Research Journal of Medicinal Plant

ISSN 1819-3455

Academic Journals Inc.

www.academicjournals.com

Research Journal of Medicinal Plant 6 (3): 225-235, 2012
ISSN 1819-3455 / DOI: 10.3923/rjmp.2012.225.235

Indigenous Utilization and Potential of Medicinal Plants in the Phulpur Tehsil of Allahabad District, India

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ABSTRACT

Medicinal plants are viewed as a possible bridge between sustainable economic development, affordable health care and conservation of biodiversity. The present paper deals with the enumeration of 28 medicinally important plants frequently used by local communities of Phulpur tehsil of Allahabad district, Uttar Pradesh for the treatment of different ailments such as cold, cough, fever and gastro-intestinal disorders etc. The knowledge of local people about the indigenous plants used for medicinal purposes was collected through personal interview and group discussion during field trip. It was observed that 72% rural population of Phulpur tehsil were dependent on the indigenous medicinal plants (both wild and cultivated) for the treatment of various diseases and plant parts used most frequently were in the order: leaves>root>seeds>fruit>stem>whole plant> flower while approximately 28% local people expressed several reasons for not using the traditional medicines. It was also found that young people of new generation were not interested in the traditional medicines and according to their opinion the herbal treatment is not effective in comparison to modern system of medicine. This study provides immense scope for the bio-chemical analysis and screening of the active principles of the medicinal plants present in Phulpur tehsil for futuristic growth in the field of drug development.

Key words: Healthcare resources, medicinal plants, traditional knowledge

INTRODUCTION

The plants occupy a distinct place in the life of human-beings right from the primitive period till date. Medicinal plants have mainly been used as human nutrition, flavouring for meals, remedy for various diseases and food for animals (Sekeroglu *et al*., 2006). Plants have been used in the traditional healthcare system from time immemorial, throughout the world and still continue to occupy an important place in traditional as well as modern system of medicine (Jha and Kumar, 2003; Shukla and Gardner, 2006). According to WHO (2002), approximately 20,000 plants are medicinally important plants and about 80% of the world's people depend on traditional medicine for their primary ha needs. India is a varietal emporium of the medicinal plants and we have well-established local healthcare tradition still relevant in indigenous healthcare system. India has 3029 million ha of land mass and 17 million ha of forest cover possesses an emporia of natural resources and diversified culture (Chakraborty and Bhattacharjee, 2006). India has approximately 45,000 plant species of which 15,000 species are of flowering plants and 7000 species identified as medicinal plants and Indian system of medicines derive many of their curative tools from plants (Kumar *et al*., 2005) and the information about the plants used as drugs are also available in old Indian literature such as Charaka Samhita, Atharvaveda and Sushruta Samhita etc. (Tomar, 2009).

A medicinal plant contains active ingredients which can be used for therapeutic purposes and some other foundation compounds that can be used for the synthesis of useful drugs (Prashantkumar and Vidyasagar, 2008). Indigenous knowledge can be said to be the knowledge of the people, by the people which should be preserved for the people (Nagnur *et al*., 2009) and proper documentation of indigenous knowledge system and possible value addition will be helpful for the practitioners in the improvement of their economic conditions and it will also promote the process of conservation of the medicinal plants. Traditional herbal remedies are regarded as safe, cost effective, easily affordable with no adverse side effects and due to this fact global demand for herbal medicines is continuously increasing and in India its market is expanding at an annual rate of 20% (Pesek *et al*., 2008; Divya *et al*., 2011). The natural products symbolize safety in contrast to the synthetic drugs (Gill *et al*., 2011). Samal *et al*. (2010) reported that indigenous knowledge is the tried and test knowledge of the local communities and this knowledge has been accumulated by them over a period of time by experimentation and modification according to the need of the individual and it is essential component of sustainable development. The agenda 21 of the Rio Earth Summit also stated that indigenous people and their communities play a vital role in environmental management and development because the local communities are store house of information (Dixit *et al*., 2010) but in the last few decades, industrialization, deforestation, urbanization and over-exploitation have led to the loss of the different medicinally significant plants and as a result approximately 20-25% of existing medicinal plant species in India has become endangered plants (Jain *et al*., 2006). It was also observed that the most of the traditional healers of the Phulpur tehsil were old and young people of the area were not interested in traditional medicinal practices, this may result to the loss of the useful knowledge which has been accumulated over several generations (Thatoi *et al*., 2008). Thus, it becomes necessary to preserve this traditional system of knowledge by proper documentation because records of traditional knowledge may lead to the authenticity.

The population of the study area is predominantly rural and generally lack access to or cannot afford modern medical services and they have relied on local medicinal practitioners for their health care needs. Unfortunately, till today no functional large scale ethnobotanical survey was conducted in the rural areas of Phulpur tehsil of Allahabad district. In view of this fact, the present work was carried out to get a first-hand picture of the indigenous medicinal plants found in Phulpur tehsil of Allahabad district and their utilization by the rural population and medicinal practitioners in treatment of diseases.

MATERIALS AND METHODS

Geographical position of the study site: Allahabad is a central eastern district of Uttar Pradesh state, India. It is located in the southern part of the state at 24° 47 and 25°47 N latitude and 81° 09' and 82° 21 E longitude and stands at the confluence of the Ganga and Yamuna rivers. The district is bounded by Pratapgarh, Fatehpur and Jaunpur in the north, Varanasi and Mirzapur in the east, Rewa in south and Banda in the west. The total population of the region is approximately 49,41, 510 as per the 2001 census. Allahabad has an area of about 5246 sq km and is 98 m (320 ft) above sea level. The Allahabad district comprises of eight tehsils and Phulpur tehsil is located at 25° 33 N latitude and 82° 6 E longitude with an average elevation of 87 m.

Climate conditions of the study area: Allahabad experiences three seasons in a year i.e., summer (March-June), rainy (July-September) and winter (October-February). Sporadic winter

rains are common in December and January months while dew fall continues up to February. The annual mean temperature is 25-33°C, the mean maximum temperature is 42.5°C recorded in May-June and the mean minimum temperature is 4.5°C recorded in January February.

Research site: The systematic ethnobotanical survey was carried out in different villages of Phulpur tehsil of Allahabad district, Uttar Pradesh during July 2009-November 2010 for collection of information on medicinally significant wild plants being used by the rural population of the area and the plants were collected from different locations and road side vegetations.

Interview and group discussion with the local people: The entire study was divided into two parts. The first part of study was based on the interview and discussion with the local people of the area about the use of the medicinal plants available in the area for the treatment of their ailments while the second part of the study was based on the non-usage of indigenous medicinal plants by some of the local people.

Criteria for selection of participants: During the survey, local people were identified for interview and group discussion mainly on the basis of the following criteria: (1). a person who was resident of a village (2). willingness of the local inhabitants for participation in the study (3). a person who has demonstrated ability to identify the medicinal plants and (4). a person who has been recognized by local residents as being a medicinal practitioner or healer.

After selecting the people, knowledge about their interest and skills in identification and utilization of medicinal plants were obtained through informal interviews and discussion was made with the informants in their local language i.e., khariboli (a dialect of Hindi language) for their ease. Initially medical practitioners (healers) were not agree to discuss about the methodology of crude drug formulation from medicinal plants but when the aim of visit and survey was explained to them, they agreed to provide information on medicinal plants used by them for the treatment of different diseases. In this way, a kind of permission (consent) was received from them for documentation and dissemination of their valuable knowledge about the medicinal plants among the common people.

Collection of data: A total of 200 informants, comprising 60% male and 40% female were selected and they were between the age-group of 28-74 years. The information about local name of the plants, ethnomedicinal uses, method of crude drug preparation, dose regimen was collected by direct interaction with respondents and local healers at the tehsil. All the plant specimens were collected during the maturity stage with the help of the knowledgeable persons of the area so as to acertain the correct identification of plants and also to obtain information on their habit and habitat. The medicinal property of each plant was accepted as valid if at least five separate informants had a similar opinion. Two questionnaires were used during the survey for collection of the information about the plant resources available in the area and their utilization by the local people and traditional medicinal practitioners as described by Martin (1995) and Maundu (1995) (Appendix 1 and 2). The plants were identified with the help of deposited herbarium in Botanical Survey of India (BSI), Central Regional Centre, Allahabad and scientific names of plant species were crosschecked through the literature available.

RESULTS AND DISCUSSION

The ethnobotanical survey was conducted in different villages of Phulpur tehsil to know the utilization of indigenous medicinal plants by the rural population and medicinal practitioners for

the treatment of different ailments. It was observed that the agriculture was the main occupation of most of the rural people (78%) of Phulpur tehsil and plants played an important role in their daily life while 13 and 7% people were involved in animal husbandary and business, respectively. About 68% of selected respondents were from nuclear families and the remaining 31% were from joint family structure. Most of the inhabitants (62%) had small land-holdings and they had low income per annum whereas only 12% rural people had large land-holdings (Table 1).

Interview and group discussion with the local people: The information about the use of the medicinal plants was collected by conducting interview and group discussion with local people including both male and female participants. The local participants belonging to different socio-economic background and age group (28-74 years) were selected for interview and group discussion. The majority of the respondents approximately 70% had no formal education, 14% had primary school level education, 12% had secondary education and only 4% of the respondents had university level education (Table 2). It was also observed that people of young generation with high level of educational status were not interested in traditional system of healthcare.

Traditional use of medicinal plants: Medicinal plants have been playing an important role in the survival of the ethnic communities, who live in remote villages and forests. Rural people living in Phulpur tehsil had excellent knowledge about medicinal utilization of the local flora and most

Table 1: Socio-personal traits of the rural people in Phulpur Tehsil of Allahabad District, Uttar Pradesh, India

Variable	Classification	No. of respondents
Age	Young (28-30 years)	36±0.04 (18)
	Middle (30-50 years)	66±0.08 (33)
	Old (above 50 years)	98±0.03 (49)
Gender	Male	120±0.97 (60)
	Female	80±0.43 (40)
Occupation	Agriculture	156±0.94 (78)
	Animal husbandary	26±0.05 (13)
	Business	14±0.06 (7)
	Other	4±0.01 (2)
Land holding	Small	124±1.10 (62)
	Middle	52±0.92 (26)
	Large	24±0.21 (12)
Family size	Nuclear	137±0.98 (68.5)
	Joint	63±0.02 (31.5)
Annual income	Below Rs. 20,000/-per annum	152±1.14 (76)
	Rs. 20,000 - 30,000/- per annum	37±0.95 (18.5)
	Above 30,000/- per annum	11±0.07 (5.5)

Values are mean of five replicates±Sem. Values in parentheses indicate the percentage over the total respondents

Table 2: Educational status of the rural people in Phulpur Tehsil of Allahabad District, Uttar Pradesh, India

Educational level of the respondents	No. of respondents in Phulpur Tehsil
Illiterate	140±1.23 (70)
Primary level	28±0.97 (14)
Secondary level	24±0.86 (12)
Graduation	8±0.42 (4)

Values are mean of five replicates±Sem. Values in parentheses indicate the percentage over the total respondents

Table 3: Ethnomedicinal plants of Phulpur Tehsil of Allahabad District, Uttar Pradesh

Plant name	Family	Utilization of medicinal plants in different diseases
Allium cepa L.	Liliaceae	Raw bulb juice is taken to check sunstroke vomiting
Amaranthus spinosus L.	Amaranthaceae	Boiled leaves and roots are given to children as laxative
Argemone mexicana L.	Paperveraceae	Roots are used for expelling tapeworm, ulcer, asthma, piles, skin diseases
Asparagus racemosus Willd.	Liliaceae	Boiled tuberous roots are given to animals and women to increase lactation
Azadirachta indica A. Juss	Meliaceae	Antiseptic, blood purifier, diabetes, dysentery, leprosy, piles, skin diseases, small pox, syphilis, wounds
Carica papaya L.	Caricaceae	Cotton soaked with latex is put in between the affected teeth to cure toothache
Cleome viscose L.	Cleomaceae	Leaf juice is used in ear troubles and paste is used externally for treating boils
Curcuma domestica Val.	Zingiberaceae	For the treatment of cold, milk boiled with turmeric powder is given, for healing of wounds milk with turmeric powder is used
Cyperus rotundus L.	Cyperaceae	Malaria, gastric and intestinal disorders
Eucalyptus citriodora	Myrtaceae	Leaves are used for treatment of cold and cough
Euphorbia hitra L.	Euphorbiaceae	Plant paste with water used as enema
Ficus religiosa L.	Moraceae	Adventitious roots of the tree is mixed with water and sugar is given in case of chicken pox once a daily for a week
Hibicus rosa – sinensis L.	Malvaceae	Flower extract is utilized in urinary problems. Fresh flower is chewed to cure bronchitis and whooping cough
Lantana camara L.	Verbenaceae	Decoction of root, stem and flowers are used as antidote to snakebite
Mangifera indica L.	Anacardiaceae	Latex is applied over gums and teeth twice a day to cure pyorrhoea
Moringa oleifera L.	Moringaceae	Fresh leaf juice is taken during high blood pressure
Musa paradisiaca L.	Musaceae	Stem decoction is given to cure leucorrhoea
Ocimum sanctum L.	Lamiaceae	Fever, cold and root paste is applied to the bites of snakes and leeches.
Raphanus sativus L.	Cruciferae	Root juice is given in urinary troubles and syphilis.
Sida cordifolia L.	Malvaceae	Dysentery, boils, gonorrhea, leucorrhea.
Solanum nigrum L.	Solanaceae	Sprain, fever, jaundice, swelling, cough, heart ailment
Tamarindus indica L.	Fabaceae	Digestion, muscular pain, scorpion bite, sun stroke and urine complaints
Tephrosia purpurea L.	Fabaceae	Fever, vomiting, asthma, blood purifier, swelling
Tinospora cordifolia (Willd.)	Menispermaceae	Antipyretic, bone fracture, diphtheria, malaria, sex strength, piles, venereal complaints
Verbena officinalis L.	Verbenaceae	Root paste is used as an antidote to snakebite
Xanthium strumarium L.	Asteraceae	Malaria, piles, ringworm, ulcer, eye diseases
Zea mays L.	Poaceae	In treatment of kidney stones
Zingiber officinalis Rosc.	Zingiberaceae	Fresh rhizome juice is given in cold, fever, constipation and influenza

of them (72%) preferred herbal medicinal plants for the treatment of different ailments more than allopathic medicines. It was found that rural people preferred to take home-made remedies made up of medicinal plants to cure simple health - related problems like cough, cold, fever and digestive problems but for the complicated problems like chest pain, menstrual disorders, rheumatism, eye and kidney problems they used to take advice from local traditional healers (Dixit and Kumar, 2003). The present investigation brought in light about 28 indigenous medicinal plants used against various diseases by rural population in different villages of Phulpur Tehsil of Allahabad district (Table 3). These promising species include both wild and cultivated plants such as 14 plants were wild plants also considered as weed (*Amaranthus spinosus* L., *Argemone mexicana* L., *Asparagus racemosus* Willd., *Cleome viscosa* L., *Cyperus rotundus* L., *Euphorbia hitra* L., *Lantana camara* L., *Moringa oleifera* L., *Ocimum sanctum* L., *Sida cordifolia* L., *Solanum nigrum* L., *Tephrosia purpurea* L., *Xanthium strumarium* L., and *Verbena officinalis* L.) while 14 plants (*Allium cepa* L., *Azadirachta indica* A. Juss., *Carica papaya* L., *Curcuma domestica* Val., *Eucalyptus citriodora*, *Ficus religiosa* L., *Hibicus rosa-sinensis* L., *Mangifera indica* L., *Musa*

Table 4: Preparation methods for remedies made of indigenous medicinal plants

Method of preparation	Description
Paste	Fresh plant parts are crushed with a stone pestle and mortar
Juice	Obtained by crushing or squeezing plant parts and filtering through cloth. Sometimes it requires addition of freshwater or other liquid for dilution.
Powder	Dried parts of the plant ground to make the powder
Decoction	Plant parts are boiled in water and the extract (crude drug) is used
Chewing	Fresh plant parts are chewed
Infusion	Plant parts are plunged in water for a few minutes

paradisiaca L., *Raphanus sativus* L., *Tamarindus indica* L., *Tinospora cordifolia* (Willd.), *Zea mays* L. and *Zingiber officinale* Rosc. were cultivated plants. However, few plants namely, *Curcuma domestica* Val. rhizome used for the treatment of septic and wounds (Somchit *et al*., 2005a), *Zingiber* juice for the treatment of fever and constipation (Somchit *et al*., 2005b), leaves of *Azadirachta indica* used for the treatment of diabetes, skin diseases and infections (Rahman *et al*., 2005), leaves of *Eucalyptus citriodora* has been used to relieve from cold and cough (Adeniyi *et al*., 2006) and decoction of styles of *Zea mays* L. obtained from female inflorescence or immature cobs for the treatment of kidney stones are some of the examples which are already available in the old literature (Shukla *et al*., 2010).

Almost all the plant parts such as leave, root, rhizome, bark, flowers, fruit, young shoots and whole plants etc., were used to prepare different medicinal formulations (Tomar and Singh 2005; Bussmann and Glenn, 2010). In most of the preparations leaves (32%) were used for the preparation of medicines followed by roots (25%), seeds (12%), fruits (10%), stem bark (9%), whole plant (8%), flower (2%) and latex (2%) while the use of multiple plant parts was also recorded in a few cases (Srivastava and Attri, 2006). The common use of the leaf in the preparation of remedies in the tehsil may be due to the relative ease of finding this plant part and leaves remain available in plenty for most of the months in a year. It was also observed that many traditional healers relied on the herbal preparations often consisting of multiple ingredients with very specific preparations to treat the complicated diseases of their patient rather than just using single plant extracts. Some of them preferred root to prepare remedies it may be due to the reason that roots generally contain high concentrations of bioactive compounds. The methods of preparation of different formulations from medicinal plants fall into five categories viz: Plant parts applied as a paste (33%), juice extracted from the fresh plant parts (21%), powder made from dried plant parts (17%), decoction (15%), chewing of fresh plant parts (9%) and infusion (5%) (Table 4). External application of different formulations was used mostly for skin diseases, insect bites and wounds whereas internal consumption of the preparations was used mostly for fever, cold and cough etc. Generally people used fresh parts of the plant for the preparation of medicine, if the fresh plant parts were unavailable, dried plant parts were used. Among the drug formulation, generally paste and juice formulations were used over the powder and decoction forms and dosage pattern was different for individuals and it was based on the age of the patient, severity of the disease and personal judgement of the medicinal practitioner.

Most of the rural people of Phulpur Tehsil preferred herbal medicines for an effective cure with a confidence that the herbal medicine would not produce any side-effect at the optimum level and due to the positive effect of herbal treatment they had strong faith in crude formulations (Kokate *et al*., 2002). Some rural people also point out that allopathic medicines are expensive and have adverse side-effects in comparison to the traditional medicines. During survey, one interesting

Table 5: Reasons for not using the indigenous medicine for the treatment of ailments

Reason	Number of the respondents
Prefer to go to doctor	21±0.46 (37.5)
Breakdown of the joint family	17±0.53 (30.36)
Treatment is not very effective and it is slow process	11±0.09 (19.64)
Higher level of education	5±0.14 (8.93)
Non-documentation of the use of medicinal plants	2±0.01 (3.57)

Values are mean of five replicates±Sem. Values in parentheses indicate the percentage over the total respondents

finding was also observed that educated persons of the area were found to have less knowledge of the native medicinal plants as compared to illiterate ones (Sharma and Alam, 1990). It was also noted that reputed healers of the rural areas of Phulpur Tehsil did not keep records and information about the traditional medicines was mainly passed on verbally from one generation to another generation and the young people of modern generation were picking up the traditional knowledge from their ancestors on the basis of observation only (Shukla and Sinclair, 2009).

Non-usage of indigenous medicinal plants: During the second part of the survey, it was observed that approximately 28% local people of the studied area did not use medicinal plants and they expressed several reasons for non-usage of the indigenous medicinal plants (Table 5). Majority of them mentioned that they prefer to go to doctor while 11% people felt that treatment with traditional medicines is not very effective and it is a slow process. It was also found that the absence of elders in the family or breakdown of joint families may also be one of the reasons for non-utilization of the traditional medicinal plants because these remedies were better known to the older members of the family, During survey it was found that the young people were not interested to carry on traditional healthcare system in Phulpur Tehsil. Most of the young people had a opinion that the cultivation of traditional medicines is useless and this type of remedies are for poor and uneducated people. It may be due to the influence of modern life style and rural-urban migration in search for lucrative job opportunities etc. Some respondents said the drawback of the traditional medicines that the utilization of the medicinal plants is not properly documented in form of literature, although ayurvedic texts do mention the healing properties of the traditional medicines but the old texts are not easily accessible to the common man for reference (Nagnur *et al*., 2009).

The present study revealed that rural people of Phulpur Tehsil utilized both wild and cultivated medicinal plants for the treatment of different ailments. It was also observed that even though the accessibility of allopathic medicine for simple and complicated diseases was available but most of the people (72%) of the area relied on medicinal plants, at least for the treatment of simple diseases like cold, cough, fever, headache, skin diseases, tooth infections and gastro-intestinal disorders etc. Earlier studies on traditional medicinal plants also indicated that the economically backward rural and tribal people of different regions of India prefer folk medicine due to low cost and sometimes it is a part of their social life and culture (Singh, 2008). During study, the knowledge of medicinal plants was not appearing to be homogenous in the Phulpur tehsil. It is evident from the interview conducted in different villages of Phulpur tehsil that the knowledge of medicinal plants was limited to the traditional healers and elderly persons who were living in the tehsil from a long time (Dhar *et al*., 1999). It was also observed that the traditional healers of the area were very old and most of the young people were not interested in traditional medicinal practices, this may result to the loss of the useful knowledge which has been accumulated over several generations (Purohit *et al*., 2002). Thus, it becomes necessary to preserve this traditional system of knowledge

by proper documentation and identification of different plant species because proper documentation of the traditional knowledge may lead to the authenticity.

Cultivation of medicinal plants has a great income generation potential and can be one of the means for poverty alleviation both in rural and urban areas of our country (Kala, 2005). It can create employment and income generation opportunities especially for poor farmers and rural women. Conservation of biological resources as well as their sustainable use is important in preservation of traditional knowledge. There is a need to inculcate awareness about the conservation of medicinal plants among different sections of the society especially among the rural population (Uprety *et al*., 2010). Rural people should be encouraged to develop medicinal plant gardens in the villages which will not only cater their basic needs but also a source of income by selling medicinal plants to the traditional healers and other plant collectors. Researches should be carried out in laboratories to develop modern agro-techniques for the cultivation of medicinal plants on priority basis. These steps if properly implemented will not only protect the medicinal plants but also medicinal plant based traditional knowledge and will also help in boosting the rural economy of our country. The present scenario offers a great opportunity for scientists and social workers to work in coordination to devise mechanism to promote traditional health care system and engage rural people in cultivation and conservation of medicinal plants.

EPILOGUE

People of the Phulpur tehsil of Allahabad District had ethnopharmacological knowledge and therefore relied on medicinal plants for the treatment of different ailments. The aim of this study is not only to prescribe the remedies for different diseases in human-beings but also an endeavour to draw attention for the need of a detailed study on medicinal plants which can provide better and efficient remedies in future for the fatal diseases like cancer, hepatitis and cardio-vascular diseases etc. Medicinal plants provide huge opportunities for community development, livelihood improvement and poverty alleviation. Unfortunately, medicinal plants are facing threat of existence should be identified and immediate steps should be taken for their conservation through in -situ and ex-situ programmes. Awareness programmes at grass root level should be introduced in the area to educate the local communities about the use and selection of the medicinal plants. Therefore, collaborative research and integrated efforts are necessary to save the treasure-house of medicinal plants.

ACKNOWLEDGMENTS

The author is thankful to Prof. A. K. Srivastava, Director General, Amity Institute of Biotechnology, Amity University, Noida for his continuous encouragement and valuable suggestions. Author is also grateful to the rural people of Phulpur tehsil of Allahabad district, Uttar Pradesh for sharing their knowledge on indigenous medicinal plants.

APPENDIX 1

Questionnaire for ethnobotanical survey conducted in Phulpur tehsil of Allahabad district, Uttar Pradesh:

- Date
- Name of Informant
- Age

- Gender
- Education
- Locality

Information about potential plant species used in the area:

- Local name of the species
- Locality
- Who collected the plant?
- Why collected?
- Which part is collected?
- How the plant is collected?
- Whether the plant material is stored and for how long it is stored and why?
- Availability status of the plant in the last 5 years: (Increased/decreased)
- Any conservation effort on the part of local people

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