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RESEARCH ARTICLE

An inventory of medicinal plants used in traditional healthcare practices in Bundelkhand region of central India

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ABSTRACT

This paper presents the results of a study on traditional healthcare practices of local herbal healers known as *Vaidya* and other knowledgeable people of Jhansi district of Bundelkhand region. Since knowledge of traditional uses of various medicinal plants is limited to mostly traditional herbal healers, it is of extreme importance to compile and document this heritage for coming generations. In the present study, 100 plant species belonging to 43 genera and 50 families are used traditionally for the curing of more than 45 ailments and diseases. Among all the plant species, trees found to be most dominant (45%) followed by herbaceous plants (32%), shrubs (14%) and climbers both annual and perennials (9 %). The highest number of medicinal plants were recorded in four families *viz.,* Caesalpiniaceae (7 species), Papilionaceae and Apocynaceae (6 species), Euphorbiaceae (5 species). The traditional medicinal plants were mostly used to cure dysentery, diarrhea, fever, skin diseases, wounds, rheumatism, piles, and digestive disorders, etc.

INTRODUCTION

The importance of traditional medicine as a source of primary health care was first officially recognised by the World Health Organisation (WHO) in the Primary Health Care Declaration of Alma Ata (1978) and has been globally addressed since 1976 by the Traditional Medicine Programme of the WHO. That Programme defined traditional medicine as: "the sum total of all the knowledge and practices, whether explicable or not, used in diagnosis, prevention and elimination of physical, mental or social imbalance and relying exclusively on practical experience and observation handed down from generation to generation, whether verbally or in writing."

Plants and plants based medicaments have been employed since the dawn of civilization for prolonging life of man by combating various ailments. Ancient ethnic communities around the world have learnt to utilize their neighborhood herbal wealth for curative purpose. Indian subcontinent is being inhabited by over 54 million tribal people dwelling in about 5000 forest dominated villages spreading across the country comprising 15% of the total geographical area, their knowledge of plants developed often of the cost of their life in their natural dwellings through centuries old experience could not be perfectly documented due to the lack of literacy and it had rather descended from one generation to another as a domestic practice (Nath and Khatri, 2010). They comprises of one of the unique treasure and rich source of diversified ethno-botanical wealth. Traditional herbal remedies have always played a key role in the healthcare systems all over the world. In India, the native people still exploit a variety of medicinal plants for curing various types of ailments and disorders related to human and animal healthcare. It is estimated that about 80% of people worldwide rely mainly on traditional healthcare practices and especially on plants based medicines (Farnsworth and Soejarto, 1991; Pei, 2002). The contribution of medicinal plants to the health of rural especially tribal people in the Bundelkhand region is extremely important because most of the population still believe in traditional healthcare systems. Traditional knowledge of herbal medicines is gradually being lost, although some traditional herbal healers (*Vaidyas, Ojhas)* are still practicing an indigenous system of healthcare systematically and effectively. Primitive people have acquired knowledge about medicinal properties of plants by trial and error, and have made an outstanding contribution to the origin and evaluation of many traditional herbal therapies in the Bundelkhand region. Documentation of indigenous knowledge and evaluation of the use of plants for a variety of purposes assume greater significance, not just to retain it, but also to keep it alive and make it available for future use because of rapid socio-economic and cultural changes that are taking place across the traditional community of the region.

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MATERIALS AND METHODS

Description of the study area

Bundelkhand region lies between 23º8'–26º30' N latitude and 78º11'–81º30' E longitude. The Bundelkhand is bounded by the Yamuna in the north, escarped ranges of the Vindhyan plateau in south, the Sindh in the north-west and Bhander ranges in the south-east. The region is spread over 71618 km^2 and supports 12.45 million human populations as per 1991 census. Bundelkhand region is occupied in central part of India. The geographical location of Bundelkhand is such that it acted as a gateway between the north and south India. (Tyagi 1997). The Bundelkhand region comprises of seven districts of Uttar Pradesh *viz.*, Jhansi, Lalitpur, Jalaun, Hamirpur, Mahoba, Banda and Chitrakoot; six districts of Madhya Pradesh *viz.*, Datia, Tikamgarh, Chhatarpur, Panna, Damoh and Sagar (Fig. 1.). The

forest vegetation of Jhansi and its adjoining area is transitional between the southern tropical dry deciduous type and the northern tropical dry deciduous type. As per the official census, 2011, Jhansi has population of 2.0 million of which male and female were 1.06 and 0.93 million respectively. Total area under district is about 5028 sq. km. with population density of 398 persons per km^2.

Sampling procedure and data collection

In-depth interview and discussions based approach

The villages of Jhansi district were extensively and regularly visited for the collection of ethno-medicinal explorations. These villages were selected after consulting the local administration and elderly people keeping in view that the selected villages would represent all characteristics of the district and most of the people still believe in traditional plants based therapeutic systems. Following the methodology as suggested by Jain and Goel (1995), the information regarding the medicinal usages of the plants available in the local areas for treating ailments and diseases was collected by various direct meetings/discussions and interviewing elderly learned and experienced persons of villages who have knowledge about these medicinal plants in the villages of the surveyed district. During the present study, number of informants were consulted, who were between the ages of 45 to 75 years. Oral consent was sought out from each informant before the start of the discussion and interview. Interview and discussion were conducted in both Hindi and local Bundelkhandy language. Each informant was interviewed separately and advised not to discuss with each other so that they could provide independent information. The questions were asked in stepwise manner by first asking about their age, address, level of education and occupation. Following that, informants were asked to share their traditional knowledge on the medicinal utilization of plants. This included local name of medicinal plants used, habitat, ailments treated, mode of administration and dosage.

Floristic inventory based approach

Almost all the plants were collected in flowering and fruiting period with the help of experienced rural people. While collecting the individual plant species thorough observations were made regarding their natural habitat. Every such plant was kept in vacuum and studied for its identification. The plants specimens after identification were subjected to drying between old news papers or filter papers and kept in wooden plant press. The old news papers or filter papers were changed daily for first week to prevent folding of soaked plants. The pressed specimens were some time kept to close to artificial heat to prevent dampness. The herbarium sheets of the identified plant were by fixing the plants with the help of a transparent cello tap.

Each herbarium sheet contained information pertaining of Botanical Name, Local Name, Family, Date and Place of Collection. The sample of the plant species were identified with the help of local taxonomists and available flora (Duthie, 1994; Kanjilal, 1982; Kirtikar and Basu, 1999).

RESULTS AND DISCUSSION

The inhabitants of villages in Jhansi Districts use a number of medicinal plants for treatment of various ailments and diseases. A total of 100 plant species in 43 genera and 50 families are used traditionally with various plant parts and their combination for the treatment of more than 45 ailments and diseases in the studied area (Tab. 1). Similarly, Badola (2008) studied 118 ethno-medicinal plant species used by the tribal people of Dzongu valley in North Sikkim. Phondani *et al.,* (2010) reported 86 species distributed in 43 families are used for treatment of 37 common ailments among the Bhotiya tribal communities of Niti Valley in Central Himalaya, India. Malik *et al.,* 2011 recorded eighty medicinal plant species used for the treatment of various kinds of ailments and disorders in the Northern region of Kashmir Himalayas. Also, there has been very few attempt made on ethno-botanical potential in Bundelkhand region including the work of Saxena and Tripathi; 1989; 1990; Bhalla *et al.,* 1996; Khanna *et al.,* 1996; Dubey *et al.,* 2001; Nigam and Kumar, 2005; Thakur *et al.,* 2008; Verma *et al.,* 2008a; 2008b. Methods of using these plants vary according to the nature of ailments and diseases, the decoction of leaves, stem and root was the dominant form for treatment followed by powder and paste of bark and root, juice of leaves, and seed powder. Among all the plant species, trees found to be the most dominant (45 %) followed by herbaceous plant (32 %), shrubs (14 %) and climbers both annual and perennial (9 %). In all the tree species large trees contributes (32.0 %) followed by small (30.0 %) medium (28 %) tree species (Table 2 and Fig. 2). The highest number of medicinal plants (Table 3 and Fig. 3) were recorded in four families Caesalpiniaceae (7 species), followed by Papilionaceae and Apocynaceae (6 species), Euphorbiaceae (5 species) and Solanaceae and Rutaceae (4 species). Asteraceae, Mimosaceae, Malvaceae, Lamiaceae, Cucurbitaceae, Liliaceae, Moraceae, Combretaceae and Acantahceae contribute 3 species each while Amaranthaceae, Zingiberaceae, Asclepiadaceae, Sterculiaceae, Sapotaceae and Myrtaceae contribute 2 species. Rest of the reported families contributes one species each. The study found that different parts of the medicinal plant species were used as medicines or any crude forms namely root, stem, stem bark, leaves, flowers, fruits, seeds, whole plant and gum and latex, while most commonly used plant part was leaves (36 species) followed by roots (25 species), fruits (20 species), seeds (19 species), stem bark (18 species), whole plants (13 species) flowers (7 species), gum and latex (4 species) and stem (3 species) (Fig. 4).

Table 1. Database of medicinal plants of Jhansi District of Bundelkhand region

S.No.	Scientific name	Family	Habit	Part used	Ailments
1.	*Abrus precatorius*	Papilionaceae	Perennial climber	Leaves and roots	Snake bite and memory enhancer
2.	*Abuliton indicum*	Malvaceae	Herb	Whole plant	Piles, boils and fever
3.	*Acacia leucophloea*	Mimosaceae	Small tree	Stem bark	Boils and blisters and dental care
4.	*Acacia nilotica*	Mimosaceae	Small tree	Bark and gum	Pyorrhoea, mouth ulcer, gum and dental care
5.	*Achyranthus aspera*	Amaranthaceae	Herb	Whole plant	Asthma, liver disease and scorpion sting
6.	*Acorus calamus*	Araceae	Perennial herb	Root	Stammering (*haklana*)
7.	*Adhatoda vasica*	Acanthaceae	Evergreen shrub	Leaves	Bronchial asthma, chronic cough
8.	*Adina cordifolia*	Rubiaceae	Tree	Stem bark and buds	Rheumatism and body pain
9.	*Aegle marmelos*	Rutaceae	Small tree	Roots and fruit	Dysentery, heat stroke and fever
10.	*Ageratum conyzoides*	Asteraceae	Annual herb	Whole plant	Wounds and chronic dysentery
11.	*Ailanthus excelsa*	Apocynaceae	Large deciduous tree	Bark and leaves	Diarrhoea, dysentery and malarial fever
12.	*Albizia lebbek*	Mimosaceae	Tree	Fruits	Snake bite and scorpion sting
13.	*Allium cepa*	Alliaceae	Biennial herb	Bulb	Cholera
14.	*Allium sativum*	Liliaceae	Perennial herb	Bulbs	Eyelet and nail disorder
15.	*Aloe vera*	Liliaceae	Herb	Leaf juice and pulp	Headache, wounds and cuts, burn, and indigestion
16.	*Alstonia scholaris*	Apocynaceae	Medium size tree	Bark and latex	Eye infection and malarial fever
17.	*Andrographis paniculata*	Acanthaceae	Annual herb	Whole plant	Malarial fever, gastric disorder
18.	*Annona squamosa*	Annonaceae	Small tree	Root	Abortion
19.	*Arachis hypogea*	Papilionaceae	Annual herb	Seeds	Less sperm count

20.	*Argemone maxicana*	Papaveraceae	Prickly Herb	Root and leaves	Skin disease, viral fever
21.	*Asparagus racemosus*	Liliaceae	Under shrub	Root	Health tonic and galactagogue
22.	*Azadirachta indica*	Meliaceae	Tree	Whole plant	Diabetes, piles, worms, skin disease, mouth and teeth complaints
23.	*Balanites aegyptica*	Balanitaceae	Small tree	Stem and seed	Gastric trouble and wounds
24.	*Bauhinia variegata*	Caesalpiniaceae	Medium sized tree	Roots and stem bark	Worms and dysentery
25.	*Boerhhavia diffusa*	Nyctaginaceae	Annual herb	Roots	Urinary disorders
26.	*Bambusa arundinaceae*	Poaceae	Woody perennial	Stem and leaves	Skin allergy (*Sheet ubharna*)
27.	*Bombax ceiba*	Bambacaceae	Large deciduous tree	Bark and flowers	Labour pain and uterine disorder
28.	*Butea monosperma*	Caesalpiniaceae	Medium size deciduous tree	Leaves, flower and gum	Dyspepsia, worms and vitality
29.	*Caesalpinia crista*	Caesalpiniaceae	Prickly climber	Seeds	Cough and cold and skin disease
30.	*Calotropis gigantea*	Asclepiadaceae	Shrub	Flowers	Dizziness and vertigo
31.	*Carica papaya*	Carecaceae	Softwood tree	Fruit and root	Renal calculi, wounds and cuts, and digestive disorders
32.	*Carrissa carandus*	Apocynaceae	Small tree/shrub	Leaves and root	Diarrhoea, dysentery, cold & fever of children
33.	*Cassia fistula*	Caesalpiniaceae	Small tree	Leaves, bark, fruit and pod	Constipation, cough, insect bite and repellent
34.	*Cassia tora*	Caesalpiniaceae	Annual herb	Seeds	Asthma and respiratory disease
35.	*Cathranthus roseus*	Apocynaceae	Herb	Leaves	Diabetes and muscular pain
36.	*Citrus sinensis*	Rutaceae	Small tree	Leaves and fruit	Pimples, itching and digestive disorder
37.	*Coleus aromaticus*	Lamiaceae	Perennial herb	Leaves and seed	Gastric trouble, galactagogue
38.	*Cordia myxa*	Boraginaceae	Medium sized tree	Stem bark, leaves	Colic pain and whooping cough
39.	*Cucurbita lagenaria*	Cucurbitaceae	Climbing annual herb	Fruit	Headache and obesity
40.	*Curcuma longa*	Zingiberaceae	Perennial herb	Rhizome	Swelling in body, dysentery, skin disease and pain reliever
41.	*Cuscuta reflexa*	Convolvulaceae	Perennial climber	Whole plant	Joints pain and muscle pain
42.	*Cyperus rotundus*	Cyperaceae	Perennial grass	Leaves and root	Headache, skin disease and galactagogue
43.	*Dalbergia sissoo*	Papilionaceae	Medium to large size tree	Leaves	Jaundice, liver disorder, dysentery and headache
44.	*Datura stramonium*	Solanaceae	Shrub	Leaves and fruit	Rheumatism, arthritis and wounds
45.	*Eclipta alba*	Asteraceae	Herb	Whole plant	Eczema, dermatitis, hair loss
46.	*Emblica officinale*	Euphorbiaceae	Medium sized tree	Leaves, fruits	Colitis, dysentery, burns, menorrhage and gonorrhoea
47.	*Euphorbia hirta*	Euphorbiaceae	Annual herb	Leaves	Scorpion sting
48.	*Evolvulus alsinoides*	Convolvulaceae	Annual herb	Whole plant	Cooling medicine, cuts and wounds
49.	*Feronia elephantum*	Rutaceae	Large tree	Leaves	Leucorrhoea and menorrhage
50.	*Ficus bengalensis*	Moraceae	Large tree	Fruits	Cough and cold
51.	*Ficus glomerata*	Moraceae	Tree	Bark and fruits	Heart disease, boils and dysentery
52.	*Ficus religiosa*	Moraceae	Large tree	Bark	Boils and blisters
53.	*Flacourtia indica*	Flacourtiaceae	Small tree	Leaves and root	Jaundice and diuretic
54.	*Helectris isora*	Sterculiaceae	Small deciduous tree	Roots and fruit	Diabetes, stomachache and piles
55.	*Hemidesmus indicus*	Asclepiadaceae	Twining shrub	Roots	Gout, cough and skin disease
56.	*Hibiscus rosa sinensis*	Malvaceae	Shrub	Flower	Bleeding of nose, hypertension
57.	*Holoptelia integrifolia*	Ulmaceae	Medium to large size tree	Leaves	Ring worms
58.	*Hyptis suaveolens*	Lamiaceae	Herb	Leaves	Worms, blood purifier
59.	*Jatropha gossypifolia*	Euphorbiaceae	Under shrub	Roots, leaves and seed	Leprosy, eczema, joints pain and skin disease
60.	*Lawsonia inermis*	Lythraceae	Deciduous shrub	Leaves	Burning sensation, cooling
61.	*Luffa cylindrica*	Cucurbitaceae	Annual climber	Fruit and seeds	Skin disease and rheumatism
62.	*Madhuca indica*	Sapotaceae	Large deciduous tree	Flowers	Loss of appetite
63.	*Mamordica indica*	Cucurbitaceae	Annual climber	Fruit juice	Diabetes, joints pain and jaundice
64.	*Mangifera indica*	Anacardiaceae	Medium to large size tree	Seeds	Bronchitis
65.	*Mimusops hexandra*	Sapotaceae	Medium to large size tree	Leaves	Boils and blisters
66.	*Moringa oleifera*	Moringaceae	Small tree	Leaves, fruits and seed	Joints pains and health tonic
67.	*Mucana pruriens*	Papilionaceae	Climber	Roots and seeds	Less sperm count (spermatorrhoea), early ejaculation
68.	*Murraya koenigii*	Rutaceae	Perennial shrub	Leaves, bark and seed	Vomiting, dysentery, gum and teeth care
69.	*Musa paradisiaca*	Musaceae	Large herbaceous plant	Fruits	Diarrhoea
70.	*Nelumbo nucifera*	Nymphaeaceae	Aquatic perennial	Root, flower and seed	Cholera, Sleeplessness, piles
71.	*Ocimum sanctum*	Lamiaceae	Herb	Leaves	Cough and cold, stress and asthma
72.	*Opuntia ficus indica*	Cactaceae	Succulent herb	Stem	Joints pain

73.	*Oxalis corniculata*	Oxalidaceae	Annual herb	Whole plant	Mental stress, headache and fever
74.	*Perestrophe bicalyculata*	Acanthaceae	Annual herb	Whole plant	Malarial fever
75.	*Phyllanthus nirurii*	Euphorbiaceae	Annual herb	Whole plant	Jaundice and liver disorders
76.	*Pongamia pinnata*	Papilionaceae	Small tree	Leaves and seed	Boils, worms and skin disease
77.	*Psidium guajava*	Myrtaceae	Small tree	Leaves and fruit	Mouth ulcer, throat sore and diarrhoea
78.	*Pterocarpus marsupium*	Fabaceae	Tree	Stem bark and gum	Tuberculosis and asthma
79.	*Punica granatum*	Punicaceae	Large deciduous tree	Stem and root bark, fruit and seed	Diarrhoea, dysentery, piles and anaemia
80.	*Rauwolfia serpentina*	Apocynaceae	Under shrub	Root and leaves	Hypertension, dipperession, snakebite, diarrhoea and dysentery
81.	*Ricinus communis*	Euphorbiaceae	Evergreen shrub	Leaves and seed	Weak eyesight, swelling in testis (hydrocoel)
82.	*Salvadora oleiodes*	Salvadoracea	Small tree	Root	Pyorrhoea
83.	*Saraca asoca*	Caesalpiniaceae	Small evergreen tree	Bark and roots	Menstrual disorder and renal calculi
84.	*Sida cordifolia*	Malvaceae	Annual herb	Leaves	Ulcer and dysentery
85.	*Solanum nigrum*	Solanaceae	Annual herb	Whole plant	Joints pain
86.	*Solanum xanthocarpum*	Solanaceae	Annual herb	Roots and flower	Dysentery and cough
87.	*Sterculia urens*	Sterculiaceae	Large tree	Roots	Malarial fever
88.	*Syzygium cumini*	Myrtaceae	Medium to large sized tree	Seeds	Blood sugar
89.	*Tamarindus indica*	Caesalpiniaceae	Large Tree	Fruits	Menorrhage and laxative
90.	*Terminalia arjuna*	Combretaceae	Evergreen tree	Bark	Heart disease, cough and chronic bronchitis and fracture
91.	*Terminalia bellerica*	Combretaceae	Tree	Fruits	Constipation, fever and appitizer
92.	*Terminalia chebula*	Combretaceae	Tree	Furits and seeds	Stomachache and cough
93.	*Tinospora cordifolia*	Menispermaceae	Climbing shrub	Leaves, fruit and seed	Gout, leucoderma and fever
94.	*Tribulus terrestris*	Zygophyllaceae	Annual herb	Leaves and fruit	Renal and urinary disease
95.	*Tridex procumbens*	Asteraceae	Herb	Leaves	Toothache and bruises and cuts
96.	*Vitex negundo*	Verbenaceae		Twig	Toothache
97.	*Withania somnifera*	Solanaceae	Under shrub	Roots	Joints pain, boils and dysentery.
98.	*Wrightia tinctoria*	Apocynaceae	Small tree	Stem bark and seeds	Stomachache and rheumatism
99.	*Zingiber officinale*	Zingiberaceae	Perennial rhizomatous herb	Rhizome	Stomachache and cough
100.	*Zizyphus oenoplia*	Rhamnaceae	Small thorny shrub	Bark, leaves and root	Wounds and throat sore

Table 2. Life form of plant species used for treatment of various diseases

S. No.	Habit of plant	No. of plant
1.	Herb	32
2.	Under shrub	06
3.	Shrub	08
4.	Climber (annual)	03
5.	Climber (perennial)	06
6.	Small tree	15
7.	Medium tree	14
8.	Large tree	16

Table 3. Utilization patterns of plant parts for treatment of various types of diseases

S. No.	Plant parts	No. of diseases
1.	Roots	25
2.	Stem	03
3.	Stem bark	18
4.	Leaves	36
5.	Flowers	07
6.	Fruits	20
7.	Seeds	19
8.	Whole plant	13
9.	Gum & latex	04

The present investigation revealed that ethno-medicinal plants are being used to treat the various ailments and diseases like diarrhea and dysentery, cough and cold, fever (viral/malarial), skin diseases, digestive disorders, boils and blisters, snake bite and scorpion sting, arthritis and joints pain, rheumatism, diabetes, piles, teeth complaints, asthma, jaundice, bone fracture, headache, hypertension, pyorrhea, throat sore, urinary disorders, menstrual disorders etc. by the local especially rural people of Jhansi District of the Bundelkhand region.

Maximum number of diseases treated by different plant parts (Table 4 and Fig. 5) are diarrhea and dysentery (15 species) followed by viral and malarial fever (12 species), cough and cold (12 species), skin diseases (10 species), digestive disorders (9 species), boils and blisters and wounds and cuts (7 species), snake bite and scorpion sting (6 species), headache, stomachache, intestinal worms and piles (5 species), asthma, jaundice and liver disorders and menstrual disorders (4 species). While in case of blood pressure and hypertension, mouth ulcers, rheumatism, burns, body and muscular pain, eye infections are treated by the lesser number of plant species (3 species each). For the curing of vitality, bronchitis, renal calculi, pyorrhea, cholera, urinary disorders, loss of appetite, burning sensation, gouty joints, heart diseases, throat sore, and spermatorrhoea, different herbal formulation of two species each is being prescribed by the traditional healer and also used by the local people of the area. Subsequently, for treating bone fracture, dizziness and vertigo, gonorrhea, leucoderma, leucorrhoea, leprosy, tuberculosis, uterine disorders and vomiting various compositions of plant based medicines of single species were used frequently. In this study, frequently prevalent ailments and diseases of the area are diarrhea and dysentery, cough and cold, viral and malarial fever and different skin related disorders, as very poor sanitation facilities are available in rural areas. Hostile climatic conditions favours such type of seasonal disorders also people are not very aware about the health and hygienic related issues. Uses of a large number of species (15) against diarrhea and dysentery by local people of Jhansi district indicates about the rich oral tradition of transfer of knowledge from generation to generation. Tribals of Mayurbhanj district of North Orissa reported to use 16 medicinal plants to treat diarrhea (Rout *et al.,* 2009). The potential of antidiarrhoel and antidysenteric activity has been evidenced by the quick relief to sufferers that may be due to the presence of bio active compounds in these formulations (Gerald *et al.,* 2010; Sahu, 1983). Similarly in case of viral and malarial fever, the local inhabitants including traditional herbal healers are being used and prescribed

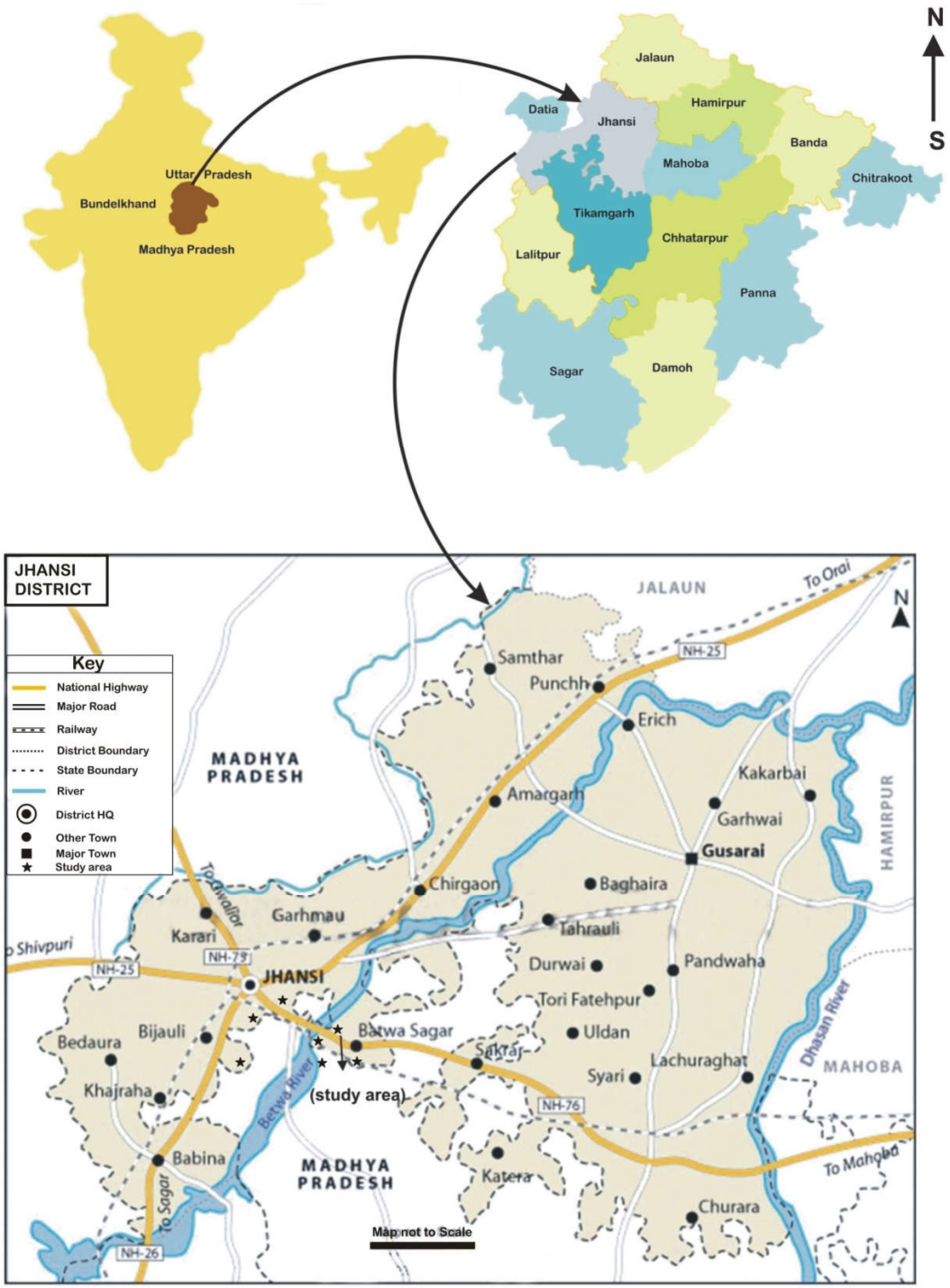


Figure 1. Map showing study area of Bundelkhand region

different formulations of *Abuliton indicum, Aegle marmelos, Ailanthus excels, Alstonia scholaris, Andrographis paniculata, Argemone maxicana, Carrissa carandus, Perestrophe bicalyculata, Sterculia urens* and *Tinospora cordifolia*. Some earlier studies especially in Satpura and Vindhyan Plateau of Central India (Nigam and Kumar, 2005; Rai, 2006; Verma *et al.,* 2008a; Singh *et al.,* 2010) also reported that indigenous herbal remedies by the various tribal groups such as Baiga, Bhariya, Gond and Sahariya have been very effective for the treatment of viral and malarial fever. Medicinal plants have proved to be very effective for prevention and cure of various disorders and their use against digestive disorders is very common at household level of rural and urban area. In present study, 9 species *viz. Balanites aegyptica, Butea monosperma, Carica papaya, Cassia fistula, Citrus sinensis, Coleus aromaticus, Cordia myxa, Emblica officinale* and *Terminalia bellerica* found to be effective against gastric trouble, dyspepsia, and constipation. Sindhu *et al.,* (2007) also reported the effectiveness of using plants products like Pomegranate, Dry ginger, Black pepper, Lemon, Tamarind, Garlic and Sacred fig for preparation of effective home remedies against various digestive disorders. *Bauhinia variegata, Butea monosperma, Hyptis suaveolens* and *Pongamia pinnata* plants and their parts were found to be used by rural families in different composition for expel and killing the intestinal worms in children. Hazarika and Pandey (2010) recorded forty three medicinal plants species that are traditionally used for the prevention and cure of worm infestations in Deuri and Mishing tribes of Assam. In case of treating maximum number of ailments and diseases, *Azadirachta indica* (6 ailments/diseases) found to be the most utilized species

followed by *Emblica officinale* and *Rauwolfia serpentine* (5 ailments/diseases) and *Acacia nilotica, Aloe vera, Carrissa carandus, Cucurbita lagenaria, Curcuma longa, Dalbergia sissoo, Jatropha gossypifolia, Punica granatum, Murraya koenigii,* and *Terminalia arjuna* (4 ailment/diseases by the each species). Also *Abuliton indicum, Achyranthus aspera, Aegle marmelos, Butea monosperma, Carica papaya, Cassia fistula, Citrus sinensis, Cyperus rotundus, Datura stramonium, Eclipta alba, Ficus glomerata, Helectris isora, Hemidesmus indicus, Mamordica indica, Pongamia pinnata, Psidium guajava, Punica granatum,* and *Terminalia bellerica* treated three ailments and diseases.

Table 4. Frequency of plant species used for treatment of various diseases

S. No.	Diseases	No. of plants used
1.	Arthritis & joints pain	06
2.	Asthma	04
3.	Blood pressure	03
4.	Body & muscular pain	03
5.	Body toner (Vitality)	02
6.	Boils & blisters	07
7.	Bone fractures	01
8.	Bronchitis	02
9.	Burning sensation	02
10.	Burns	03
11.	Cholera	02
12.	Cough & cold	12
13.	Diabetes	05
14.	Diarrhea & dysentery	15
15.	Digestive disorders	09
16.	Dizziness & vertigo	01
17.	Eye infection & diseases	03
18.	Fever (viral/malarial)	12
19.	Gonorrhea	01
20.	Gout	02
21.	Headache	05
22.	Heart diseases	02
23.	Intestinal worms	05
24.	Jaundice & liver disorders	04
25.	Leprosy	01
26.	Leucorrhoea	01
27.	Loss of appetite	02
28.	Memory enhancer	02
29.	Menstrual disorders	04
30.	Mouth ulcer	03
31.	Piles	05
32.	Pyorrhea	02
33.	Renal calculi	02
34.	Rheumatism	03
35.	Skin diseases	10
36.	Snake bite & scorpion sting	06
37.	Spermatorrhoea	02
38.	Stomachache	05
39.	Teeth complaints & dental care	05
40.	Throat sore	02
41.	Tuberculosis	01
42.	Urinary disorders	02
43.	Uterine disorders	01
44.	Vomiting	01
45.	Wounds & cuts	07

Generally traditional healing practices is a completely depends on the interviewed based approach and interactive discussion with the respondents, and present studies indicate that among all the respondents interviewed and discussion, over 70 percent were elderly knowledgeable people in comparison to younger. Similar trends has also been reported by Negi *et al.,* (2010) in the Central Himalayan region of India shows that older people have more systematic and very deep knowledge regarding the traditional healthcare practices compared with the young. Different types of preparations made from medicinally important plants included powder, decoction, extract, juice, paste and oils. Some plants were even used in more than one preparation. Majority of the plant preparation were in the form of paste and powder of leaves, roots and bark followed by extract and decoction of leaves, stem and bark. Plant parts were generally prepared as medicine using hot and cold water as the solvent, but occasionally dosage were prepared with milk, oil, honey etc. This result seems to be in conformity with Jain *et al.,* (2010). This study evidenced that the traditional healers are very aware of dose and frequency of drugs to be administered. They determine the dose and frequency depending on ailment history and different condition of the patients (age, weight, pregnancy). However, it was observed that there is a difficulty in determining the accurate dose of herbal preparations, as measurements are done by approximation. The duration of the treatment in general was from two/three to seven or fifteen days based on the nature and intensity of the ailment and diseases. Most of the patients are found fully satisfied and having full faith with the treatment given by herbal healers and knowledgeable people for cure of various diseases prevailing among tribal and village communities. Preparation in the form of juices were attained from the leaves of *Abrus precatorius, Abuliton indicum, Ageratum conyzoides, Allium sativum, Aloe vera, Coleus aromaticus, Eclipta alba, Feronia elephantum* and *Holoptelia integrifolia.* The whole plant extracts resulted from plants like *Abuliton indicum, Achyranthus aspera, Ageratum conyzoides, Cuscuta reflexa, Evolvulus alsinoides, Phyllanthus nirurii, Perestrophe bicalyculata* and *Oxalis corniculata.* The roots and leaves are the two major plant parts which are frequently used for the treatment of disease by the local people of Jhansi District of Bundelkhand region.

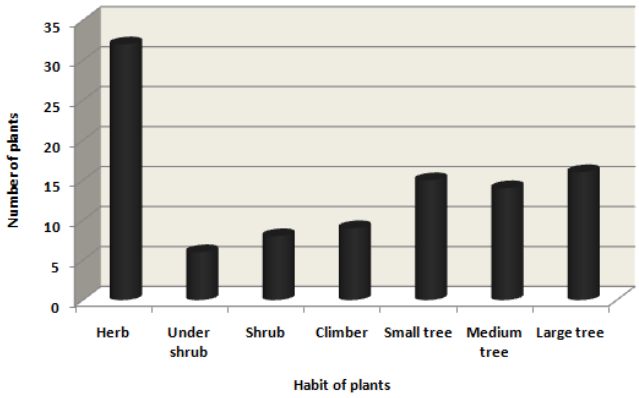


Figure 2. Life form of plant species used for treatment of various diseases

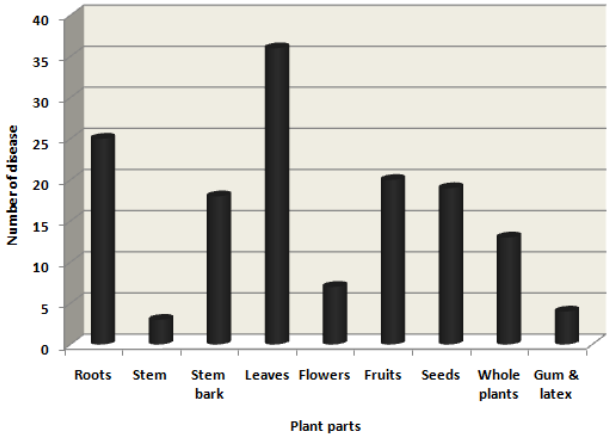


Figure 3. Utilization patterns of plant parts for treatment of various diseases

External applications prepared from the medicinal plants are used to cure many ailments and diseases like skin diseases, wounds and cuts, boils and blisters, arthritis and joints pain, rheumatism, poisonous bite and sting and scalp and dandruff. Oral consumption chiefly involves in curing viral and malarial fever, cold and cough, diarrhea and dysentery, jaundice and liver disorders and digestion related disorders.

Figure 4. Frequecny of plant species used for treatment of various diseases

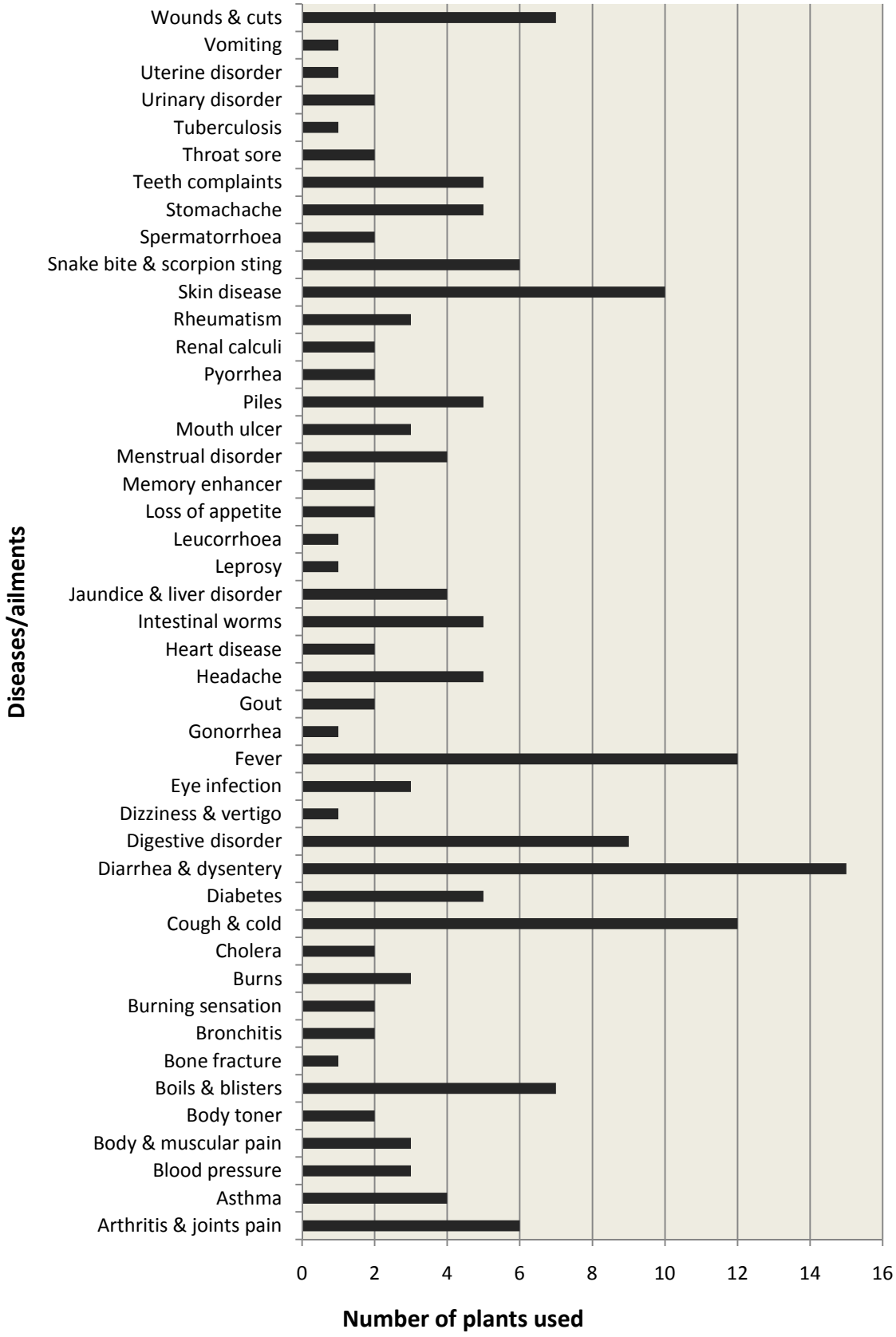
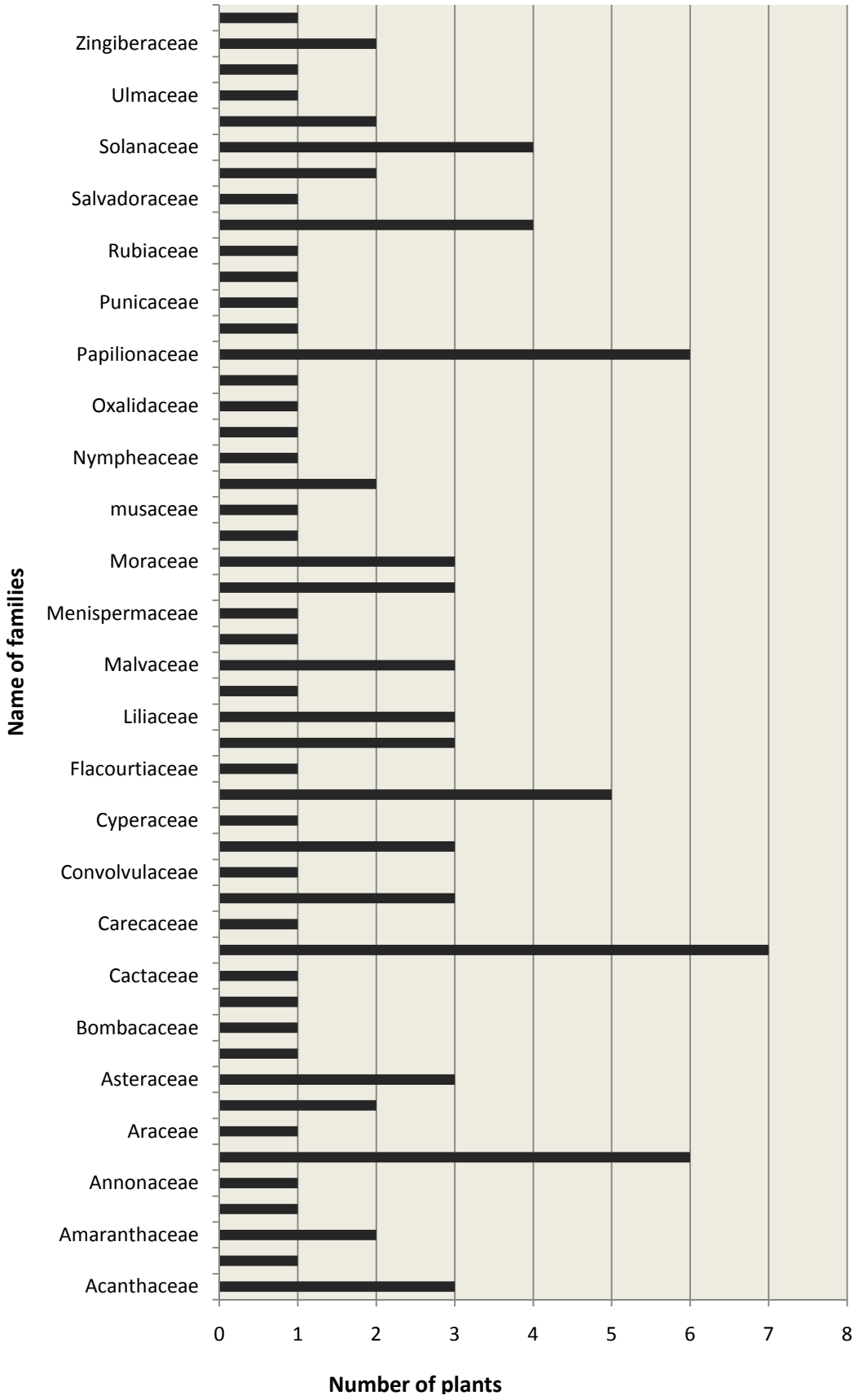


Figure 5. Number of family identified



In Jhansi District, the traditional medicinal system is very efficient, supportive and successful in treating jaundice and liver disorders, arthritis and joints pain, skin diseases and renal calculi. On interviewing, it have been reported that *Emblica officinale, Feronia elephantum, Saraca asoca and Tamarindus indicus* found to be the most effective in curing female related disorders like Leucorrhoea, Menorrhage and Menstrual problems. Also *Bombax ceiba* lowered the labour pain during delivery as most of the uneducated older people of villages still believe in local *Dai* (Nurse) at the time of delivery. *Asparagus recemosus, Coleus aromaticus* and *Cyperus rotundus* were effective in enhancing milk secretion during lactation period. The roots and seeds preparations of *Mucana pruriens* found to be very effective in male infertility like enhancement of sperm count and early ejaculation. Among all the species a total 25 species found to be effective in curing headache, leprosy, skin diseases, rheumatism, boils and worms in which *Cucurbita lagenaria, Jatropha gossypifolia, Luffa cylindrical* and *Pongamia pinnata* were commonly used externally on affected area in the form of seeds oil for the treatment of headache, leprosy, skin diseases, rheumatism, boils and worms. In the same way, Verma *et al.,* (2008) describe 31 species for the treatment of various skin ailments in villages of Jhansi, Uttar Pradesh. *Boerhhavia diffusa* and *Tribulus terrestris* found to be effective in treating various urinary disorders, while in the case of diabetes and blood sugar, *Azadirachta indica, Cathranthus roseus, Helectris isora, Mamordica indica* and *Syzygium cumini* were most effective and frequent used species in the investigated area of the present study. Modak *et al.,* (2007) reported nine species that have been used in the Indian traditional system of medicine and have shown experimental or clinical anti-diabetic activity.

Snake bite, scorpion sting and other poisonous insects bites are also a frequently treated because the rural people of the area work in the agricultural fields and nearby forests for their livelihoods, where snakes and scorpions are commonly encountered, and the studies indicated that *Abrus precatorius, Albizia lebbek, Cassia fistula, Euphorbia hirta,* and *Rauwolfia serpentina* are effective against poisonous bites. Thirumalai *et al.,* (2010) studied ethnobotanical survey of folklore plants for the treatment of jaundice and snake bite in Vellore districts of Tamil Nadu, India. A total 12 species *viz. Adina cordifolia, Cuscuta reflexa, Datura stramonium, Luffa cylindrical, Mamordica indica, Moringa oleifera, Opuntia ficus indica, Solanum nigrum, Tinospora cordifolia, Withania somnifera* and *Wrightia tinctoria* are very efficient and regularly used in treating rheumatism, arthritis, gouty joints and joints pain. Kumar *et al.,* (2010) also reported 21 plant species used for rheumatism and arthritis by the Kol, Sahariya and Kabootra tribes of Bundelkhand region of Uttar Pradesh. In this study, *Dalbergia sissoo, Flacourtia indica, Mamordica indica* and *Phyllanthus nirurii* were used in different formulations for the treatment of jaundice and liver disorders. Samvatsar and Diwanji (2000) reported the tribal people of Western Madhya Pradesh of India used 13 plants for the treatment of jaundice. Kumar *et al.,* (2010) was reported the *Citrullus collocynthis, Phyllanthus nirurii* and *Zingiber purpureum* for treatment of jaundice in Chhindwara and Betul districts of M.P. In recent research, *Phyllanthus nirurii* has gained worldwide attention due to its effectiveness against Hepatitis B (Yeh *et al.,* 1993). Present study shows that dental problems in rural area are due to low awareness levels and poor oral hygiene habits in people and about 50 percent were unconcerned about curing dental problems. *Acacia nilotica, Azadirachta indica, Tridex procumbens and Vitex negundo* reported to be the effective in relieving gum and teeth complaints in present investigation. Similar plant species have also been reported by Rawat *et al.,* (2010) from ethnobotanical studies on dental hygiene in district Hamirpur of Himachal Pradesh.

Conclusion

The knowledge of medicinal plants used is mainly restricted to local healers and it is very important to document this knowledge for future generation, otherwise it will vanish forever. Throughout the region there is an urgent need to support, safeguard and promote cultural and spiritual values of traditional medicines. Also, to test the scientific validity of the herbal preparation or drugs, clinical studies are required to be conducted. This can establish therapeutic properties of these preparations for safe and longer use. The indigenous knowledge and uses of herbal medicinal plants of a particular area have to be analyzed to develop appropriate management measures of *ex-situ* and *in-situ* conservation for best utilization of natural resources. Many developing countries have intensified their efforts in documenting the ethno-medicinal data on medicinal plants and research to find out scientific evidence for claims by tribal healers on Indian herbs has been intensified. Once these local ethno-medicinal preparations are scientifically evaluated and disseminated properly, people will be better informed regarding efficacious drug treatment and improved health status.

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The importance of traditional medicine as a source of primary health care was first officially recognised by the World Health Organisation (WHO) in the Primary Health Care Declaration of Alma Ata (1978) and has been globally addressed since 1976 by the Traditional Medicine Programme of the WHO. That Programme defined traditional medicine as: “the sum total of all the knowledge and practices, whether explicable or not, used in diagnosis, prevention and elimination of physical, mental or social imbalance and relying exclusively on practical experience and observation handed down from generation to generation, whether verbally or in writing.”

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