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Plant used in primary health practices in Vindhya Region of Eastern Uttar Pradesh, India

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ABSTRACT
Plant species have long been used as principal ingredients of traditional medicine in the Vindhya region of Eastern Uttar Pradesh in India. The present paper was made to analyze the ethnomedicinal plants used by the tribal communities, mainly Khairwar, Gond, Kol, Nutt, Manjhi and Mawasi. This paper addresses the integration of herbal medicine into a public health. Ethnomedicinal data from local people were collected through direct interviews and a semi-structured questionnaire following the WHO recommendations based on awareness and use of herbal medicine in different seasons of the year 2010-2012. The present study has resulted in the documentation of 61 medicinal plant species used by tribal communities into different disease groups like diabetes, wound healing, jaundice, kidney disorder and tuberculosis. Plant species *Aegle marmelos* (L.) (100%) secure highest FL and Jaundice aliment (0.85) secure highest ICF value. Ethnobotanical study of the Vindhya region of Uttar Pradesh in India explore the importance of traditional medicine to human health and suggested that clinical approaches is needed to evaluate the biochemical parameters of herbal medicine.

Keywords: Ethnobotany; Plant medicine; Quality control of herbal medicine; Traditional knowledge; Drug discovery.

1. Introduction
Traditional medicine and complementary/alternative medicine (TM/CAM) have been used, through the ages, in all countries of the South-East Asia Region. Many countries in this Region have extensive systems of TM within existing health services. In the rural areas of countries such as India, Indonesia, Nepal and Sri Lanka, a large proportion of the population use traditional medicines to meet their primary health care needs. Due to this long history, the roles of TM and its practitioners have been recognized by the governments in this Region, with national policies and regulations on TM being implemented in many of these countries.
According to the WHO global survey on the national policy and regulation of TM, there are three common difficulties and challenges: lack of information sharing; lack of safety monitoring of herbal medicines; and lack of methods to evaluate their safety and efficacy. The coordinating agency should adhere to the principles set out in the WHO Guidelines on Good Agricultural and Collection Practices for Medicinal Plants (for GACP) and manufacturers and assemblers should follow WHO Good Manufacturing Practices (for GMP). Manufacturers of herbal medicines should obtain a license and register their products. The quality control system for production should be in place. The implementation of a credible concept of quality assurance, e.g. identifying and eliminating potential sources of contamination, should be a primary goal of the manufacturers rather than the implementation of all individual technical aspects.

Traditional knowledge is a valuable asset for any country as it plays a vital role in making the nation more progressive and transforming its society. There is little documentation of traditional knowledge of herbal medicine in codified systems like ayurveda, around 1,500 plant species are known but in folk tradition more than 4,500 species are used. The healthy relationship between humans and nature can provides possibility of finding new uses for medicinal plants and to discover new herbal drugs. Medicinal plants therefore have important contribution in the primary healthcare practices of tribal communities. The World Health Organisation (WHO) estimates that up to 80% of the world's population in developing countries depends on locally available plant resources for their primary healthcare, since western pharmaceuticals are often expensive. A wide range of plants with ethnobotanical value against some very important diseases have been reported but much larger numbers of folk

medicines have remained endemic to certain tribal pockets of North East India. Therefore, further detailed studies on the ethnobotanical aspects in the region may provide meaningful ways for the promotion of traditional knowledge and medicinal plants for the benefit of mankind [1]. In the present paper, the work that has been reported for ethnobotanical studies with particular reference to biodiversity conservation of the important medicinal plants in the North Eastern region have been discussed. Vast ethnobotanical knowledge exists in India from ancient time. [2] Since the 1950s the study of ethnobotany has intensified; 15 books and 450 papers have been published that includes the indigenous knowledge of 2500 plants.

The medicinal plants of Vindhya region, Eastern Uttar Pradesh, India has not been fully documented due to some organized ethnomedicinal studies. The Vindhya region of Uttar Pradesh includes Mirzapur and Sonbhadra districts, which is mostly covered with forest [3]. There is limited development of therapeutic products and indigenous knowledge of medicinal plants. The folk remedies are getting lost speedily due to migration of practitioners from rural to urban areas. The current loss of medicinal plants in the studied region is also due to natural and anthropogenic factors that missing the indigenous knowledge of medicinal plants.

Therefore, ethnobotanical survey of the Vindhya region was carried out in the Mirzapur and Sonbhadra districts. The study sites were Chunar, Vindhyachal, Patharia, Robertsganj, Sirsi fall, Windom fall, Chopan, Rajgarh, Halia, Hathinala and Dudhi. There are a number of diverse ethnic groups in the area. The dominant ethnic groups are Khairwar, Gond, Kol, Nutt, Manjhi and Mawasi.

The aim of the present study was therefore to document ethnomedicinal information of plants used by indigenous communities in villages surrounding forest areas of Eastern Uttar Pradesh, India. The generated information will be used in future to explore ways of sensitizing the community on the sustainable utilization of the forest resources so as to minimize their genetic loss. The present study was performed with the aim of producing an inventory of the plants used by traditional healers in Vindhya hills and also to document the ICF and FL values of various medicinal plants.

Thus, the potentialities of ethnomedicinal studies in North East India should be given the importance as it can provide us a very effective strategy for the discovery of plant based medicine. Their identification and conservation also deserve careful attention [4].

2. Materials and methods

2.1 Description of the Study area

The Vindhya region of Uttar Pradesh lies between 82^0 E & 83^0 23' longitude and 22^0 45' N & 24^0 34' N latitude. The forest of Vindhya region is tropical dry deciduous type. The rainfall varies from 1200-3720 mm in July-August.

2.2 Methods

Four field surveys were carried out in different seasons of the year 2010-2012. In all surveys four group discussions and three informal meetings were held and in total, 122 respondents were identified but only 70 consulted for interviews. Vaidhyas and womens were active participants of the informal meetings. The interviews were undertaken using semi-structured interview guides. Focused discussions were also undertaken. The aim was to receive information regarding popular species based on health problems, treatment methods, local name of medicinal plants used, source of collection (wild/cultivated), plant parts used, methods of preparation and application. The collected samples of the plants were identified by the taxonomist. The ethnobotanical information collected were analyzed to obtain the following data:

- Number of useful medicinal plants

- Most cited species

- Parts of plants most frequently used

- The process of administration of herbal drugs

- Informant consensus factor (ICF)

- Fidelity level (FL)

Information about importance of each species to the local communities was analyzed for fidelity level as: FL = (Np/N) × 100; where Np is the number of informants who gave information of a given species as being important while N is the total number of all informants mentioning important medicinal plants (Al-qura, 2005).

The ICF is calculated as follows: number of use citations in each category (Nuc) minus the number the number of species used (Nsu), divided by the number of use citations (Nuc) in each category minus one:

ICF = Nuc – Nsu/ Nuc – 1

3. Results

The present study therefore evaluated the ethnomedicinal uses of selected 61 medicinal plants found in region of Vindhya hill of Sonbhadra and Mirzapur districts in eastern Uttar Pradesh, India (Table 1). Among them mainly were herbs (30%), shrubs (45%), trees (17%) and climbers (8%). These herbal medicines were used to treat stomach disorder, respiratory problems, skin infection, diabetes and wound healing. The proportion of remedies used for treatment of stomach disorder occupies high percentage.

Author focused mainly on plant parts used, methods of preparation, administration, dosage and duration in drug preparation. The most commonly used plant parts for herbal preparations in the area were Leaves (42.3%), Root and Leaves (18.2%), Root bark (12.2), Seeds (5%) and fruits (2.5%). The administration routes are oral (58.7%), external (32.5%) and nasal (7.9%).

In regard to fidelity levels, among the 12 most frequently utilized species (Table 2), some species have high frequency of citation, some appear to have low fidelity levels. However *Aegle marmelos* (L.) Correa and *Azadirachta indica* A. Juss have high frequency and fidelity levels and can be considered the most important medicinal species in the region.

The category that has the highest FL value is *Aegle marmelos* (L.) (100%) followed by *Azadirachta indica* A. Juss (95.2%). The lowest is *Semecarpus anacardium Linn.* (41.2%). Obviously, the remedies for frequently reported ailments have the highest FL value and those with low number of reports have lowest FL values. The remedies such as *Semecarpus anacardium* Linn. have low FL value because the majority of the informants do not know the dosage and the methods of preparation of the remedies.

Some plants were reported to be used for very few diseases sometimes even only one disease but can be considered important on basis of consistency of use (i.e., 100% consensus among the respondents. The medicinal plants that are presumed to be effective in treating a certain disease have higher ICF values. Jaundice secured the highest ICF values (0.85). The ICF values of each aliment were represented in Table 3.

The diversity of ethnomedicinal plants is rich in Vindhya Region in comparison to the other tribal forest areas of Eastern Uttar Pradesh, India. These medicinal plants are exploited chiefly by the local inhabitants and tribal peoples and to some extent by various pharmaceutical firms of adjoining district. Rapid industrialization and urbanization in this area have imposed a great loss to these medicinal plants. *Rauvolfia serpentina* a reputed medicinal plant was frequently found in the study area only a few years back but the plant become rare and restricted to some localized areas due to over exploitation and urbanization. Similarly *Asparagus racemosus* is still found frequently in the study area but day by day it is also become disappear due to overexploitation.

Table 1: Plant used in curing different aliments in Vindhya Region of Eastern U.P., India

Scientific Name	Local Name	Family	Parts Used	Troubles treated	Administration process	Citation frequency
Abrus precatorius Linn.	Gumachi	Fabaceae	Root Leaf Seed	Fever Sciatica Asthma	Decoction	16
Abutilon indicum (Linn.) Sweet	Kanghi	Malvaceae	Root	Analgesic Diuretic	Decoction	18
Achyranthes aspera Linn.	Latjeera	Amaranthaceae	Root Leaf	Gynaecological disorder Dysentery Bronchitis	Decoction	22
Aegle marmelos (L.) Correa	Bel	Rutaceae	Leaf	Diabetes	Decoction	29
Aloe barbadensis Mill.	Ghritkumari	Liliaceae	Leaf	Malaria Ulcer	Decoction	11
Andrographis paniculata (Burm. f.) Wall. ex Nees	Kalmegh	Acanthaceae	Leaf	Blood Purifier Malaria Skin diseases	Decoction	14
Artemisia vulgaris Linn.	Dauna	Compositae	Leaf Root	Fever Parkinson disease Hysteria	Decoction	10
Asparagus racemosus Willd.	Satwar	Liliaceae	Root	Seminal debility Lactation in females Urinary Troubles	Decoction	12
Azadirachta indica A. Juss.	Neem	Meliaceae	Leaf Bark	Skin problem, Anticancer, Wound healing, Antidiabetic	Decoction	21
Bacopa monneriri	Chhoti bramhi	Scrophulariaceae	Leaf Root	Blood pressure Cardiac tonic	Decoction	9
Barleria cristata Linn.	Kansaraiya	Acanthaceae	Leaf	Wound Fever Respiratory Problem	Decoction	4
Bauhinia variegata Linn.	Kachnar	Fabaceae	Flower	Piles Diabetes	Decoction	15
Boerhavia diffusa Linn.	Punarnawa	Nyctaginaceae	Leaf Root	Jaundice Astringent	Decoction	10
Butea monosperma (Lam.) Taub.	Palas	Fabaceae	Seed	Anti-inflammatory Scorpion String	Decoction	5
Calotropis procera (Ait.) R. Br.	Madar	Asclepiadaceae	Root	Wound Rheumatic Pain	Decoction	8
Catharanthus roseus (Linn.) G. Don	Sadabahar	Apocynaceae	Leaf	Blood cancer Diabetes	Decoction	17
Cannabis sativa Linn.	Bhang	Cannabinaceae	Leaf	Ear problem Wound	Decoction	11
Chlorophytum tuberosum Baker	Safed musali	Liliaceae	Leaf Root	Diabetes Immune disorder	Decoction	14
Coccinia grandis (Linn.) Voigt.	Kunuru	Cucurbitaceae	Leaf	Tuberculosis Jaundice	Decoction	4

				Diabetes		
Convolvulus pluricaulis Choisy	Shankhpuspi	Gentianaceae	Whole plant	Anxiety Depression Decrease cholesterol	Decoction Juice	8
Curculigo orchioides Gaertn	Kali musali	Hypoxidaceae	Root	Diabetes Jaundice Wound	Decoction	3
Cuscuta reflexa Roxb.	Amarbel	Convolvulaceae	Leaf Root	Dandruff Heart problem	Decoction	5
Datura innoxia Linn.	Datura	Solanaceae	Seed	Bronchial asthma	Decoction	5
Desmodium gangeticum (Desv.) DC.	Salparni	Fabaceae	Root	Tuberculosis Diarrhoea	Decoction	4
Eclipta prostrata Hassak.	Bhingraj	Asteraceae	Whole plant	Spleen enlargement Liver disorder	Decoction	6
Emblica officinalis Gaertn.	Amla	Euphorbiaceae	Fruit	Dyslipidaemia Oxidative stress	Decoction	7
Evolvulus alsinoides Linn.	Neeli Shankhpusphi	Convolvulaceae	Root Leaf	Sexual debility Urinary troubles	Decoction	5
Ficus benghalensis Linn.	Gular	Moraceae	Leaf Latex Fruit	Antidiabetic Urinary disorder Bronchitis	Decoction	12
Gymnema sylvestre R.Br	Gudmar	Asclepiadaceae	Leaf Root	Antidiabetic Liver tonic	Decoction	7
Hemidesmus indicus Linn.	Anantmul	Asclepiadaceae	Leaf	Fever Blood disorder	Decoction	4
Indigofera tinctoria Linn.	Sarphonk	Fabaceae	Whole plant	Leucorrhoea	Decoction	3
Ipomoea aquatica Linn.	Nari ka sag	Convolvulaceae	Whole plant	Digestive problem	Decoction	2
Ixora coccinea Linn.	Vajrhari	Rubiaceae	Flower	Eczema	Decoction	4
Jatropha curcas Linn.	Ratanjot	Euphorbiaceae	Seed	Cholera Stomach disorder	Decoction	6
Justicia adhatoda Nees.	Adusa	Acanthaceae	Leaf	Fever	Decoction	3
Leucas aspera (Willd.) Link.	Gumma	Lamiaceae	Leaf	Coughing Cold	Vapour	7
Madhuca latifolia Roxb.	Mahuwa	Sapotaceae	Flower	Diabetes Stomach disorder	Decoction	10
Mimosa pudica Linn.	Lajwanti	Fabaceae	Leaf Root	Wound healing Piles	Decoction	5
Nicotiana tobacum Linn.	Tambakoo	Solanaceae	Flower	Asthma	Decoction	6
Ocimum sanctum Linn.	Tulsi	Lamiaceae	Leaf	Painful tooth Cough	Decoction	17
Oxalis corniculata Linn.	Khati buti	Oxalidaceae	Leaf	Cooling Stomachic disorder	Decoction	3
Phyllanthus niruri Linn.	Jaramla	Euphorbiaceae	Whole plant	Diuretic Jaundice	Decoction	5
Plumbago zeylanica Linn.	Cheetrak	Plumbaginaceae	Leaf	Eczema Ringworm infection	Decoction	7
Prosopis spicigera Linn.	Shami	Fabaceae	Leaf	Rheumatism	Infusion	11
Rauvolfia serpentina (Linn.) Benth. ex Kurz	Sarpgandha	Apocynaceae	Leaf Root	Labour pain Blood pressure	Decoction	8
Ricinus communis Linn.	Arandi	Euphorbiaceae	Seed	Skin diseases Piles Rheumatism	Decoction	16
Semecarpus anacardium Linn.f.	Bhilwa	Anacardiaceae	Fruit	Indigestion Cough	Decoction	4
Sida cordifolia Linn.	Bariyara	Malvaceae	Roots	Ashtma	Decoction	8
Shorea robusta Gaertn.	Sakhu	Dipterocarpaceae	Pericarp	Antibacteria	Decoction	7

				Wound		
Solanum xanthocarpum Schard & Wendl.	Bankateli	Solanaceae	Leaf	Gonorrhoea Snake bite	Decoction	2
Solanum nigrum Linn.	Makoi	Solanaceae	Leaf	Liver disorder Skin diseases	Decoction	5
Syzygium cumini Linn.	Jamun	Myrtaceae	Bark	Stomach Problem Diabetes	Powder	10
Terminalia arjuna Wight & Arn.	Arjun	Combretaceae	Bark	Cardiac disorder	Powder	18
Terminalia bellirica Roxb.	Behera	Combretaceae	Fruit	Gastric Troubles Heart tonic Cough & Cold	Decoction	5
Tinospora cordifolia (Willd.) Miers.	Giloy	Menispermaceae	Stem	Delivery pain	Decoction	8
Tribulus terrestris Linn.	Gokhru	Zygophyllaceae	Whole plant	Kidney stone	Decoction	6
Tridax procumbens Linn.	Musbhari	Asteraceae	Leaf	Eczema Wound	Decoction	10
Vernonia cinerea Less.	Sahdevi	Asteraceae	Leaf Root	Fever	Decoction	5
Withania somnifera Linn.	Ashwagandha	Solanaceae	Leaf	Tuberculosis Fever Rheumatic pain	Decoction	9
Xanthium indicum Linn.	Chotadatura	Compositae	Root Fruit	Anthelmintic Improves appetites	Decoction	4
Ziziphus nummularia (Burn.f.) Wight. & Arn.	Jharber	Rhamnaceae	Root Leaf	Anthelmintic	Decoction	7

Table 2: Most commonly used medicinal plants with their fidelity level
(0 = The Least, 100 = The Highest Efficiency)

Plant Species	Fidelity Level (FL)
Aegle marmelos (L.) Correa	100%
Azadirachta indica A. Juss	95.2%
Abutilon indicum (Linn.) Sweet	87.6%
Ricinus communis Linn.	79.2%
Terminalia arjuna wight & Arn	76.9%
Bauhinia Variegata	72.3%
Catharanthus roseus (Linn.)G. Don	69.8%
Ficus benghalensis Linn.	65.3%
Madhuca latifolia Roxb.	62.4%
Syzygium cumini Linn.	59.01%
Vernonia cinerea less.	46.8%
Semecarpus anacardium Linn. F.	41.2%

Table 3: ICF value of category of aliments

Category	Species (Nsu)	Use Citations (Nuc)	ICF Value
Gastrointestinal disorder	14	32	0.58
Kidney disorder	5	19	0.77
Cancer	3	14	0.84
Jaundice	4	22	0.85
Respiratory disease	10	28	0.66
Wound healing	7	15	0.57
Tuberculosis	3	12	0.81
Fever	6	12	0.54
Snake bite	2	3	0.5
Malaria	2	5	0.75

4. Discussion

Ethnomedical knowledge opens new avenues to increase the potentiality of herbal medicine and their implications to human health care system. Today, Traditional Medicine (TM) is termed as complementary or alternative medicine due to non-sufficient validated scientific approaches. To increase the promotion of TM, there is a need to standardize phytochemical composition and pharmacological significances of herbal medicines [5]. Herbal medicine can also be revalued by extensive researches and therapeutic principles to ascertain safety and efficacy of traditional medicines in all over the world.

The most reported species were *Aegle marmelos* Linn. (in 23 interviews), and *Terminalia arjuna* (in 18 interviews). The most frequently claimed medicinal uses were for wound healing, skin and subcutaneous tissue, digestive system, high temperature (as antipyretic), pain (as analgesic) and cardiovascular system.

Some toxic plants were also mentioned that are claimed medicinally very important like *Datura innoxia* Linn. and *Solanum nigrum* [6]. The most cited parts of plants were the leaves and aerial part. The main preparation and administration processes were infusion, decoction and inhalation, Decoction was the main process of preparation, being used in nearly 58% of the reported useful plants. Most plants used as aromatic or condiment also have medicinal uses. This confirms that food and medicinal plant uses are closely related and can be relevant to the development of functional foods, pharma foods and nutraceuticals.

Medicinal plants play a vital role in the development of new drugs. The bioactive extract of medicinal plants should be standardized on the basis of active compound. The quality assurance of a herbal raw material can be established by different scientific approaches. Presently the quality parameters of the herbal products are evaluated through latest analytical and computational based technology like chromatographic techniques, TLC, HPLC, GC, HPTLC etc. The marker compounds (pharmacologically active components) and chemical fingerprints are also used as a significant tool for the quality control and authenticity of herbal medicines [7]. The application of modern biotechnology has also entered a new era to protect and standardized them by using tissue and cell cultures.

Medicinal herbs constitute the major parts of local medicines in the traditional health care system. Practices of TM are declined very rapidly due to disinterest of younger generation and excessive extraction of herbal raw materials in synthesis of western medicine [8].

The illegal extraction of medicinal plants has becomes common now. There is no such type of regulation in our country about the simultaneously utilization and cultivation of medicinal plants. Peoples generally have to see that they are not more interested about the cultivation of medicinal plants in comparison to their utilization as raw materials for several pharma industries [9]. Existing government policies are also not in favour of traditional healers. Local medical practitioners are facing the problem of obtaining appropriate plant parts of desired quantity for curing various ailments. The traditional health care system is on the verge of extinction.

The uses of traditional medicine have become big challenges due to lacking of quality and assurance of herbal medicine and also acceptance of the validity of traditional medicine from government public health officers. The main obstacles behind the acceptance of traditional medicine in the study sites are as followings:

1. Traditional practitioners are not so well qualified, so people in doubt to recognize their abilities.
2. Traditional clinics are not well approved.
3. The composition of traditional medicine is not same for a particular diseases uses by a different tribal practitioners.
4. The researches on traditional medicine occupy a limited space in modern medical science.
5. Today there are few professional healers in the area which serve the community due to government policies.

The above obstacles can be overcome by adopting the following criteria:

1. Develop national policies on the evaluation of traditional medicine.
2. Quality, safety and assurance of herbal medicine should be approved.
3. The government of India must have to establish a Data Bank on Traditional Knowledge (DBTK).
4. To provide the financial assistance for Non - Government Organization to document and preserve the herbal medicine.
5. Traditional practitioners should be approved by Indian government policies.

5. Conclusion

Governments should establish the necessary institutional and financial support to evaluate and promote the potential role of herbal medicine in modern health care system. These goals can be achieved by following measurements:

1. Documentation of various medicinal plants that are used by the tribal communities to treat the common diseases.
2. To establish a local botanical gardens for preserving the medicinal plants in different parts of the country, in order to ensure a sustainable supply of safe, effective and affordable medicinal herbs.
3. Setting up testing laboratories with adequate facilities for the assessment of the efficacy of medicinal herbs.

In order to integrate traditional medicine into the health care system, the knowledge and traditional practitioners and their right to benefit from that knowledge needs to be honoured.

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