-income countries [16]. Though various drugs are being used, but least toxicity, side effects and efficacies are the question. In Indian and other ancient medical systems around the world, a variety of plants have been used to treat diabetes mellitus [17-22]. In this regard, scientists are focusing on alternative medicine as it has been reported that alternative or traditional medicines have very less side effect with higher efficacies. Peoples in CHTs area are heavily dependent on the medicinal plants found in this region. They are using different types of plants for the treatment of diabetes [22-26] such as *Abutilon indicum*, *Alternanthera sessilis*, *Alysicarpus monilifer*, *Boerhaavia diffusa*, *Bryophyllum pinnatum*, *Caesalpinia crista*, *Cajanus cajan*, *Cassia sophera*, *Coccinia*

*grandis*, *Hibiscus rosa-sinensis*, *Kalanchoe pinnata*, *Mangifera indica*, *Ocimum sanctum*, *Pavetta indica*, *Polygonum flaccidum*, *Rhoeo discolor*, *Scoparia dulcis*, *Syzygium cumini*, *Terminalia arjuna*, *Trigonella foenum-graecum* etc.

### 2.2 Wound Healing

Several species of medicinal plants are used by various cultures and ethnic groups for wound healing [27]. Medicinal plants are a viable option for the treatment of lesions. Their effectiveness has been shown in clinical trials that looked at both the positive and negative effects [28]. Medicinal plants are using successfully for wound healing in different countries [27-30]. Wound healing the most common scenario to people of all areas including the CHTs region [31]. Indigenous peoples are using various plants for wound healing, e.g. *Abelmoschus moschatus*, *Ageratum conyzoides*, *Aloe indica*, *Biophytum sensitivum*, *Celosia cristata*, *Curcuma caesia*, *Datura metel*, *Eclipta prostrata*, *Grewia serrulata*, *Lannea coromandelica*, *Mangifera indica*, *Peliosanthes teta*, *Tagetes patula*, *Thladiantha cordifolia*, *Vitis pedata* etc.

### 2.3 Cancer or Tumor

Cancer is a serious health problem in all populations, regardless of wealth or social status [32]. The discovery of drugs from medicinal

plants has aided in the treatment of cancer, and the majority of new clinical applications of plant secondary metabolites and their derivatives in the last half-century have been directed at cancer treatment [33]. Medicinal plants are used traditionally in cancer or tumor treatment in different regions of the world [34-38]. Scientists are hardly working to find some target specific and effective drugs for the treatment of various types of cancer. As an alternative source, scientists are keen to focus on traditional medicine and hence medicinal plants in CHTs would attract the cancer biologists to unveil the molecular drug resources. The peoples in CHTs region use many different kinds of plants for the treatment of tumor or cancer [39,40] such as *Achyranthes aspera*, *Curcuma caesia*, *Curcuma amada*, *Curcuma purpurascens*, *Desmodium gangeticum*, *Ficus hispida*, *Hyptis suaveolens*, *Musa sapientum*, *Ottelia alismoides*, *Piper nigrum*, *Vitex nigundo*, *Vitis pedata*, *Emilia sonchifolia* etc.

## 2.4 Menstruation Problem

One of the most serious disorders affecting reproductive health is gynecological disorder [41]. Menstrual trouble is one of the gynaecological problems which treated using medicinal plants in different parts of the world [41-43]. Various plants have been used by the indigenous peoples of CHTs for the treatment of menstruation problems [44,45] such as *Abroma augusta*, *Acorus calamus*, *Bombax ceiba*, *Butea monosperma*, *Coccinia cordifolia*, *Curcuma caesia*, *Dysophylla crassicaulis*, *Enhydra fluctuans*, *Holarrhena antidysenterica*, *Jatropha curcas*, *Mimosa rubricaulis*, *Saraca indica*, *Terminalia belerica* etc.

## 2.5 Anti-venom

Snakebites are common in tropical countries such as Bangladesh, where the majority of snakebites occur in rural areas. More than 80% of victims in Bangladesh are handled primarily with the aid of medicinal plants [46]. Medicinal plants are used for the treatment of snake bite in different region of the world [47-50]. Medicinal plants in this CHTs region are a rich source having anti-venom properties [51] such as *Abroma augusta*, *Achyranthes aspera*, *Alocasia cucullata*, *Aristolochia tagala*, *Calotropis procera*, *Cassia occidentalis*, *Ficus hirta*, *Persicaria chinensis*, *Senna occidentalis* etc.

## 2.6 Anti-malaria

Malaria is estimated to cause a million deaths worldwide per year, and despite the fact that 90% of deaths occur in Africa, it remains a major health concern in South Asian countries, including Bangladesh [52]. Chittagong Division accounts for over 85 percent of Bangladesh's total 150,000-250,000 annual malaria cases, whereas in the Chittagong Hill Tracts (CHTs) accounting for 80 percent [53]. Medicinal plants are used for the treatment of malaria in different region of the world [54-57]. The people of CHTs [58,59] used several medicinal plants with anti-malarial properties such as *Amaranthus spinosus*, *Azadirachta indica*, *Cassia hirsuta*, *Citrus aurantifolia*, *Eclipta prostrata*, *Hedyotis scandens*, *Helianthus annuus*, *Lantana camera*, *Oryza sativa*, *Senna occidentalis*, *Urena lobata* etc.

Beside these activities a large number of plants are being used for the treatment of various other diseases such as stomachache, birth control, bronchitis, kidney disorder, rheumatic arthritis, headache, skin disease, cough, abortion, fever, tonsillitis, asthma, anti-inflammatory role, gastritis, bowel pain, piles, night blindness, anti-hemorrhagic role, hemorrhoids, respiratory infection, common cold, gastrointestinal disorders, dysentery, diarrhea, indigestion, constipation, hypertension, conjunctivitis, mental health problem, leprosy, partial deafness, scabies, jaundice, ulcer, diuretic, eczema, blood clotting agent, back pain, mumps, septic abscess, antiseptic, anaemia, anthelmintic, chronic eye disease, bone fracture, throat pain, tuberculosis, insomnia, impotency, pox, mucus in stool, sexual disorder, allergy, pneumonia, scabies, Urinary Tract Infection (UTI), joint ache, measles, chicken pox, syphilis, nasal problem, ear pain, frequent urination, heart palpitation, blood purification, indigestion, epilepsy, vomiting, sex stimulant, dizziness, sinusitis, leucorrhoea etc. Apart from these effects, which are solely obtained from the medicinal plants of CHTs, there are also some common plants having similar effects that are also available in plain land as well [60-63].

The people of CHTs area use these medicinal plants for over centuries and the ethnic communities especially in villagers are almost dependent on these medicinal plants. So we should take measures to preserve these medicinal plants. If these medicinal plants are studied properly, it could be very helpful for

medical science. It has been unequivocally established that medicinal plants and associated knowledge play a significant role in the general welfare of the upland communities of CHTs, Bangladesh [8]. As it is the rich source of high biodiversity of medicinal plants as well as the habitat of various other animals, so that, it should be of proper care to keep this environmentally safe biodiversity in this region.

### 3. CONCLUSION

Nature contains beneficial properties for the welfare of mankind. Human are destroying the normal properties of nature due to various developmental activities. These activities alter the nature of environment and as a result various kinds of abnormalities are found like global warming, climate change, exposure to UV light, acid rain and so on. These environmental changes are correlated to the outbreak of many new diseases and scientists are trying to resolve those health hazards by establishing many new drugs as therapy. Though there are many drugs, which are already established for the treatment of many notorious diseases, but burning issues are side effects along with the efficacies of the drugs. For this reason, scientists are looking for the alternative drug sources with least side effects and in this regard traditional medicines are getting much more attention. As in this review, we have discussed a lot of traditional medicines used specifically in the CHTs region, it would be a rich source of research to develop new drugs or bioactive compounds for the treatment of relevant diseases. More vigorous studies at the molecular level would unveil a new window of potential new drug development for human welfare.

### CONSENT

Not applicable.

### ETHICAL APPROVAL

Not applicable.

### SUPPLEMENTARY MATERIALS

Supplementary materials is available in this following link:  
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### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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