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Full Length Research Paper

Diversity of medicinal plants used in the treatment of skin diseases in Tabuk region, Saudi Arabia

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Saudi Arabia has a unique floral diversity due to its remarkable diversity in the ecological habitats. Many plant species are widely applied in traditional medicine to treat several diseases. In the present study, ethnobotanical survey of plant species in Tabuk Region (Saudi Arabia) was carried out describing their uses in treating skin diseases. The results showed that a total of 51 plants species belonging to 40 genera and 28 families were reported. The richest families terms of number of species were Asteraceae, Boraginaceae and Chenopodiaceae (4 species, 7.84% for each) followed by Euphorbiaceae, Fabaceae and Zygophyllaceae (3 species, 5.88% for each). Most of the plant species collected in this study are in the life form of herbs and shrubs and comprise 74% of the plant species. On the other hand, the most frequent plant parts used to treat skin diseases are whole plant (51%) and leaf (24%). The flora diversity in Tabuk Region is obviously threatened by anthropogenic activities and the public authorities should start thinking seriously about the conservation of these important natural resources.

Key words: Flora, medicinal plants, Skin diseases, Tayma, Tabuk region, Saudi Arabia.

INTRODUCTION

Arabian Peninsula include many countries; it is acceptable fact that the biodiversity of plant species in Saudi Arabia is amongst the richest flora in Arabian Peninsula. This comprises a valuable and important genetic source for medical plants in the Middle East (Rahman et al., 2004). The diversity of plants in Saudi Arabia is due to its unique habitats that stretch along large spatial area. A total of 2250 species (including pteridophytes and gymnosperms) in 142 families are represented in the flora of the Kingdom of Saudi Arabia. Of these, there are 242 endemic and 600 rare and endangered species in the

wild (Collenette, 1999). However, the diversity of plants in Saudi Arabia and specifically Tabuk region is threaten by several human activities such as woodcutting, agriculture and the invasion of exotic species (Al-Mutairi et al., 2016).

Medical plants are considered an important economic resource of natural biodiversity. These medical plants can be exploited appropriately to produce essential drugs. Furthermore, these natural resources should be conserved and protected with sustainable management. The fact of using plants in traditional medicine started

thousands years ago and this knowledge has been inherited from one generation to another. There are several studies about the medicinal use of plants in treating different diseases (Rahman et al., 2004; Al-Sodany et al., 2013; El-Mawla et al., 2016; Al-Harbi, 2017; Shinwaikar et al., 2004), and many studies carried out in some Asian countries about using medicinal plants to cure skin diseases such as India (Sanjeet et al., 2012; Mudasir, 2014; Balaraju et al., 2015), while there are a few studies about using medicinal plants traditionally to treat skin diseases such as scabies, eczema and healing wounds in Saudi Arabia.

Due to the importance of the plants in the treatment of skin diseases and In the light of paucity of the information in this regard, this study was conducted to highlight on the wild plants and their medical uses to treat skin diseases in Tabuk region, Saudi Arabia.

MATERIALS AND METHODS

Study area

The surveying of plant species was carried out in several habitats (Sand dunes, valleys, mountains, gravel lands and coastal lands) of Tabuk region which is situated in the North west part of Saudi Arabia with approximate area of 117000 km². The climate in this region is extremely arid with very low annual rainfall of less than 40 mm/year. According to several floral and ecological studies conducted in this region, this region is characterized with unique habitats and remarkable plant diversity (Al-Mutairi et al., 2016).

Surveying the plants

The plant species of medical importance to treat skin diseases were surveyed in various sites of Tabuk region (Tabuk City, Tayma, Duba, Haql, Al-Wajh and Umluj) (Figure 1). And then the plant species were classified using the available taxonomical keys and description by Chaudhary (2001), Collette (1999), Migahid (1996) and Cope (1985). To Identify of the collected plants species for their uses to treat skin diseases was carried out using the description by Rahman et al. (2004), Al-Shanwani (1996), El-Mawla et al. (2016) and Al-Sodany et al. (2013).

Data collection

The study area was divided into six sites in each site there are five locations, in each location four plots were taken (10 m x10 m) for each plot, then the plant species were listed.

A total of 120 sample plots were selected in area under study (Tabuk region). Locations and sample plots were selected to represent a wide range of environmental variation. In each location, sample plots were selected randomly. The sampling process was carried out during the spring season 2016 when most species were expected to be growing.

Data analysis

The plant species were collected in this study were listed and species richness of the plant families, percentage of the plant parts and the percentage of the life forms of the plant species used to treat skin diseases were indicated.

RESULTS

Diversity of medicinal plants in the study area

In the study, a total of 51 species belonging to 40 genera and 28 families were reported for their traditional medical application in Tabuk region, Saudi Arabia. Table 1 presented the number of the species in each family with percentage of their contribution to total number of plant species recorded. The families of Asteraceae, Boraginaceae and Chenopodiaceae were the richest families (4 species, 7.84% for each family). Therefore, these three families constituted almost 25% of the total number of plant species reported to treat skin disease in Tabuk region. However, the families; Euphorbiaceae, Fabaceae and Zygophyllaceae were reported secondly as richest families (3 species, 5.88% for each family).

The plant species reported in this study are widely known to be used to treat skin diseases in Tabuk region. Table 2 summarizes the percentage of the plant parts that is used for this purpose. Most of these medical plants are used as "whole plant" as the percentage of this application is 51%. Then, plant leafs were secondly important in their application to treat skin diseases in Tabuk region.

Plant parts used

Plant parts used to treat skin diseases in Tabuk region is given in Figure 2 and Tables 2 and 3.

DISCUSSION

Relationship between this study and the past studies

The present study aimed to survey plant species in Tabuk Region (Saudi Arabia), so it was carried out describing their uses in treating skin diseases, so it will be added and completed to the several studies that surveyed application of plants in treating different human diseases such as digestive system diseases (Rahman et al., 2004) described 86 plant species of medicinal importance with dominance of seven families. However, Al-Sodany et al. (2013) described 261 plant species which are commonly used in traditional medicine from Taif. In addition Korpenwar (2012), Egharevoa and Ikhatua (2008) Helene and Sandy (2013), Balaraju et al. (2015) and Manish et al. (2012) studied the role of medicinal plants to treat skin diseases.

Plant diversity

In this study, a total of 51 plant species belonging to 40 genera and 28 families were collected from Tabuk Region (North West of Saudi Arabia) and were identified



Figure 1. Map of the study area (Tabuk region) from Saudi Arabia.

for their traditional application to treat skin diseases. The number of plants species collected from Tabuk region that used to treat skin diseases is higher compared to other related studies. For instance Balaraju et al. (2015) and Erhenhi et al. (2016) reported only 21 plant species and Egharevba and Ikhatue (2008) reported 41 and Manish et al. (2012) reported 23 plant species which are used to treat skin diseases. In the present study, the life form of herbs was the most dominant and constitutes almost 45% followed by shrubs 29%. This is in agreement with the study of Egharevba and Ikhatue (2008) which reported 42% herbs and 26% shrubs, while it is not in agreement with the study of Erhenhi et al. (2016) which reported the life form trees was the most dominant life form followed by herbs.

Part used

According to the available information, the active

ingredients of these plants are certain phytochemical compounds that results in ultimate physiological action on human body. Some of these phytochemical compounds are plants alkaloids, saponin, tannins, flavonoids, carbohydrates and phenolic compounds (Edeoga et al., 2005). As shown in the present study findings, the most frequent plant part used to treat skin diseases in Tabuk is whole plant (51%) and leaf (24%). This corresponds with the study carried out by Helene and Sandy (2013) which showed that leaf 31%. This is despite the fact that for herbal medicine preparations, different parts of plants can be used such as leaves, bark, stems, roots, fruits and flowers (Egharevba and Ikhatue, 2008). According to Algasim et al. (2013), leaves are the most frequent part used to treat skin diseases in Zari and Zari (2015) and Korpenwar (2012) reviewed the application of four plant species; aloe (*Aloe vera*), oat (*Avena sativa*), turmeric (*Curcuma longa*) and chamomile (*Matricaria chamomilla*) applied to treat eczema. It was concluded that these four plant species have strong potential for treating eczema.

Table 1. Species richness of the plant families that used to treat skin diseases in Tabuk region, Saudi Arabia.

Family	Number of species	Percentage
Acanthaceae	1	1.96
Amaranthaceae	2	3.92
Apocynaceae	1	1.96
Asclepiadaceae	1	1.96
Asteraceae	4	7.84
Avicenniaceae	1	1.96
Boraginacea	4	7.84
Brassicaceae	1	1.96
Capparaceae	2	3.92
Cleomaceae	1	1.96
Chenopodiaceae	4	7.84
Cucurbitaceae	1	1.96
Euphorbiaceae	3	5.88
Fabaceae	3	5.88
Labiatae	1	1.96
Liliaceae	1	1.96
Moringaceae	1	1.96
Oleaceae	1	1.96
Orobanchaceae	1	1.96
Plantaginaceae	1	1.96
Poaceae	2	3.92
Portulacaceae	2	3.92
Resedaceae	2	3.92
Rhamnaceae	2	3.92
Sapindaceae	2	3.92
Solanaceae	2	3.92
Tamaricaceae	2	3.92
Zygophyllaceae	3	5.88

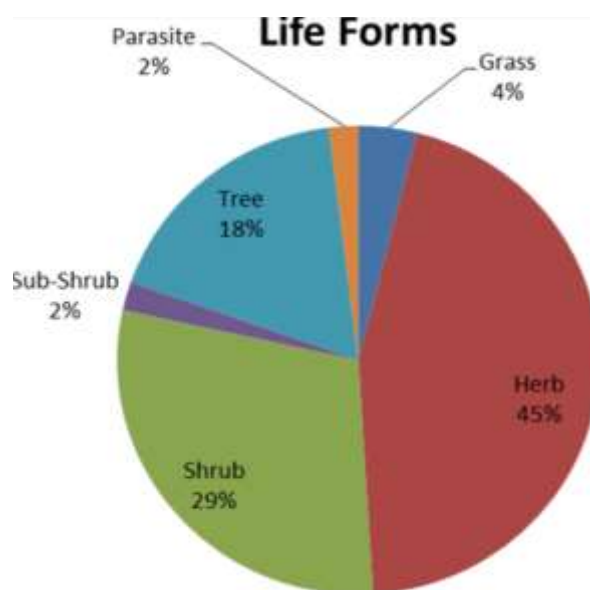
**Figure 2.** The percentage of the life forms of the plant species used to treat skin diseases in Tabuk.

Table 2. The Percentage of the plant parts used to treat skin diseases in Tabuk region, Saudi Arabia.

Plant parts	Percentage
Whole plant	51
Leaf	24
Bark	6
Oil	6
Root	3
Gum	2
Latex	2
Fruit	2
Stem and buds	2
Wax	2

Table 3. List of the medicinal importance of the identified plants species in the study area.

Family/species	Life form	Traditional and medical use	Parts used
Acanthaceae			
<i>Blepharis ciliaris</i> L.	Herb	To treat vitiligo, sores and wounds	Leaf, seeds
Amaranthaceae			
<i>Amaranthus spinosus</i> L.	Herb	To treat eczema	Whole plant
<i>Celosia rigyna</i> L.	Herb	To treat dermatitis	Whole plant
Apocynaceae			
<i>Rhazya stricta</i> Decne.	Shrub	To treat syphilis	Root, stem, leaf, flower
Asclepiadaceae			
<i>Pergularia tomentosa</i> L.	Shrub	To treat microbial skin diseases	Leaf
Asteraceae			
<i>Picris abyssiniac</i> Sch.	Herb	To treat dermatitis	Leaf
<i>Pulicaria incisa</i> Lam.	Herb	To treat dermatitis and bleeding	Whole plant
<i>Pulicaria undulata</i> L.	Shrub	To treat hurts	Whole plant
<i>Sonchus oleraceus</i> L.	Herb	To clean sores	Plant juice
Avicenniaceae			
<i>Avicennia marina</i> Forssk.	Tree	to treat small pox	Bark
Boraginacea			
<i>Arnebia hispidissima</i> DC.	Herb	To treat Eczema	Whole plant
<i>Arnebia linearifolia</i> DC.	Herb	To treat sores	Whole plant
<i>Heliotropium digynum</i> Forssk.	Shrub	To treat many skin diseases	Leaf
<i>Heliotropium europaeum</i> L..	Herb	To treat wounds and snake bite	Whole plant
Brassicaceae			
<i>Brassica rapa</i> L.	Herb	to treat skin rash and vitiligo	Root, leaf, seed
Capparaceae			
<i>Capparis deciduas</i> Forssk	Shrub	To treat skin rash, sores and boil	Whole plant
<i>Capparis spinose</i> L.	Shrub	To treat dermatitis	Whole plant
Cleomaceae			
<i>Cleome chrysantha</i> Decne.	Herb	To treat wounds, sores and blisters	Leaf

Table 3 cont'd

Chenopodiaceae				
<i>Bassia muricata</i> L.	Herb	To treat Sores		Oil of seed.
<i>Haloxylon salicornicum</i> Mog	Shrub	To treat wounds, sores and dermatitis		Whole plant
<i>Suaeda aegyptiaca</i> Hasselq..	Shrub	To treat blisters and sores		Leaf
<i>Suaeda monoica</i> Forssk.	Shrub	To treat many skin diseases		Wax
Cucurbitaceae				
<i>Citrullus colocynthis</i> L.	Herb	To treat sores, swelling and vitiligo		Fruit
Euphorbiaceae				
<i>Euphorbia arabica</i> Hochst and Steud.	Herb	To treat Warts		Whole plant
<i>Euphorbia helioscopia</i> L.	Herb	To remove warts		Latex
<i>Ricinus communis</i> L.	Shrub	To treat a head skin		Oil of seeds
Fabaceae				
<i>Acacia arabica</i> Lam.	Tree	To stop bleeding		Bark, gum powder
<i>Acacia seyal</i> Forssk.	Tree	To stop bleeding		Gum
<i>Alhagi camelorum</i> Fisch.	Shrub	To treat dermatitis		Whole plant
Labiatae				
<i>Thymus vulgaris</i> L.	Subshrub	To treat many skin diseases		Whole plant
Liliaceae				
<i>Asphodelus fistulosus</i> L.	Herb	To treat dermatitis		Whole plant
Moringaceae				
<i>Moringa peregrine</i> Forssk.	Tree	To clean skin and elastic it		Leaf
Oleaceae				
<i>Olea europaea</i> L.	Tree	To treat skin pain		Oil
Orobanchaceae				
<i>Cistanche phelypaea</i> L.	Parasite	To treat sores		Whole plant
Plantaginaceae				
<i>Plantago major</i> L.	Herb	To treat blisters, boil and wounds		Whole plant
Poaceae				
<i>Cynodon dactylon</i> L.	Grass	To stop bleeding		Whole plant
<i>Eremopogon foveolatus</i> Del.	Grass	To treat wounds		Whole plant
Portulacaceae				
<i>Portulaca quadrifida</i> L.	Herb	To treat many skin diseases		Leaf, seeds
<i>Portulaca oleracea</i> L.	Herb	To treat many skin diseases		Whole plant
Resedaceae				
<i>Ochradenus baccatus</i> Del.	Shrub	To treat wounds		Stem, leaf, flower
<i>Oligomeris linifolia</i> Vahl	Herb	To treat breast skin		Plant extract
Rhamnaceae				
<i>Ziziphus jujube</i> Lam.	Tree	To treat many skin diseases		Leaf
<i>Ziziphus spina-christi</i> L.	Tree	To treat sores and wounds		Leaf, bark
Sapindaceae				
<i>Dodonaea viscosa</i> Jacq.	Shrub	To treat wounds and burns		Powder of leaf

Table 3 cont'd

Solanaceae			
<i>Datura stramonius</i> L.	Herb	To treat dermatitis, sores and vitiligo	Leaf, root
<i>Solanum forskalii</i> Dunal.	Herb	To treat sores	Whole plant
Tamaricaceae			
<i>Tamarix aphylla</i> L.	Tree	To treat eczema	Bark
<i>Tamarix nilotica</i> Bge.	Tree	To treat dermatitis	New stems and buds
Zygophyllaceae			
<i>Fagonia arabica</i> L.	Shrub	To treat wounds	Whole plant
<i>Fagonia bruguieri</i> DC.	Shrub	To treat dermatitis, swellings, scabies, blisters and vitiligo	Whole plant
<i>Tribulus terrestris</i> L.	Herb	To treat skin pain	Whole plant

according to the available literatures.

Conclusions

The present study reported 51 plant species belong to 40 genera and 28 families which are commonly used to treat skin diseases in Tabuk Region (Saudi Arabia). The survey of plant species applied to treat skin diseases can be considered as the first report that attempts to provide the basic information for future ethnobotanical studies in this region.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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Full Length Research Paper

Ethnomedicinal practices and phytochemical assessment of *Uraria lagopoides* (L.) DC. around Mayurjharna Reserve, Eastern India

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Plants have been used from ancient times in India for various systems of medicine like ayurveda, unani, homoeopathy, allopathy, siddha, ethnic, etc., to attempt cures for diseases and to relieve physical and mental sufferings. The aim of the study was to ascertain multiple usages of *Uraria lagopoides* in the outskirts of Mayurjharna and presence of phytochemicals in leaves and roots through standard tests for metabolites by extracting methanolic and aqueous solutions. Flavonoid and phenolic content in the extract were also determined by UV-visible spectrophotometer. *U. lagopoides*, a trailing perennial herb, was found to be the most important plant by the Santhal, Munda and Lodha ethnic community with a 'use value' of 1.85. Intensive exploration of *U. lagopoides* affirms that the plant has multipurpose use against various diseases viz. wound healing, anti-inflammatory, anti-diarrhoea, abortifacient, laxative, aphrodisiac and others. The methanolic extract reveals the presence of tannins, alkaloids, glycosides, carbohydrates, flavonoids, steroids, and saponins whereas aqueous extract shows positivity of tannins, glycosides, carbohydrates, flavonoids, and saponins. The flavonoid contents in *U. lagopoides* leaves and roots were 145.68 (± 5.80) and 178.93 (± 0.05) μg of quercetin per mg of dry extract, respectively. The phenolic content in leaves and roots were 43.073 (± 1.36) and 40.195 (± 2.13) μg of pyrocatechol equivalent per mg of dry extract. Preliminary qualitative and quantitative screening confirms the presence of multiple metabolites which also commensurate the multiple usage of the roots and leaves of *U. lagopoides*.

Key words: Ailments, indigenous, medicinal plants, metabolites, *Uraria lagopoides*.

INTRODUCTION

Plants have been used from ancient times to attempt cures from diseases and to relieve physical and mental sufferings. About 85% of the rural population of India utilized wild plants for the treatment of various ailments (Fransworth, 1994; Jain, 1992). Though allopathic drugs have brought a revolution throughout the world but the plant base medicines have its own unique status (Behera, 2006). Natural forests are key resources for

poor forest fringe dwellers. Mainstream of poor rural households in developing countries depend on plant and animal products of forests which are the sources of a variety of food items that complement agricultural crops, fuels for cooking and a wide range of traditional medicines and other hygiene products (Warner, 2000; Pandey, 2009).

India has one of the medicinal plant resource related

health cultures in the world. It has both a codified and an oral tradition and over 1.5 million carriers. The oral culture has traditionally been rooted in the 4635 ethnic communities in the country. This tradition in India is largely due to the diverse medicinal plant resource base, cultural rootedness, flexibility, easy accessibility and affordability, especially for the poorest. Government of India has reported that for 65% of its population, traditional medicine is the only available source of health care (Shaw et al., 2015).

In this context, India is one of the world's 12 mega diversity centers having rich vegetation with 47,000 plant species and a wide variety of medicinal plants along with tradition of plant-based knowledge distributed among the vast numbers of ethnic groups (Islam and Jha, 2003). Plants have been used from ancient times in India for various systems of medicine; ayurveda, unani, homoeopathy, allopathy, siddha, ethnic, etc., to attempt cures for diseases and to relieve physical like and mental sufferings. In the Indian State of West Bengal, major source of medicinal plants is within forest areas, which are having rich plant diversity in wide range of forest types supporting innumerable medicinal plants both in hills and plains. Out of 11,879 km² of forests in the state, the reserve forest comprises of 7,054 km², that is, 54% of the total forest area and 3,772 km², that is, 30% of the total forest area constitutes protected forest. Again 34% of the total forest area in the state are declared as protected areas where conservation of the habitat get due emphasis. Thus, medicinal plants resources in the protected areas and the remaining reserve forests and protected forests get satisfactory protection, though the resource in the remaining forest areas is under great stress in view of human interference and other biotic factors. To put special emphasis on medicinal plant conservation, Kankrajhore Medicinal Plant Conservation Area (MPCA) is one of the 11 MPCA established in the state (Biswas et al., 2017).

Uraria lagopoides (Papilionaceae), a trailing perennial herb locally known as 'Prisniparni' is found in India (Bihar, Orissa, West Bengal), Nepal, China and Northern Australia. The plant has been reported to be aphrodisiac, useful in treatment of asthma, dysentery, delirium, ulcers, malarial fevers, fractures of bones, inflammation of chest and diarrhoea (Kirtikar and Basu, 2006; Chopra et al., 1956; Dey, 1994; Narian, 1999; Nadkarni, 1976). This plant finds use as a remedy for several ailments in the indigenous system of medicine. The phytochemical studies of the ethanolic extract of *U. lagopoides* revealed the presence of flavonoids, glycosides, proteins and phytosterols (Kumar and Nuthakki, 2014).

Exploration and systematic documentation of indigenous knowledge on medicinal plants with special

focus on *U. lagopoides* is essential and the learning is possible by retrieving the lifelong experiences of the ethnic community and herbal practitioners. The major objectives of this paper includes: 1, Prioritization of frequently used medicinal plants by the local community against the health issues confronted by them; 2, intensive exploration of indigenous knowledge on usage of *U. lagopoides* in the outskirts of Mayurjharna Wildlife Sanctuary; 3, scientific validation of usage through preliminary screening of phytochemicals in leaves and roots of *U. lagopoides* collected from the wild.

MATERIALS AND METHODS

Study area

Mayurjharna Elephant Reserve (N 23°27' and 22°23', E 86°27' and 87°32') having an area of 414 km² covered three districts of West Bengal state of India (Figure 1) namely West Midinipur, Bankura and Purulia. This study included six villages of West Medinipur district namely Kakrajhore, Amlasol, Daldali, Jabola, Jujardhara and Mayurjharna under Binpur-II block for retrieval of ethnomedicinal information.

Assessment tools

Focused Group Discussion (FGD) were carried out by organizing several meetings at Kakrajhore, Amlasol, Daldali, Jabola, Jujardhara and Mayurjharna villages for listing common diseases and frequently used medicinal plants by local tribes which include Santhal, Munda and Lodha tribal community. Personal interviews were conducted by exercising semi-structured questionnaire to retrieve inherited knowledge on usage of medicinal plants from the respondents. The emphasis was given to retrieve maximum information regarding the usage of *U. lagopoides* while conducting personal interviews.

Analysis of both qualitative and quantitative data was performed by using statistical software PASW Statistics 18.0. The relative importance of plant species used was evaluated by the use value (Phillips and Gentry, 1993), according to the following formula:

$$UV_i = \sum U_i / N_i$$

Where, UV_i refers to the use value of a species i, U_i represents the number of use reports by each informer for specific plant species i and N_i is the number of informants. High use value indicates that there are many use reports for a plant, implying that the plant is important, and low value (approach to 0) indicates that there are few reports related to its use (Suleiman, 2015).

Processing of plant parts

Plants of *U. lagopoides* were collected from its natural habitat at Mayurjharna forest. The collected plants were dry cleaned and leaves and roots parts were separated manually. Plant parts were dried under the shed about a month till a constant weight was achieved. Next the dried roots and leaves were ground

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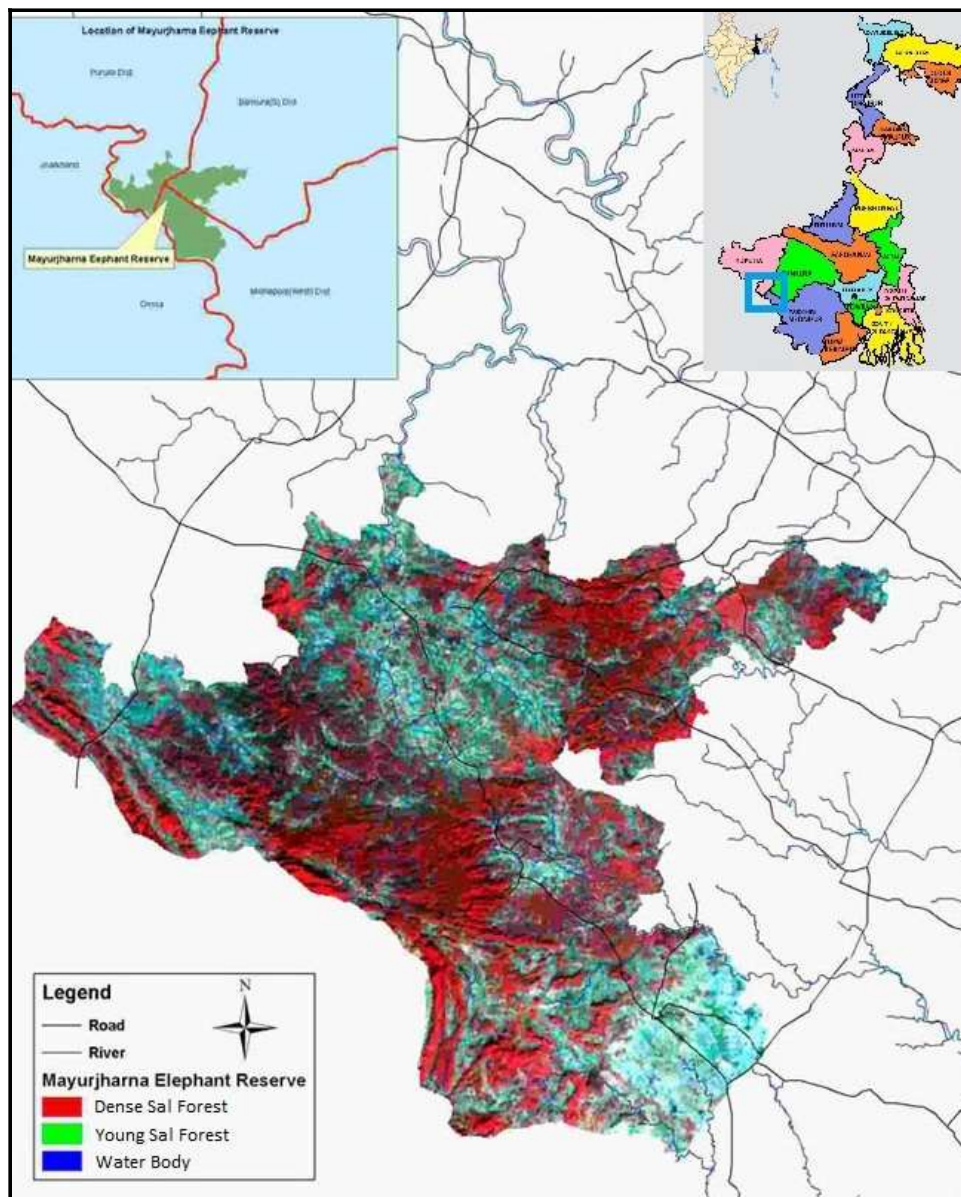


Figure 1. Location map of study area (Mayurjharna, India).

mechanically into fine dust to facilitate the extraction process. Both of the samples were divided into two parts to be extracted by using methyl alcohol and aqueous media as solvent.

Extraction process

Alcoholic extraction was carried out with dried powdered leaves and roots of *U. lagopoides* by following Soxhlet extraction method (Harborne, 1998; Yadav and Agarwala, 2011; Ajayi et al., 2017) with minor alteration. Powdered plant material of 100 g was immersed in 500 mL of 80% methanol and shaken manually with 2 h interval for 72 h. Subsequently concentrated extract was separated through controlled evaporation at 30-40°C. In the case of aqueous extraction, 8 g of plant material was mixed with 250 mL of distilled water and concentrate was obtained by deploying same method as above.

Qualitative phytochemical analysis

The phytochemical screening process described by Kokate et al. (2006) and Harborne (1998) were applied for individual constituents of the crude extracts. The presence and absence of the compounds were indicated as positive (+) and negative (-), respectively for both extracts. The standard tests for tannins (ferric chloride and lead acetate test), carbohydrate (Fehling's and Molisch's test), alkaloids (Dragendorff's, Wagner's and Hager's test), flavonoids (alkaline test), glycosides (Modified Borntrager's Test), triterpenoids and steroids (Salkowski's test), and saponins (Lead acetate test) were conducted to find the metabolites presence in the plant material.

Quantitative estimation of flavonoid and phenolic content

Flavonoid content was determined as per Hsu (2006) that is 1 mg

of extract was added to 1 mL of 80% ethanol and aliquot of 0.5 mL was added to a test tube, containing 0.1 mL of 10% aluminium nitrate, 0.1 mL of 1 M potassium acetate and 4.3 mL of 80% ethanol. Absorbance of the mixture was measured at 415 nm in a UV-visible spectrophotometer, after incubation of 40 min at room temperature. The flavonoid content of the extract was determined in terms of quercetin equivalent using the linear equation based on the calibration curve, $A = 0.0067C + 0.0132$; where, A=absorbance at 415 nm wavelength and C=quercetin equivalent in μg .

Phenolic content was estimated as per Singleton et al. (1999), where 0.1 mL of extract solution containing 500 μg of extract was transferred to 100 mL of conical flask, and the volume was adjusted to 46 mL by addition of distilled water, 1 mL of Folin-Coicalteu reagent was also added to the mixture. After 3 min, 3 mL of 2% sodium carbonate (Na_2CO_3) solution was added. The mixture was shaken occasionally for 2 h at room temperature. Absorbance of the mixture solution was measured at 760 nm in a UV-visible spectrophotometer. Phenolic content was determined as pyrocatechol equivalent using the following calibration curve, $A = 0.0034C - 0.058$; where, A=absorbance and C=pyrocatechol equivalent in μg .

RESULTS AND DISCUSSION

The study area is pre-dominated by local indigenous people primarily Santhal, Munda and Lodha ethnic community. The composition of respondent includes 80% male and 20% female whereas, 17% of the respondents were below 50 years of age and 83% were above 50 years of age. Though the male practitioners dominate, the women have a big role to address gynaecological and obstetrics issues faced by local villagers. The composition of age reveals that the traditional knowledge is deteriorating with the generation due to lack in faith or people want immediate remedy.

The FGD unfolded that the most common diseases or ailments confronted by the local people are in the following order - malaria, diarrhoea, jaundice, typhoid, dysentery, digestive disorder, leucorrhoea, snake bite, headache, etc. In the study area, more than 80% families are below the poverty line and because of malnutrition the local people are very much susceptible to various diseases especially vector borne disease. Snake bite is also a major concern as most of the victims are affected during the harvesting of Babui grass which is used for rope making and is a major cash crop.

Local people were able to figure out some of the important plants of all habits (tree, shrub, herb, and climber) available in the Mayurjharna forest area which were used for treating the most common ailments and other purposes. The 'use value' of top ten plants, that is, Shivjata (*U. lagopoides* (L.) DC.), Ramdatan (*Smilax ovalifolia* Roxb.), Satamul (*Asparagus racemosus* Wild.), Amloki (*Embllica officinalis* Gaertn.), Talmuli (*Curculigo orchoides* Gaertn.), Putla (*Croton roxburghii* Balakr.), Chitpunji (*Dregea volubilis* (L.f.) Benth.), Bhuikul (*Ziziphus nummularia* (Burm.f.) Wight & Walk.-Arn.), Dudhilata (*Ichnocarpus frutescens* R.Br.) and Paniyalata (*Cissus adnata* Roxb.) were 1.85, 1.84, 1.82, 1.74, 1.68, 1.61, 1.49, 1.29 and 1.18, respectively. *U. lagopoides* or

Shivjata was found to be the most important plant in the locality as per the 'use value' indicating multipurpose and frequently used medicinal plants.

By acute observation and refereeing standard literature, it was found that *U. lagopoides* is trailing subshrubs, prostrate or spreading up to 2 ft tall stems hispid; leaflets are of 5x2.5 cm, ovate-oblong, obtuse, mucronate, hispid below, subcordate at base, petiole 1.5 cm long, stipule 12 mm long filiform, mostly trifoliate, rarely 1 foliolate, central leaflet is nearly round or elliptic to ovate, gray-yellow velvety on the underside, base rounded or heart shaped, tip rounded or notched. Racemes are about 2 cm broad, 3-6 cm long at the end of branches, bracts 8x5 mm, ciliate. Flowers - many pale purple pea like are born in densely flowered, pedicelled, calyx lobes 10 mm long, bristled, upper lobes smaller, standard 7x5 mm, acute to the base, wings 5x2 mm, clawed; keel 6 mm long, auricled, joints of pods 3.5x2.5 mm, reticulate, shining; sepal cup is 5 parted, lower sepal about 2 times as long as upper ones, white hairy. Flowers are about 6 mm standard obovate, base flat, pod is enclosed by sepal cup, black brown at maturity, small. Flowering and fruiting is in November-December/May-September.

Intensive exploration of *U. lagopoides* affirms that the plant has multipurpose use against various diseases and the whole plant bears healing properties. The potential use of the plant parts includes:

- (1) Wound healing: The paste of leaves is applied to wounds for recovery.
- (2) Anti-inflammatory: The whole plant is used medicinally for relieving swelling. Aqueous and alcoholic extracts of the plants are used to treat intermittent fever, asthma and chest inflammation.
- (3) Anti-diarrhoea: Decoction of the leaves and roots for the treatment of dysentery and diarrhoea.
- (4) Abortifacient: An aqueous extract of the leaves has abortifacient properties. On the other hand the paste of roots mixed with milk is given to a pregnant woman as a remedy against miscarriage.
- (5) Laxative: The whole plant is consumed to have clear bowl.
- (6) Aphrodisiac: The whole plant is also consumed to stimulate sexual desire.

Others - this plant is used along with other plant to treat rheumatism, bleeding piles, catarrh and scorpion sting.

The qualitative tests for both methanolic and aqueous extracts for both roots and leaves were carried out and their respond in various reagents are shown in Table 1 which indicates the presents of multiple metabolites. The methanolic extract reveals the presence of tannins, alkaloids, glycosides, carbohydrates, flavonoids, steroids, and saponins whereas aqueous extract shows positivity of tannins, glycosides, carbohydrates, flavonoids, and saponins.

Quantification was exercised in case of flavonoid and phenolic content in the extract. The results has shown that the flavonoid contents in *U. lagopoides* leaves is

Table 1. Metabolites presents in leaves and roots of *U. lagopoides*.

S/N	Metabolites	Reagent	Methanolic		Aqueous	
			Root	Leaf	Root	Leaf
1	Tannins	Ferric chloride	+	+	+	+
		Lead acetate	+	+	+	+
		Wagner's reagent	+	+	-	-
2	Alkaloids	Dragendorff's reagent	-	-	-	-
		Hager's reagent	-	-	-	-
3	Glycosides	Modified Borntrager's	-	-	+	+
4	Carbohydrates	Molisch's test	+	+	+	+
		Fehling's test	-	-	-	-
5	Flavonoids	Alkaline test	+	+	+	+
6	Steroids	Salkowski's test	+	+	-	-
7	Saponins	Lead acetate	+	+	+	+

'+' indicates presence and '-' indicates absence of metabolites in plant material.

145.68 (± 5.80) μg of quercetin per mg of dry extract whereas roots contain 178.93 (± 0.05) μg of quercetin per mg of dry extract. The phenolic content in leaves is 43.073 (± 1.36) μg of pyrocatechol equivalent per mg of dry extract, whereas roots contain 40.195 (± 2.13) μg of pyrocatechol equivalent per mg of dry extract. Comparison with the above two extract, in petroleum ether extract showed positive for carbohydrates, flavonoids and glycosides, and on the other hand petroleum ether extract showed higher total flavonoid content than methanol extract (Hossain et al., 2015).

Conclusion

The ethnic people mainly Santhal, Munda, Lodha community living around Mayurjharna forest area of West Medinipur District hold a valuable knowledge of the uses of plant resources and others represent an important component of the local livelihood strategies. Qualitative and quantitative screening confirms the presence of multiple metabolites which also commensurate the multiple usage of the roots and leaves of *U. lagopoides*. More in-depth investigations are required for more possible phytochemical and pharmacological activity.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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