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Research Article

Medicinal Plant's Wealth of Aravalli Hills, Gurgaon District, Haryana, India

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Abstract

Background and Objective: The Aravalli hills of Gurgaon district Haryana have high richness of biodiversity. This necessitates to find medicinal wealth for human use. The aim of this study was to investigate and record medicinal uses of plants by the inhabitants of in and around Aravalli hills in Gurgaon district, Haryana, India. **Materials and Methods:** An ethnobotanical study was conducted from March, 2014-2019 onwards through personal interviews of local villagers/farmers. The standard ethnobotanical methods were followed. The plants were identified by available literature and flora. The data was collected through a series of field investigations. The systematic and random sampling methods were employed to study different locations. Ethnobotanical information was gathered using semi-structured interviews. **Results:** The paper records (count) 53 important plant species of medicinal value from different families. Most of the plant species belonged to family Fabaceae followed by Moraceae and Asteraceae. **Conclusion:** Hence, the study revealed that Aravalli hills Gurgaon has much useful medicinal floras, that local people can use the parts of the plant in disease treatment and can modify, the ways of formulation application/administration and ingredients used in preparation.

Key words: Medicinal flora, ethnobotanical, traditional knowledge, biodiversity, herbal treatment

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Data Availability: All relevant data are within the paper and its supporting information files.

INTRODUCTION

Human societies have been in close contact with their environments since the beginning of their formation and used the ingredients of the environment to obtain food and medicine¹. India has a long history and strong base for Ayurveda, which is the traditional herbal medical system. Herbal plants play an important role in prevention and treatment of human diseases². The word Ethnobotany is structured by combining two Greek words: Ethnos and Botane. Ethnos represents 'people' and Botane means 'herb'. It means that 'the study of people and herbs'. It can be called as study of people and plants (trees, shrubs and herbs)'. This was introduced by Jain³ that Ethnobotany is 'the study of the utilitarian relationship between human beings and vegetation in their environment which includes its medicinal uses.

Now, Ethnobotany is a well known branch of Botany having received much attention in the developed countries like USA, UK, France and in several other parts of the world. Indian Vedic literature covers a lot of information relevant to Ethnobotany in which Charaka Samhita appears to be the most important. Various parts of India was covered with dense forests having a large number of medicinal plants. Local people had immense knowledge on various applications of plants. Keeping this in mind, usage of medicinal plants was investigated in some parts of the country⁴⁻⁶.

But only a little work has been done in Aravalli hills of Haryana. This covers vast surface having high richness of biodiversity in this area necessitating us to start a number of ethnobotanical investigations and results to be documented. Therefore, documentation of medicinal plants and their usage by local inhabitants of Haryana Aravalli hills is an important issue. The objective of this study was to collect and document information about the medicinal plants used by inhabitants of the hills of Aravalli in and around Gurgaon district, Haryana, India.

MATERIALS AND METHODS

Study area: The study was carried out at Aravalli hills of Gurgaon district Haryana from March, 2014-December, 2019.

Details of study area: The Aravalli Hills is a range of mountains running approximately 692 km (430 mi) in a southwest direction, starting in north India from Delhi and passing through southern Haryana. The latitude of Gurgaon,



Fig. 1: A general view Aravalli hills

Haryana is 28.457523 and the longitude is 77.026344. Gurgaon can be located at the cities place category with the GPS coordinates of 28°27' 27.0828" N and 77°1' 34.8384" E. Gurgaon has an elevation of 226 m that is equal to 741 feet.

A large diversity of medicinal plants (Tree, Herb and Shrub) occurs in Aravalli range. Before starting the field work on medicinal uses of plants and the study area (Hills of Aravalli) in and around Gurgaon district Haryana, India general information about the area was informally collected from the inhabitants (villagers/farmers) of the Aravalli hills (Fig. 1, 2a-c).

Identification of plants: For this study standard ethnobotanical methods were followed^{3,7,8}. The plants were identified by available literature and flora⁹⁻¹³. Two broad steps of ethnobotanical investigations were adopted. In the first step direct contact with local people/farmers was made to collect first hand information from each study site. In the second step an indirect approach was adopted and information was gathered in different ways, such as; consulting traditional local Vaidyas (doctors/hermits) going through the diaries of foresters, plant collectors and also ancient literature.

Collection of information on way of application and use: Information on medicinal plants was also recorded about the plant parts used, vernacular names, way of preparation of medicine either from individual plant or in combination with other plants. The data gathered was analyzed for various genera and species of high value medicinal plants in order to understand and list the pattern of diversity of the particular medicinal plants and their uses.

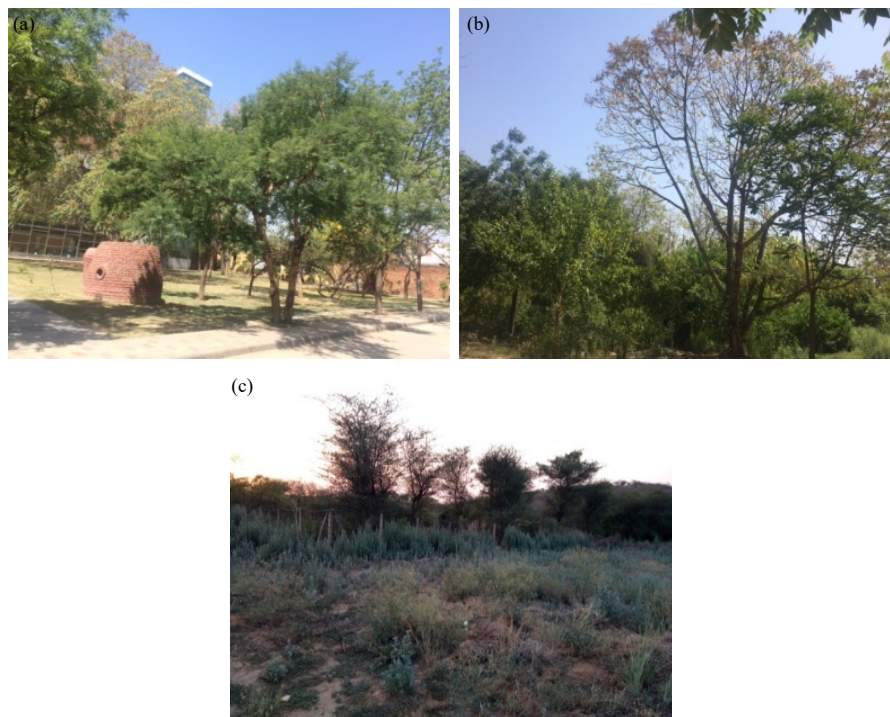


Fig. 2(a-c): Views of flora of Aravalli hills, (a) Flora near AUH Gurgaon, (b) Dense forest and (c) Flora where cultivation started

RESULTS

A total of 53 species (Table 1) of medicinal plants belonging to different families have been documented. It is evident from Table 1 that family Fabaceae covered 5 species, Moraceae 4 species and Asteraceae 3 species while other families showed 2 or 1 species, respectively.

The information gathered revealed that local people of Aravalli in and around Gurgaon use different plants or plant parts for management of several diseases/illness. The plant parts which were mostly utilized were leaf. These medicinal plants are quite effective remedies against various diseases such as; cold, cough, stomach-ache, fever, diarrhoea, diabetes, jaundice, dysentery, back-ache, ulcers etc. The local herbalist uses these plants as healers in traditional medicines. The local people and farmers use different plants for curing various minor to major infections. They prepare medicines in many ways using different parts of plants for various problems. Whole plant or sometimes mainly the root, stem bark, fruit and latex are taken.

DISCUSSION

A total of 53 species were recorded in which family Fabaceae covered 5 species, Moraceae 4 species and Asteraceae 3 species while other families showed 2 or 1

species, respectively. India have wealth of 6,600 medicinal plants¹⁴. A study of Daniels¹⁵ revealed that Western Ghats has 4500 species. Northeast India has India's richest reservoir of plant diversity¹⁶ and harbours 40% of India's endemic plant species¹⁷.

Floristic survey of district Karnal, Haryana (India) conducted in 2011-2012 by Kaur and Vashista¹⁸, revealed 71 ethnobotanical species belonging to 67 genera of 38 families. Among the families Leguminosae (8 species) was the most dominant family followed by Asteraceae (7 species). For preparation of the medicines plant parts mainly used are leaves, fruits, seeds and roots¹⁸ this study also showed that peoples are using these parts.

Ethnobotanical methods using semi-structured interviews conducted at Rewari and Mahendergarh district of Haryana revealed that a total of 48 species of medicinal plants belonging to 26 families. People of these districts have been using these plants in treatment of more than 60 diseases¹⁹. Sharma *et al*.²⁰ recorded 48 plants used by the Meo community. The difference in number type or species may be due to locations and climatic variations.

The local inhabitants (people and farmers) of the Aravalli, hills in and near Gurgaon district of Haryana have in depth knowledge on plants providing many remedies for various disease problems of human beings and livestock. Aravalli hills are now losing many medicinal plants cover and

Table 1.: Medicinal value of plants recorded from local inhabitants of Aravalli hills near Gurgaon district of Haryana, India

Botanical name	Local name of the plant	Family	Medicinal application as narrated by local people
<i>Abutilon indicum</i> (Linn) Sweet	Pilibooti	Malvaceae	The leaves and seeds of this plant are crushed with water to form a paste which is applied by rural people to cure syphilis. They also take orally 10 mL decoction of the plant before dinner for about a month to cure gonorrhoea. The fresh leaves are grinded with turmeric, rice and coconut milk to prepare a paste which is applied on boils.
<i>Acacia nilotica</i> (Linn) Delile	Kikar	Fabaceae	Decoction of the whole plant is taken to cure asthma.
<i>Aegle marmelos</i> (L.) Corrêa ex Roxb.	Bel Patra	Rutaceae	Paste of the leaves of this plant is applied on forehead to relieve headache. The unripe fruit is powdered with sil-batta and taken with water in dysentery. Juice used as heart tonic.
<i>Ailanthus excelsa</i> Roxb.	Bilayati neem or Uloo neem	Simaroubaceae	The powder of this plant stem bark (5 mg) when mixed with curd is taken orally to cure dysentery, juice of the leaves and stem bark are useful against skin eruption and seed oil is insecticidal.
<i>Albizia lebbek</i> (L.) Benth.	Siris	Fabaceae	Paste of leaves and bark used to cure insect bite and scorpion sting and useful in the treatment of asthma, cold and cough.
<i>Amaranthus viridis</i> Linn.	Jangli Chauli	Amaranthaceae	Tender branches and leaves of this plant are used as vegetables and eaten to cure digestive ailments.
<i>Amaranthus spinosus</i> Linn.	KanteWalli-Chaulai	Amaranthaceae	Pills prepared from root paste of this plant are useful to cure congestion of liver and irritation in urinary duct, decoction of root taken orally in stomachache.
<i>Argemone mexicana</i> Linn.	Pili Kateli or Satyanasi or kandiali	Papaveraceae	About 5 mL decoction of crushed flowers with water is taken orally in whooping cough. Latex is useful in rheumatic pain and cutaneous infection and useful in curing scabies.
<i>Blumea balsamifera</i> DC.	Kakronda	Asteraceae	Warm juice of the leaves useful for children suffering from pneumonia. Juice (2 mL) of the leaves mixed with honey (same quantity) is taken orally once a day for three days to destroy intestinal worms.
<i>Bonnaya brachatea</i> Limk	Yakio, Keehom-Man, Manipuri	Scrophulariaceae	Boiled leaves consumed empty on stomach in the morning to cure painful urination. Paste of roots and with honey twice daily for one month to cure TB.
<i>Bryophyllum calycinum</i> Salisb.	Patharchat	Crassulaceae	Decoction of leaves of this plant is given to the stone patients.
<i>Butea monosperma</i>	Flame of the forest	Leguminosae-papilionaceae	General health tonic and for the treatment of liver disorders.
<i>Calotropis gigantea</i> (Linn). R. Br.	Safed-aak, Shiv-aak	Asclepiadaceae	Decoction of the bark used to cure dysentery and diarrhoea. Powder of white flowers mixed with honey and taken orally to cure mental disorders.
<i>Calotropis procera</i> (Ait) R.Br.	Aak	Asclepiadaceae	Paste of roots applied on pimples. Latex is applied on scorpion, snake and insect bite to relieve pain and burning sensation. Useful in painful joints and swellings. Fresh buds taken to relieve asthma and cough.
<i>Cannabis sativa</i> Linn.	Bhang	Cannabaceae	Leaves warmed with Brassica oil are tied over the cut or bruises to relieve pain.
<i>Cassia tora</i> L.	Panwar	Caesalpinaceae	Dried leaves and inflorescence of the plant orally administered to cure dysentery and diarrhoea, crushed seeds 1 g taken by mouth for 7 days used to relieve pain.
<i>Cassia fistula</i> L.	Amaltas	Fabaceae	Root-paste of this plant is applied as an antidote to snake bite and scorpion sting, root paste with lime juice is used for ringworm. The decoction of leaves and seeds are used to cure several skin diseases.
<i>Chenopodium album</i> Linn.	Bathua	Chenopodiaceae	Paste of root is useful in skin diseases, burning sensations and syphilis. Bark is useful in boils, leprosy, ringworm affection diabetes, stranguy and cardiac problems.
<i>Chenopodium murale</i> (L.)	Khatua	Chenopodiaceae	Fresh leaves of this plant are mixed with wheat flour to prepare chapatti. The tender-branches with leaves are boiled and used as vegetable. This pot-vegetable improves digestion and cures constipation. The juice of this plant with sugar is used to help pain or dissolve kidney stones.
<i>S. Fuentes, Uotila and Borsch</i>	Lasura	Boraginaceae	Seeds are edible, shoots, stalks and leaves can be eaten as greens. It is used in vitiated conditions of peptic ulcer and dyspepsia.
<i>Cordia dichotoma</i>	Jangli jamalgota	Euphorbiaceae	Paste of the stem bark and green leaves is applied in skin diseases. Decoction of the bark is used as gargle for mouth ulcer.
Frost F			
<i>Croton bonplandianum</i> Baill.			Oil of the seeds is used as purgative of extraordinary efficiency.

Table 1: Continue

Botanical name	Local name of the plant	Family	Medicinal application as narrated by local people
<i>Cuscuta reflexa</i> Rouxb.	Amar-bel, aakash-bel	Convolvulaceae	Decoction of the stem of this plant (50 mL) is used to cure dysentery, diarrhoea, jaundice, cholera and asthma. It is useful to cure small and large pimples through thin paste.
<i>Gynodon dactylon</i> (Linn.) Pers.	Dub	Poaceae	Paste of the leaves is useful in the treatment of piles. The fresh sap is effective in controlling nasal bleeding, when used as nasal drop (5 drop). Also beneficial in the treatment of dysentery, diarrhoea, vomiting and frequent thirst.
<i>Dalbergia sissoo</i> Roxb.	Sisham	Fabaceae	One tea spoon leaf decoction is used twice a day helps to cure dysentery and diarrhoea. Infusion of the leaves is used in throat infection. The oil of the wood are used for massage up to 1 month to cure paralysis. Powder of the stem bark (one spoon) taken orally twice a day for 2-3 days to cure pneumonia in children.
<i>Datura stramonium</i> Linn.	Dalba or Dhatura	Solanaceae	Seed oil of this plant mixed with cloves is taken with honey twice daily for five days in case of malaria.
<i>Eucalyptus lanceolatus</i> Dum.	Safeda	Myrtaceae	Used as an astringent, oil of the leaf also an antiseptic and is used for disinfecting and dressing of wounds, useful in rheumatism.
<i>Eugenia jambolana</i> Linn.	Jamun	Myrtaceae	Chewing of leaves and taking seed powder controls blood sugar.
<i>Euphorbia hirta</i> Linn.	Dudhi	Euphorbiaceae	Decoction of whole plant is used to cure asthma, bronchial infection, cough, dysentery and colic pain paste of the leaves is used to cure ringworms. The extract of the leaves is taken to cure pneumonia and typhoid.
<i>Ficus benghalensis</i> Linn.	Bargad	Moraceae	Tender twigs used to clean teeth. Extract of young leaves used to cure diarrhoea and dysentery. Latex cures pain of rheumatism. Males take two drops of it orally daily with sugar to make the semen thick and to regain sexual potency.
<i>Ficus racemosa</i> Roxb	Cluster fig tree orgoolar (gular)	Moraceae	Have healing power, bark is rubbed on a stone with water to make a paste, which can be applied over afflicted by boils mosquito bites, few drops of latex used to relieve stomach pain and digestive problems.
<i>Ficus religiosa</i> Linn.	Pipal	Moraceae	Decoction of bark powder is given orally 2-3 times for 2 or 3 days to cure typhoid, decoction of bark to relieve vomiting and fever, used as mouth wash for toothache, gum problems and bad odour. Bark crushed in water and mixed with honey and cow milk are applied on breast for mastitis. Decoction of the leaves is taken to cure pneumonia. Decoction prepared with stem bark mixed with honey helps to cure common-cold.
<i>Ipomea aquatica</i> Forsk.	Kalmi sag	Convolvulaceae	Leaf extract relieves asthma. Consumption of boiled leaves with cooked rice enhances appetite.
<i>Launaea nudicaulis</i> Hook. F.	Jangli gobhi	Asteraceae	Extract of the leaves of this plant is taken orally to cure constipation.
<i>Mimosa pudica</i> L.	Touch-me-not plant	Fabaceae	Decoction is taken 3-5 days to correct uric acid levels, also useful in dysentery and painful menses.
<i>Melia azadirachta</i> Linn.	Neem	Meliaceae	Used as toothbrush, cures toothache, bad breath and gum problems and protect the mouth from many infections. Decoction prepared from bark useful in fever, arthritis, stomach disorders, etc., Fumigation of dried leaves acts as good insecticide.
<i>Moringa oleifera</i> Lam.	Sohanjana or Saijna	Moringaceae	Leaves/fruits cooked as vegetables and are used in curries helps check anaemia, general debility. Fresh roots and stem bark crushed with a little water are applied on joints in swelling, tumor and in rheumatic pain. Fresh leaves with sugar are chewed in acute diarrhoea. Powder of seeds taken orally in flatulence and indigestion.

Table 1: Continue

Botanical name	Local name of the plant	Family	Medicinal application as narrated by local people
<i>Morus alba</i> Linn.	Tut or shahtoot	Moraceae	Young tender leaves eaten for curing dysentery up to three days.
<i>Nasturtium officinale</i> W.T. Aiton	Water cress	Brassicaceae	Leaf consumed as vegetables.
<i>Neolamarckia cadamba</i> (Roxb.) Bosser	Kadamb	Cinchonoideae	Extract of the leaves serves as a mouth gargle, alkaloids prepared from the extracts of the Kadamba tree leaves, when consumed (one spoonful) for 4-10 month's cures diabetes.
<i>Ocimum sanctum</i> Linn.	Tulsi	Lamiaceae	Tea prepared with the leaves used to cure cough, cold and fever. Juice of the leaves mixed with lime juice is an excellent remedy in skin infections and ringworms.
<i>Oxalis majus</i> Linn.	Khatti-buti	Oxalidaceae	Plant sap used to cure scurvy and other skin diseases, leaves used as a cooling refrigerant in stomach disorders, fever and acute headache, leaves extract with honey or sugar is used to cure dysentery and diarrhoea.
<i>Phyllanthus emblica</i> Linn.	Indian gooseberry	Phyllanthaceae	Prevents hair fall, hair loss, dandruff, juices of amla and lemon when apply over the scalp and left for 20 min helps hair follicles and hair shaft revitalize, enhances hair lustre, color and pigmentation, prevents greying and baldness due to the presence of carotene and iron.
<i>Phyllanthus niruri</i> L.	Stonebreakerseed-under-leaf	Phyllanthaceae	Effective in inhibiting kidney stone formation.
<i>Polygonum plebeium</i> R.Br.	Polygonum	Polygonaceae	Used as a vegetable in food and applied externally to cure scabies.
<i>Portulaca oleracea</i> L.	Verdolaga red root, orpursley	Portulacaceae	Used in weakness and heart disease.
<i>Raphanus raphanistrum</i> L.	Wild radish	Brassicaceae	Flower buds used as a broccoli substitute and Antirheumatic.
<i>Ricinus communis</i> Linn.	Arand/or arandi	Euphorbiaceae	Warm leaves are applied on swelling of teats in nourishing mothers, massage of oil relieves pain. Headache and rheumatism.
<i>Senna auriculata</i> (L.) Roxb.	Matura tea tree, ranawara	Caesalpinioidaeae	Roots used as decoction against fevers, diabetes, diseases of urinary system and constipation, dried flowers and flower buds used as a substitute for tea in case of diabetes patients, its extract is applied to the eye, in case of chronic purulent conjunctivitis.
<i>Silybum marianum</i> (L.) Gaertn	Milk thistle	Asteraceae	Roots can be eaten raw or boiled and buttered or par-boiled and roasted. It is useful as a natural treatment for liver problems viz., cirrhosis, jaundice, hepatitis and gall bladder disorders.
<i>Solanum nigrum</i> Linn.	Makoi	Solanaceae	Sap (5 mL) of the fresh plant is taken orally daily early in the morning to cure liver diseases, leaf sap is applied on wounds caused by dog-bite.
<i>Thospora cordifolia</i> (Willd.) Miers ex Hook. F. And Thoms.	Amrita" or "Guduchi	Menispermaceae	Highly useful in fevers, diabetes, dyspepsia, jaundice, urinary problems, skin diseases and chronic diarrhoea and dysentery.
<i>Withania somnifera</i> (L.) Dunal	Ashwagandha	Solanaceae	Useful for improving thinking ability, also decreases pain and swelling. Prevents effects of aging, helps diabetic patients, useful in fertility problems.
<i>Ziziphus jujuba</i> Lam.	Ber or Beri	Rhamnaceae	Leaf paste applied topically cures boils, bruises and pimples. Used to fill cracked feet.

some plants are now getting rare as confirmed by the elders. This was observed during field study too. Overgrazing, soil erosion, drought and deforestation are the major factors which affect various medicinal plants. So, one should work in close connection with governmental and non-governmental organizations in order to help find traditional knowledge on medicinal plant species for future generations. If the present trend remains unchecked many high value medicinal plants may soon be extinct. Awareness should be created for conservation and for sustainable use of traditional medicinal plants. It needs *In situ* and *Ex situ* conservation measures for medicinal plants which are getting scarce in these places still they are harvested as wild only. There must be conservation priority for multipurpose plants (plants with more diversified medicinal uses). This is because of high intensity of harvesting which leads to over-exploitation.

More attention is needed on medicinal plants on their role that they play in environmental protection, poverty alleviation and health care. It needs more in depth investigations to document indigenous knowledge on medicinal plants.

CONCLUSION

The recorded all species (53) have immense potential useful in different ailments and it needs large scale trials for use and conservation. It effectively depicted that peoples living in hilly area have deep ethnobotanical knowledge in and around Gurgaon district of Haryana which is useful for pharma industry.

SIGNIFICANCE STATEMENT

This study discovers that Aravalli hills of Gurgaon district Haryana have high richness of biodiversity covering 53 important plant species. That can be beneficial for human for treating various human ailments. This study will help the researcher to uncover the critical areas of the ways of formulation application/administration and ingredients used against diseases. Thus a new theory on dependence of plant products may be advocated which will reduce the cost of synthetic medicines. This study discovers the possible use of medicinal plants. This study will help the researcher to investigate more for its conservation.

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