



Journal of Medicinal Plants Studies

Traditional Knowledge and Ethnopharmacological Perspectives of Herbal Medicine in India: a Review

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Natural products are potent sources for healthcare management throughout the world in the areas of clinical and pharmaceutical research to discover new drugs in international pharmacopoeias. Semi-structured interviews were conducted with tribal practitioners in Eastern Uttar Pradesh, India to explore the possibility of finding new uses of herbal medicine. The present paper aimed to review the medicinal importance of 24 plants that are mostly used by tribal people for the treatment of several diseases like respiratory, stomach, kidney disorders, diabetes, wound healings etc. Plants are potent sources of secondary metabolites that include alkaloids, glycosides, coumarins, flavonides, steroids and other compounds. Some of the most commonly drugs in modern medical science such as atropine, berberine, digitalis and the anti-cancer drugs vinblastine and vincristine originated from plants. Herbal medicines therefore are one of the best alternative methods in discovery and development of new drugs.

Keyword: Chemical composition; Drug development; Ethnopharmacology; Natural product; Traditional medicine

1. Introduction

Traditional knowledge of herbal medicine can serve as a powerful approach to drug discovery. Plants are an important source of medicines for indigenous people and have a highly significant role in indigenous pharmacopoeias. These are easily available to all tribal peoples of the forest areas.

The isolation and characterization of pharmacological compounds from plants is increasing day by day. Several important drugs that are used in the treatment of different diseases have been derived from plants such as *Achyranthes aspera*, *Cleome viscosa* L. and

Cyperus rotundus Linn. Plants are generally used by tribal practitioners in different diseases such as stomach disorders, fever, ulcers, asthma, snakebites, respiratory ailments, leucorrhoea, dandruff, eye-diseases and diabetes. Medicines are usually prepared in the form of powder, decoctions, paste and juices^[1].

Plants become medicinally important when their therapeutic uses, characterization and screening of phytochemicals are known. The drug discovery from plants will be more holistic and can provide maximum benefits to the community. A large number of phytochemicals have been isolated from plants, which include, sitosterol

from *Adhatoda vasica*, saponin A & B from *Achyranthes aspera*, aspartate aminotransferase from *Andrographis paniculata*, alkaloids from *Argemone mexicana* and atropine from *Datura* metal.

There is a need for more research into herbal medicine to investigate their pharmaceutical importance. Plants are needed to conserve on a large scale because in present scenario, they are confined to a limited area. The conservation of medicinal plants will be in our future interest. The main focus of this study was to characterize

the traditional and the ethnopharmacological importance of herbal medicine in the modern healthcare sector.

2. Material & Method

The Sonbhadra districts of the Eastern Uttar Pradesh in India were selected for this study due to its highly dense forest and rich vegetation with a wide variety of plants and geographical and climatic conditions (Figure 1).

Fig 1: Location of Sonbhadra district of eastern Uttar Pradesh, India



2.2 Methodology

Information was collected through interviews with 42 persons aged between 35 and 70. The methods used for this study were semi-structured interviews [2, 3]. The main way of gathering information is to talk with people, to watch what they do and to participate in their activities. The peoples are recruited in 2 to 3 groups. Each group having 3 to 4 members that conduct interview

with tribal people. The questions were based on commercial uses of the indigenous knowledge about plant parts used in drug preparation, detailed information about mode of use (i.e., decoction, paste, powder and juice), and form of usage either fresh or dried and mixtures of other plants used as ingredients. The general questions asked by the tribal people to explore the indigenous knowledge are given in Table 1.

Table 1: Questionnaire asked by tribal people to explore the indigenous knowledge

S. No.	Questionnaire	Options	
		Yes	No
1	Have you ever used herbal medicine?		
2	Do you know some of the plants used as herbal medicine?		
3	Is herbal medicine effective in treating chronic diseases?		
4	Do you have knowledge about the plant parts used, mode of use and their preparation?		
5	Are you aware of any side effects associated with the use of herbal medicine?		

On the basis of questionnaires, we find out the significances of weeds in the tribal health care system, focusing primarily on how plants are used, managed and their pharmacological significances perceived across human societies. Plants were identified by expert of the taxonomist.

3. Results

The ethnomedicinal knowledge of the plants growing in the Sonbhadra district is based on

existing literature and information gathered mainly from several tribal areas inhabiting the surrounding forest area. A significant representation of medicinal plants from which drugs are currently derived is reported here. In the Sonbhadra district of India 62 medicinal plants were studied in which 24 medicinal plants are reported in the treatment of different ailments (Table 2).

Table 2: Medicinal plants with ethnopharmacological importance:

Scientific name	Family	Local name	Parts Used	Ethnomedicinal uses	Phytochemical Constituents	Phytopharmacological Actions	References
<i>Adhatoda vasica</i> Nees	Acanthaceae	Adusa	Root, flower, leaf	The leaves, flowers, fruits and roots are extensively used for treating colds, coughs, chronic bronchitis and asthma	Vasicine, β -sitosterol, kaempferol, adhatodic acid	Abortifacient Anti-asthmatic Antitussive Antipasmodic Uterotonic	Meenal kumar et al., Evid Based Complement Alternat Med. 2007 September; 4(3): 343–350
<i>Abutilon indicum</i> L.	Malvaceae	Atibala	Roots, leaves, flower	The milk of the plant is used to treat urinary discharges	Abulitin- A, 4-hydroxybenzamide, sesquiterpene, alantolactone	Wound healing Analgesic Antidiabetic	Krisanapun C., Evid Based Complement Alternat Med. 2011, 17 Feb
<i>Achyranthus aspera</i> L.	Amaranthaceae	Latjeera	Different parts including seeds	The root of the plant is used by some people for easy delivery. It is also used with Shami root to cure jaundice given with butter	Achyranthine, saponin-A, saponin-B, tanine	Anti-inflammatory Immunomodulatory Antidiabetic Anticarcinogenic Antimicrobial	Saurabh srivastav et al., J. Nat. Prod. Plant Resour., 2011, 1 (1): 1-14
<i>Andrographis paniculata</i> Nees.	Acanthaceae	Kalmegh	Whole plant	Used in stomach problems	Alanine aminotransferase, aspartate aminotransferase, neo-andrographoli	Cardioprotective Hepatoprotective Immune enhancement Antidiabetic Antihyperlipidemic	Nugroho AE et al., Indian J Pharmacol. 2012 May;44(3):37-7-81

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<i>Argemone Mexicana</i> Linn.	Papaveraceae	Bhadbhand	Whole plant	Along with black piper the panchang used in indigestion and its milky juice is used for conjunctivitis	Alkaloids, protopine, allocryptopine	Hepatoprotective Antibacterial	Bhattacharjee ., Mem Inst Oswaldo Cruz. 2006 Sep;101(6):645-8.
<i>Boerhavia diffusa</i> L.	Nyctaginaceae	Punarna wa	Leaves, root	A decoction of the whole plant is to be taken continuously once every morning to improve general health.	Punarnavine, ursolic acid, liirodendrin steroids	Antibacterial Anti-inflammatory Anti- convulsant	Babita et al., Journal of Applied Sciences 4(7): 663-684, 2011
<i>Carissa carandus</i> Linn.	Apocynaceae	Karaunda	Root, Fruit	Root extract is used in fever.	Carissone, β -sitosterol, caffeic acid, D-glucoside	Anthelmintic Antipyretic Hepatoprotective	Hegde K, Joshi AB., Indian J Exp Biol. 2009 Aug;47(8):660-7.
<i>Cleome viscosa</i> L.	Capparidaceae	Hurhur	Seed	The dried seed powder is mixed with sugar and administered orally twice a day for 7 days to relieve body pain	7-phenoxy coumarin, lactone, cleomeolide	Antipyretic Anti-diarrheal activity	Devi BP et al., Phytomedicine . 2002 Dec;9(8):739-42.
<i>Catharanthus roseus</i> L.	Apocynaceae	Sadabhar	Leaves, Root	It is useful in leukemia and diabetes	Tabersonine, serpentine, vindoline	Hypotensive Hypolipidemic	David G. McCaskill et al., Plant Physiol. 1988 June; 87(2): 402-408
<i>Calotropis procera</i> (Aiton) W.T. Aiton	Asclepiadaceae	Madar	Leaves	Leaves is applied for rheumatism, filariasis, wounds, glandular swellings, eczema, pigmentation and other skin inflammation	Triterpenes, oleanolic acid	Anthelmintic	A.A. Quariry et al., Veterinary Research Communications January 2001, Volume 25, Issue 1, pp 61-70
<i>Coccinia</i>	Cucurbitaceae	Kunru	Fruit,	The fruit is	Carbonic acid,	Wound healing	C

<i>indica</i> W & A	e		Leaves	used as a vegetable and the leaves are used with sesame oil in skin disorders	fatty acid, glucose, starch, glucosides	Anti-diabetic Appetizer Sweat secretion easily through body	Alagesaboopat hi., Afr J Tradit Complement Altern Med. 2009; 6(3): 222–227.
<i>Cyperus rotundus</i> Linn.	Cyperaceae	Motha	Whole plant	The whole plant is made into a decoction along with young leaves of neem, black pepper and leaves of tulsi. The decoction vapour is inhaled to treat malarial fever	Olealonic acid, β -sitosterol, terpenes, cyperaceae	Antispasmodic Analgesic Antipyretic Anti-inflammatory	PG Daswani et al., Indian J Pharmacol. 2011 May-Jun; 43(3): 340–344
<i>Datura stramonium</i> L.	Solanaceae	Dhatura	Root, seed	Paste of the leaves is used on the face to treat pimples, and its smoke is used in bronchitis	Hyoscyamine, scopolamine, allantoin, Vitamin- C, atropine	Antiasthmatic Anticholinergic	D Charpin et al., Thorax. 1979 April; 34(2): 259–261
<i>Euphorbia thymifolia</i> L.	Euphorbiaceae	Dudhi	Whole plant	This is used on wounds	Isomallotinic acid, 12-deoxyphorbol-13, 12-diacetate, 1-hexacosanol	Anti- lipid peroxidation Free radical scavenging Antiviral Antibacterial	Linn CC et al., J Biomed Sci. 2002 Nov-Dec;9(6 Pt 2):656-64
<i>Eclipta alba</i> L.	Asteraceae	Bhangrai ya	Whole plant	The leave extract is used in jaundice and skin diseases. The juice is used with honey for children with coughs	Coumestan type compound, wedelolacton, Dimethyl-wedelolacton	Antihepatotoxic Antimicrobial	V. N. Murthy et al., Anc Sci Life. 1992 Jan-Jun; 11(3 & 4): 182–186
<i>Hemidesmus indicus</i> B.	Asclapidaeae	Anantmol	Root	The plant is used for gastric ailments. Small pieces are baked in goats milk and used against sciatica.	Hemidescine, rutin, indicine, denicinine, heminine, desinine	Anti-inflammatory Antimicrobial Anti-ulcerogenic Anticarcinogenic Anti-oxidant	SR Samarakoon et al., Pharmacognosy Res. 2010 Nov-Dec; 2(6): 335–342.

<i>Lantana indica</i> Linn.	Verbenaceae	Laltena	Flowers, Leaves	The flowers and leaves are a source of essential oil. The fruits are used by tribes in food	β - sitosterol, 3- hydroxy-22 β - 12 oleanen- 28 oic acid	Antimycobacterial Anti-bacterial	R. Venkataswamy et al., Indian J Pharm Sci. 2010 Mar- Apr; 72(2): 229–231
<i>Leucas cephalotes</i> Spreng.	Labiatae	Guma	Flower, Leave, Root, Stem	Locally it is used to treat stomach problems. Haldi and mustard oil is mixed and ground well, then given once a day for 7 days	α - thujene, α - farnesene, ropionate, Isoamyl propionate	Hepatotoxicity Anti-inflammatory Antimicrobial Antioxidant	G Sofi et al., Anc Sci Life. 2011 Oct-Dec; 31(2): 44–48
<i>Phyllanthus niruri</i> Linn.	Euphorbiaceae	Bhumi Awala	Whole plant	Extract of the herb is used in the treatment of jaundice and malaria	Ascorbic acid, Kaempferol, Ricinoleic acid, Gallic acid, Saponin	Anti-HIV Antimalarial Anticancerous Antihepatitis Antidiabetic Anticholesterogenic Antihepatotoxic Antihypertensive	Calixto JB et al., Med Res Rev. 1998 Jul;18(4):225- 58
<i>Phyllanthus amarus</i> Schum. & Thonn.	Euphorbiaceae	Jangli amla	Root, stem, leaf	For jaundice, whole plant parts are powdered and can be given mixed with water	Lignans, Flavonoids, Polyphenols, Triterpenes, Steroids	Antimicrobial Antidiabetic Hypolipidemic Antioxidant Hepatoprotective	Patel JR et al., J Ethnopharmacol. 2011 Nov 18;138(2):286 -313.
<i>Sida cordifolia</i> L.	Malvaceae	Bariyara	Leaves	Along with other ingredients mix to prepare special sweet preparation (Sethaura) for lactating mothers to provide strength and vigour.	β - phenethylamines, quinazolines, carboxylated tryptamines	Anti-inflammatory Anti-oxidant Antibacterial	Hajhashemi V et al., J Ethnopharmacol. 2000 Sep;72(1- 2):273-7
<i>Solanum nigrum</i> L.	Solanaceae	Black night shade	Fruit	The aqueous extract of the matured fruit is used for diabetes mellitus and the seeds are useful in skin diseases	Solanocarpidine, campesterol, caffeic acid	Antioxidant Antihyperlipidemic Antimicrobial Anticancer Antiulcer Neuroprotective	Vadivel Arulmozhi et al., Pharmacogn Mag. 2010 Jan-Mar; 6(21): 42–50

<i>Strychnos nux vomica</i> Linn	Loganiaceae	Kuchali	Seed	Seed extract are used to cure snake biting	Brucin, loganin, struxine, strychnine	Antisnake venom activity	Chatterjee I et al., Indian J Exp Biol. 2004 May;42(5):468-75
<i>Tribulus terretris</i> L.	Zygophyllaceae	Gokhru	Root	The paste of the root is a good remedy for stomachache and dried fruit powder with cows urine is given for urinary disorders	Vanilin, fatty acid ester, P-hydroxybenzoic acid, xanthosine, β -sitosterol	Diuretic Contractile	Al-Ali M et al., J Ethnopharmacol. 2003 Apr;85(2-3):257-60
<i>Vetiveria zizanoides</i> L.	Poaceae	Khas	Root	The dried plant root is powdered and mixed with water to make a paste. This paste is applied on the fore head to relieve headaches	Benzoic acid, vetiverol, furfarol, β -vetivone, vetivene	Wound healing Antioxidant	Luqman S et al., Indian J Biochem Biophys. 2009 Feb;46(1):122-5

The importance of herbal medicine in the present healthcare sector has been overlooked despite significant evidence that they are an important source of medicines for indigenous people. The overall results suggest that medicinal plants have been used for treating various health problems in the study regions. Therefore, the scientific community should give more attention for proper phytochemical screening of plants and their conservation [4, 5]. These plants were most frequently used as antihelmintic, anti-inflammatory, antihepatotoxic, anticarcinogenic and antidiabetic agents.

4. Discussion

4.1 Biochemical investigations of herbal medicine:

In recent years, approximately 110 new plant-based drugs were introduced to India pharmaceuticals [6] including rescinnamine, reserpine, vinblastine and vincristine which are derived from plants. Therefore, they can provide

an outstanding contribution to modern therapeutics; for example: serpentine isolated from the root of Indian plant *Rauwolfia serpentina* in 1953, was a revolutionary event in the treatment of hypertension and lowering of blood pressure [7]. Vinblastine isolated from the *Catharanthus roseus* is used for the treatment of cancer [8]. Vincristine is recommended for acute lymphocytic leukemia in childhood advanced stages of Hodgkin's, lymphosarcoma, cervical and breast cancers [9]. The drugs derived from medicinal plants are used to treat mental illness, skin diseases, tuberculosis, diabetes, jaundice, hypertension and cancer. Plants play an important role in the development of potential therapeutic agents. Some plants have been found to possess significant antibacterial properties such as *Achyranthes aspera* L., *Boerhavia diffusa* L. [10] and *Tribulus terrestris* L. and also antidiabetic properties such as *Catharanthus roseus* L. [11]. Lupeol acetate isolated from the root extract of Indian sarsaparilla *Hemidesmus indicus* R.Br. is

used to neutralize viper and cobra snake venom [12]. It has been reported that an active compound from the *Strychnos nux-vomica* seed extract, inhibited viper venom induced lipid peroxidation in animals [13].

4.2 Importance of herbal medicine in remote areas:

Mostly tribal peoples inhabit remote areas with medicinally rich dense forest where there are no government facilities for medical care. They depend on plant based medicine to treat their ailments.

4.3 Future status of medicinal plants in Pharma industries:

The current Research and Development thrust in the pharmaceutical sector is focused on the development of plant-based drugs through investigation of traditional system of medicine. Around 80% of pharmaceutical products are of plant origin. The increased human population in forest regions is responsible for the depletion of plants and plant-based medicines that provide the essential raw materials for the development and production of commercial products. Many plants are reported to treat more than one disease for example, *Hemidesmus indicus* is used to cure 34 types of diseases and *Phyllanthus emblica* is used to cure 29 diseases [14].

5. Conclusion: The evidence presented here suggests that screening of the plants may yield more medicinal compounds and play an important role in the health care system in the tribal community. The claimed therapeutic values of the reported species call for modern scientific studies for their phytochemical composition to provide a sound base for defining the role of traditional medicine in the development of new drug development.

6. Acknowledgements

We are very much thankful to all the local informants and healers for sharing their knowledge and information. The authors are also grateful to NGO, Society for Educational

Development and Environmental Research, Varanasi to provide the support during the survey.

7. References

- Garg V, Dhar VJ, Sharma A, Dutt R. Facts about standardization of herbal medicine: a review. Journal chinese integrative medicine 2012; 10(10):1077-83.
- Cotton CM. Ethnobotany: Principles and applications Chichester, New York: John Wiley and Sons Ltd 1996.
- Martin GJ. Ethnobotany: a methods manual London, UK: Chapman and Hall 1995.
- Heinrich M. Ethnobotany and its role in drug development. Phytotherapy Research 2000; 14:479-488.
- Singh A, Singh GS, Singh PK. Medico-ethnobotanical inventory of Renukoot forest division of district Sonbhadra, Uttar Pradesh, India. Indian Journal of Natural Products and Resources 2012; 3:448-457.
- Patwardhan B. Ayurveda and Traditional Chinese Medicine: A Comparative Overview. Evid Based Complement Alternat Med. 2005; 2(4):465-473.
- Tabassum N, Ahmad F. Role of natural herbs in the treatment of hypertension. Pharmacogn Rev 2011; 5(9):30-40.
- Surh YJ. Cancer chemoprevention with dietary phytochemicals. Nature Reviews Cancer 2003; 3(10):768-780.
- Groninger E. Vincristine induced apoptosis in acute lymphoblastic leukaemia cells: a mitochondrial controlled pathway regulated by reactive oxygen species? Int J Oncol 2002; 21(6):1339-45.
- Gopal H, Vasanth S, and Mebel JH. Antibacterials from *Boerhaavia diffusa*. Anc Sci Life 1999; 18(3&4):254-258.
- Karuna Rasineni et al. Antihyperglycemic activity of *Catharanthus roseus* leaf powder in streptozotocin-induced diabetic rats. Pharmacognosy Res 2010; 2(3):195-201.
- Chatterjee I, Chakravarty AK, Gomes A. *Daboia russellii* and *Naja kaouthia* venom neutralization by lupeol acetate isolated from the root extract of Indian sarsaparilla *Hemidesmus indicus* R.Br. J Ethnopharmacol 2006;(1):38-43
- Chatterjee I, Chakravarty AK, Gomes A. Antisnake venom activity of ethanolic seed extract of *Strychnos nux vomica* Linn. Indian J Exp Biol 2004; 42(5):468-75.

14. Gayathri M, Kannabiran K. Antimicrobial activity of *Hemidesmus indicus*, *Ficus bengalensis* and *Pterocarpus marsupium* Roxb. *Indian J Pharm Sci* 2009; 71(5): 578-581.