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Documentation of ethno-medicinal plants used by tribes of Mandla district (M.P) (India) for the treatment of keratinophilic infections

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Abstract
The study was mainly focused on documentation of medicinal plants used by Baiga, Gond, Bhariya and Kol tribes located in the Mandla district of Madhya Pradesh. These folk healers have inherited the art of curing the patient for skin/fungal diseases by using medicinal plant preparations found in forest ecosystem around their tribal localities. These healers know the properties of large number preparations used to cure skin diseases, which needs to be documented and scientifically examined for cure of ailment. These plants were cross-checked with available literature to know the significance of this tribe on medicinal knowledge. A total of thirty species belonging to twenty one families of angiospermic plants were documented. The habit wise distribution of the documented plants include nine species of trees, four species of shrubs, fourteen species of herbs and two species of climbers. The documented information revealed that 34 medicinal formulation used by tribes of Mandla district for skin diseases treatment. Out of these use of leaves was (39.0%) followed by bark (17.0 %), fruit (14.6%), root (12.1%) seeds (12.1%), whole plant (2.4%) and flower (2.4%). The common use of root and leaf in the preparation of remedies could partly be due to the relative ease of finding these parts. Leaves remain green and available in plenty for the most of the months throughout the years. From this study, we conclude that the preparation and dosage of the medicines by Baiga, Gond, Bhariya and Kol tribes of this area is unique.

Keywords: ethnomedicinal studies, medicinal plants, gond, baiga and bharia tribe, mandla

Introduction
Mandla district is predominantly a tribal area which is declared as a scheduled area under the constitution of India. The total population of district as per 2011 census was 1,054,905 males 525,272 and females 529,633. Out of the total population, the rural population of the district is 924,716 and urban population 130,189. The percentage of scheduled castes and scheduled tribes are 4.59& and 57.88%, respectively [1]. A large number of plant extracts / decoctions or pastes are being used since ages as home remedies by layman and traditional medicinal practioners in India for treatment of various diseases [2, 3, 4, 5, 6, 7]. The use of plants as medicine goes back to early man. These traditional medicines based on medicinal plants have been used for centuries. Therefore one approach that has been used for discovery of antimicrobial agents is the evaluation of plant extracts [8]. In recent years, there has been an increasing search for new antifungal compounds due to the lack of efficacy, side effects and resistance associated with some of the existing drugs [9]. The most important of these bioactive compounds include alkaloids, tannins, flavonoids, and phenolic compounds [10]. Interestingly, plant extracts and oil are widely employed in folk medicine, mainly in communities with inadequate conditions of public health and sanitation. Several medicinal plants have been extensively studied in order to find more effective and less toxic compounds [11]. The export of such plants has reached to the tune of 60 billion U.S. $ and is growing at the rate of 7% annually. India exports 80,000 tons of medicinal plants to U.S.A, U.K and other countries in wild form [12].

The ethnic groups is native to Mandla district of Madhya a Pradesh, India. Some of the researchers documented traditional knowledge of various tribe inhabited in surrounding villages of Mandla district. There is no proper report on medicinal knowledge of Mandla district for the use of various preparatrions for the treatment of various diseases so far. Hence, the present investigation is mainly focused on documentation and utilization pattern of ethno medicinal preparations used for the treatment of skin diseases were carried out in seven selected tribal blocks viz., Mandla, Bichhia, Ghughari, Muhgaon, Narayanganj, Niwas and Bijandanti as the area is rich in tribal community. This knowledge is transferred orally from generation to generation and dwindling rapidly due to the lack of interest among the younger generations. Therefore, this study is led to document the indigenous knowledge of this ethnic group.

Material and methods
Selection of study area
Mandla district was chosen as the area because i) district has rich flora unexplored for ethno medicinal preparations use for the treatment of skin diseases and ii) ethnomedicinal information have not been documented adequately from this region. Twenty eight villages of seven selected tribal blocks of Mandla district were visited for the documentaion of ethno medicinal preparations used for skin treatment. These include

Mandla, Bichhia, Ghughari, Muhgaon, Narayanganj, Niwas and Bijandanti.

Selection of tribal healers / vaidyas

The details of tribal blocks, tribal herbal healers and tribal areas were collected from Tribal Welfare Office (near Katra Hospital) and forest office (Maharajpur road) of Mandla district. The local tribal healers /Vaidyas of fame as well as common adult inhabitants of seven selected tribal blocks, viz., Mandla, Bichhia, Ghughari, Muhgaon, Narayanganj, Niwas and Bijandanti were selected for documentation of ethno medicinal knowledge. Monthly field trips were conducted in the tribal pockets of selected blocks.

Procurement of ethno medicinal knowledge

The traditional herbal healers, tribal heads and tribal person were contacted and enquired to gather the related information about various preparations used for the treatment of skin diseases Fig. 1(a**)**. Special attention was paid to record information from local traditional herbal healers with the help of local guides Fig. 1(b**)**.

The interviews were usually started with general questions in hindi language about the village after which more specific questions were asked about the ethno medicinal preparations used by the healers for the treatment of the skin diseases. The structured interviews were performed with the aid of a questionnaire.

Collection and preparation of ethno medicinal material

Fresh preparations of selected plants free from disease were collected from various tribal villages of Mandla district and from herbal healers (Madhya Pradesh) Fig. 1(b**)**. Identification of plants has been made through the local name of plant with the help of relevant literature [13, 14, 15, 16]. The ethno medicinal plant extracts were washed thoroughly 2-3 times with running water, once with sterile distilled water, then air-dried on sterile blotter under shade. The ethnomedicinies were prepared according to the method described by herbal healers. Twenty grams of each fresh preparations comprising of leaf/bark/root/ seed/flower/whole plant, fruits and other ingredients were crushed in a mortor and the medicinal paste.

Fig 1(a): Group photograph taken during survey, left to right Ram charan, Javed Iqbal, Phol Chand Mrawi, Gyan Singh Tumrajh

Fig 1(b): *Plumbago zeylanica* (Chittawar) plant shown by herbal healer from Bicchia tehsil of Mandla district

Fig 1(c): Photograph showing preparing of herbal medicines with herbal healers (Bantu Verman and his worker) at Narayanganj tehsil of Mandla district.

Fig 1(d): Herbal healers of Mandla district with raw materials of herbal material

Results

The documentation and utilization pattern of ethno medicinal preparations used for the treatment of skin diseases were

carried out in seven selected tribal blocks viz., Mandla, Bichhia, Ghughari, Muhgaon, Narayanganj, Niwas and Bijandanti as the area is rich in tribal community. The villages visited were Jantipur, Pholsagar, Bagchara Gondi, Bhawal Lalipur, Balwara, Mamori, Niwas Proper,Bari Khari, Manikpura, Bhuabichhia, Amwar, Kotwahi, Bodachhapari, Toauri, Paada, Khamaria,Kaknu, Patan, Deku, Salaiya, Barangda, Baigatola, Dhanwahi and Bargaon.The median age of the traditional healers was 55 years, the youngest being 40 and the oldest 66 years. Of the 200 vaidyas interviewed, young (18-25 years) category was nil, 80 were adult (26-45 years), and 120 were older (over 46 years). Amongst the traditional healers belong to Gond, Baigas, and Bharia and Bheel tribes. All the traditional healers interviewed were highly entrusted by the people in the villages.

Traditional healers have been found to play an important role in promoting the traditional concepts and life of the ethnic groups in Mandla district. The local peoples in the villages seemed to prefer modern medicines if affordable and available. Only in some villages the people told that they prefer traditional medicines because they think that they cannot get treated correctly with modern medicines. Most of the people in the villages were not able to afford the expensive medicines or expensive treatments.

The science of herbal formulations is one of methods of Ayurveda. Many of the traditional Vaidyas enjoy a high level of local acceptance and respect, and thus have considerable influence on health belief and practice. According to the Vaidyas, some ayurvedic formulations except for dermatophytoses contain about 15 or more secondary plant species that enhance the potency and support the primary plant species. Sometimes other plant species were also added to the formulations to prevent any possible adverse side effects. Vaidyas occasionally use the whole herb or plant part in the preparation of medicines.

In contrast to the rest of the people in the villages, the traditional healers naturally preferred traditional medicine to modern, but some of them were ready to use allopathic medicines as well, either alone, or in with combination, if the disease they were treating was not cured by traditional remedies alone. Some of the people had the possibility to get allopathic medicines from nearby hospitals. Some of the healers had been treating patients since 1962, and wanted to point out that he has seen that traditionally prepared plant remedies effectively cure various diseases. Illustration for the trust in traditional healers and traditional medicines is that people have came from other areas, like Jabalpur, to be treated by traditional healers in Mandla district (over 90 kms away), when allopathic health care fails (from one of our interviews). Most of the traditional healers interviewed, expressed their concerns on the declining interest in traditional medicine among the young people in the villages. Young people are moving to the cities in search for work, and in many cases they seem not to be interested in traditional medicine since it is a rather poor source of income.

Medicinal plants being used by the traditional herbal healers against skin diseases of local peoples of Mandla district have been documented (Table 1). A total of thirty species belonging to twenty one families of angiospermic plants viz., Amaranthaceae, Annonaceae, Asteraceae, Brassicaceae, Burseraceae, Caesalpiniacea, Celastraceae, Combretaceae, Convolvulaceae, Cucurbitaceae, Euphorbiaceae, Fabaceae, Lamiaceae, Meliaceae, Moraceae, Papaveraceae, Plumbaginaceae, Poaceae, Selaginellaceae, Solanaceae and Ulmaceae were documented. The habit wise distribution of the documented plants include nine species of trees, four species of shrubs, fourteen species of herbs and two species of climbers (Figure 2).

The plant parts used for the treatment of skin infection were roots, leaves, fruits, barks, seeds and sometime whole plants against fungal diseases. The method of preparation fall into various categories like paste, juice extracted from the fresh plant parts and external and internal consumption were involved in the treatment of skin diseases. Some of the plant preparations were common in most of the tribes. Some of the medicinal preparations vary from one tribe to another in the mode of preparation.

The documented information revealed that 34 medicinal formulation used by tribes of Mandla district for skin diseases treatment (Table 2). Out of these use of leaves was (39.0%) followed by bark (17.0 %), fruit (14.6%), root (12.1%) seeds (12.1%), whole plant (2.4%) and flower (2.4%) (Figure 3). The common use of root and leaf in the preparation of remedies could partly be due to the relative ease of finding this plant part. Leaves remain green and available in plenty for the most of the months throughout the years.

Similar study was carried in tribal pockets of Chhindwara and Betul districts. They reported 24 herbaceous species, 14 species of shrubs, 22 species of trees and 17 species of climbers used in the preparation of traditional medicines in Chhindwara districts. In Betul district out of 50 plant species, 18 species belongs to herbs, 16 species to trees, 10 species to climbers and 6 species of shrubs [3]. The ethno botanical studies on plants resources of tehsil Multai, District Betul (Madhya Pradesh) was carried and documented 47 species of medicinal plants, belonging to 45 genera and 29 families used by large number of traditional herbal healers exist in the tribal community for ethno-medicinal practices [17].

In the present study medicinal preparations used in the form of paste, extract, powder and juice, some domestic substances are also added e.g honey, and cow urine in the preparations were found to be used in preparations used by the healers for various medications in the study area. Role of crop weeds in traditional medicines in Buldana district of Maharahtra also reported [4]. They reported that most of the weeds used in different preparations in the form of paste, extract, powder, juice, honey, whey and cow urine and reported ethno botanical information on total 411 angiospermic species belonging to 90 families. Most of the ethno medicinal information provided in this study are new as these are not available in the literature [2, 5, 4]. However, some of the plants reported here, are also mentioned in earlier studies, but methods of preparation of medicines not included in their work Thirty ethno botanical plants, which were used by tribes of Mandla district in their daily life for the treatment of various diseases in which *Azadirachta indica* A. Juss, *Cassia tora* L. were common in both the studies for treating skin diseases, but they have not reported method of use as provided in present work [7]. Other scientist also reported use of similar medicinal plants but with varying methodology of medicinal preparations.

Table 1: Medicinal plants being used by tribes of Mandla district for keratinophilic infections

S. No	Botanical name	Family	Local name	Habit	Part used
1	*Amaranthus spinosus* Linn.	Amaranthaceae	Chaurai bhaji	Herb	Root
2	*Annona squamosa* Linn.	Annonaceae	Sitaphal	Tree	Leaf
3	*Argemone mexicana* Linn.	Papaveraceae	Pili katai	Herb	Root
4	*Azadirachta indica* A. Juss.	Meliaceae	Neem	Tree	Leaf and bark
5	*Boswellia serrata* Roxb. ex Colebr.	Burseraceae	Salay	Tree	Leaf
6	*Brassica cernua* (Thunb.) Forbes & Hemsley	Brassicaceae	Raai	Herb	Seed
7	*Brassica campestris* Linn.	Brassicaceae	Sarson	Herb	Seed
8	*Caesalpinia sepiaria* Roxb.	Caesalpiniaceae	Kirkach	Shrub	Leaf
9	*Cassia tora* Linn.	Caesalpiniaceae	Chakanda	Herb	Seed
10	*Centratherum anthelminticum* (Willd.) Kuntze	Asteraceae	Ban jira	Herb	Seed
11	*Cicer arietinum* Linn.	Fabaceae	Chana	Herb	Seed
12	*Cymbopogon citratus* (Nimbu gass)	Poaceae	(Nimbu gass)	Herb	Leaf
13	*Cymbopogon nardus* (Nimbu gass)	Poaceae	(Nimbu gass)	Herb	Leaf
14	*Cymbopogon winterianus* (Nimbu gass)	Poaceae	(Nimbu gass)	Herb	Leaf
15	*Datura innoxia* Mill.	Solanaceae	Pila dhatura	Herb	Root
16	*Elaeodendron glaucum* (Rottb.) Pers.	Celastraceae	Jamrasi	Tree	Bark
17	*Eclipta alba* (Linn.) Hassk.	Asteraceae	Ghamra	Herb	Leaf
18	*Ficus arnottiana* Miq.	Moraceae	Paras papal	Tree	Fruit
19	*Holoptelea integrifolia* (Roxb.) Planch.	Ulmaceae	Chirhul	Tree	Leaf
20	*Ipomoea pestigridis* Linn.	Convolvulaceae	Panchpatri	Climber	Root
21	*Mentha piperita*	Lamiaceae	Podina	Herb	Leaf
22	*Ocimum sanctum* Linn.	Lamiaceae	Tulsi	Herb	Leaf
23	*Plumbago indica* Linn.	Plumbaginaceae	Raktbirad	Shurb	Root
24	*Plumbago zeylanica* Linn.	Plumbaginaceae	Chittawar	Shrub	Leaf
25	*Pongamia pinnata* Pierre.	Fabaceae	Karanj	Tree	Leaf and bark
26	*Ricinus communis* Linn.	Euphorbiaceae	Arandi	Small tree	Fruit
27	*Solanum anguivi* Lam.	Solanaceae	Bhatkataiya	Shrub	Fruit
28	*Selaginella bryopteris* Bak.	Selaginellaceae	Sanjiwani	Herb	Whole plant
29	*Terminalia alata* Heyne ex Roth.	Combretaceae	Saja	Tree	Leaf
30	*Trichosanthes dioica* Roxb.	Cucurbitaceae	Ban tumbi	Climber	Root

Table 2: Medicinal preparations being used by tribes of Mandla district for keratinophilic infections

S. No	Botanical and local names	Mode of preparations	Dose	No. of persons given information
1	*Aegle marmelos* (Bel) + *Cicer arietinum* (Chana)	Equal ratio of fresh bark paste of Bel and flour of Chana mix and make paste	Apply externally daily for 5 days	45
2	*Annona squamosa* (Sitaphal) + *Ricinus communis* (Arandi)	Equal ratio of fruits of Sitaphal and leaves of Arandi pounded and make paste	Paste apply externally twice daily for one week	25
3	*Argemone Mexicana* (Pili katai)	Root cut in small pieces and make paste	Apply externally twice daily for 10 days	225
4	*Azadirachta indica* (Neem)	Leaves pounded and make paste	Apply externally15 minutes daily for 5 days	551
5	*Azadirachta indica* (Neem)	Bark cut in small pieces and make paste	Paste apply externally twice daily for one week	35
6	*Azadirachta indica* (Neem)+ *Pongamia pinnata* (Karanj)+ *Brassica campestris* (Sarson)	Equal ratio of bark of Nim, Karanj and seeds of Sarson pounded and make paste	Paste apply externally on the body twice daily for 3 days	425
7	*Boswellia serrata* (Salay)	Bark pounded and make paste	Apply externally daily for 10 days	70
8	*Caesalpinia sepiaria* (Sagar goti)	Leaves pounded and get extract	Extract apply externally daily for 7 days	90
9	*Centratherum anthelminticum* (Ban jira)	Seeds pounded and make powder	5g powder mixed with tap water and apply externally for 5 days	150
10	*Cassia fistula*(Amaltas) + *Plumbago zeylanica* (Chittawar)	Equal ratio of seeds of Amaltas and root of Chittawar dry and make powder	2g powder mixed with tap water and apply externally daily for 5 days	40
11	*Cassia tora* (Chakanda)	100g seeds put in container having one liter tap water, heated till volume remain ¼ part and get filtrate	2 ml filtrate apply externally daily for 10 days	65
12	*Cymbopogon citratus* (Nimbu gass)	Leaves boiled with tap water	Extracted oil is then applied on the skin for one week	20
13	*Cymbopogon nardus* (Nimbu gass)	Leaves boiled with tap water	Extracted oil is then applied on the skin for one week	10

14	*Cymbopogon winterianus* (Nimbu gass)	Leaves boiled with tap water	Extracted oil is then applied on the skin for one week	35
15	*Datura innoxia* (Pila dhatura)	Root pounded and make paste	Apply externally twice daily for 5 days	35
16	*Eclipta alba* (Ghamra)	Leaves pounded and apply in hair	Apply in hair for 1 hour daily for 5 days	258
17	*Elaeodendron glaucum* (Jamrasi)	Bark crushed and extracted	Apply externally daily for one week	350
18	*Ficus arnottiana* (Paras pipal)+ *Brassica cernua* (Raai)	Burn the fruits of paras pipal till ash form and mix with seed oil of Raai	Ash mix with oil and apply externally for 15 days	600
19	*Ficus arnottiana* (Paras pipal)	Fruit pounded	Apply externally daily for 10 days	800
20	*Holarrhena antidysenterica* (Bari karai)	Bark, cut in pieces	10 g bark pieces chewed twice daily for 10 days	75
21	*Holoptelea integrifolia* (Chirhul)	Leaves pounded and make paste	Apply externally twice daily for 7 days	200
22	*Ocimum gratissimum* (Kali Tulsi)	Leaves boiled with tap water	Extracted oil is then applied on the skin for one week	400
23	*Mangifera indica* (Aaam)	Flowers pounded and make paste	Apply externally twice daily for 2 days	25
24	*Mentha piperita* (Podina)	Leaves boiled with tap water	Extracted oil is then applied on the skin for one week	12
25	*Ocimum gratissimum* (Kali Tulsi)	Leaves of the plant boiled with tap water	Extracted oil is then applied on the skin for one week	50
26	*Ocimum sanctum* (Safad Tulsi)	Leaves pounded and make paste	Apply externally for 10 days	375
27	*Plumbago indica* (Chitrak)	Root pounded and make paste	Apply externally with Cow urine for 6 days	45
28	*Plumbago zeylanica* (Chittawar)	Root pounded and make paste	Paste apply externally twice daily for 5 days	189
29	*Pongamia pinnata* (Karanj) + *Ipomoea pestigridis* (Panchpatri)	Equal ratio of fruits of Kanji and root of Panchpatri pounded and make paste	Paste apply externally twice daily for 6 days	35
30	*Pongamia pinnata* (Karanj)	Leaves pounded make paste	Apply externally with mustard oil daily for 5 days	250
31	*Selaginella bryopteris* (Sanjiwani)	Whole plant pounded and make paste	2g paste with honey daily for 2 days	22
32	*Solanum anguivi* (Bhatkataiya)	Fruits pounded and make paste	Apply externally on the body daily for 3 days	09
33	*Tectona grandis* (Sagon)	Dry leaves burn	Take fumes externally on body twice daily for 3 days	06
34	*Terminalia alata* (Saja)	Leaves pounded and make paste	Paste apply externally twice daily for 5 days	85

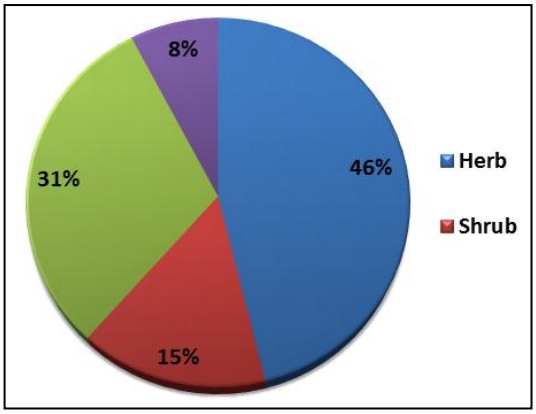

Fig 2: Habit wise distribution of ethno medicinal plants of Mandla district

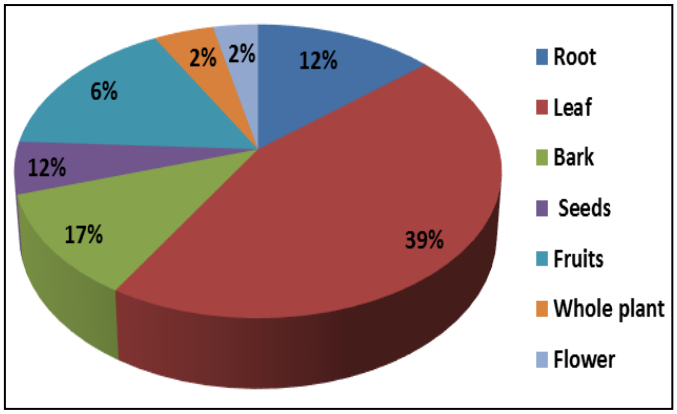

Fig 3: Contribution of different plant parts in the ethnomedicines for treating keratinophilic infection

Conclusion

In the current scenario, the development of resistant pathogens against traditional antibiotics leads to innovation of novel and effective drugs from plant resources. The documented herbal formulations against skin diseases used by Mandla tribe will pave the way to investigate efficient alternative antibiotics with high therapeutic potentials to combat the present pathogens. The present survey concludes that the local population/traditional herbal healers of Mandla district has a fairly extensive and detailed knowledge regarding wild plants and their utility. They have a wide knowledge on the use of plants for various purposes, including medicinal, food, fuel-wood, fodder, timber, household article, incense, etc., With regards to the uses of plants as medicines, this research confirms the vast knowledge of the traditional healers, local healers and village elders on the subject of plants used for medicinal purposes. The lack of modern and government facilities and remote geographical features of Mandla district, as well as a strong belief in folk medicines continue the preference for traditional healers for their health care. In the quest to increase earnings, important medicinal plants are now being harvested for profit, which may put some plant species at risk. The continuation of collection of plant species in the same area will decrease the population of the species and the species disappearing from the district. Indigenous practices and knowledge regarding the sustainable harvest and utilization of plant resources as medicine should be documented and preserved before they disappear.

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