

# Mapping of traditional healthcare providers and their healing approaches in a tribal community of district Sirohi, Rajasthan

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## ABSTRACT

**Introduction:** Traditional applications of medicinal plants in healthcare practices provide indication to new therapeutic concepts; hence, their relevance is highly recognized. The objective of the study was to map the traditional healers from the aspirational district and scientific documentation of their healing practices to treat various diseases. **Method:** This was community-based study in tribal subpopulation zone of district Sirohi. The data was collected through field survey and interviews of tribal healers by using semi-structured questionnaire. **Result:** We identified 1015 tribal healers (68% male and 32% female), and all belong to Bhil, Meena, and Garasia communities of district Sirohi. The mean age was  $60.45 \pm 16.56$  years, 82.6% healers were uneducated, and 12.6% had primary education, while 1.2% were graduates. Tribal healers act as primary point of care for tribal community and practiced various treatment modalities including herbal healing (32.7%), diviners (28.9%), child birth attendant (24.7%), and bone setters (13.7%). We recorded 88 herbal healing practices from tribal communities of district Sirohi and scientifically documented. The common diseases treated by tribal healers included wound healing, skin infection, fever, arthritis, pain, diarrhea, cough, and cold. The Fabaceae family was credited with highest number (17%) of plants used by herbal healers. It was also noted that some of the plants used for medicinal purpose are endangered and overexhausted. **Conclusion:** Ethnopharmacological data is the foundation for further validation and value addition of herbal healthcare practices. The mapping of indigenous knowledge holders and scientific documentation of their knowledge might be a crucial step for providing clue regarding new therapeutic molecules.

**Keywords:** Ethnopharmacology, herbal healing, traditional knowledge, tribals

## Introduction

Several indigenous communities in India have rich culture of traditional knowledge-based health care. In Indian scenario,

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Received: 13-08-2022

Revised: 17-01-2023

Accepted: 02-02-2023

Published: 30-06-2023

traditional medicine can be divided into classical or mentioned in standard books and folk medicine. The classical medical system included Ayurveda, Unani, and Siddha streams which are codified and well documented. Whereas folk medicine systems, on the other hand, are noncodified and are sustained from generation to generation through oral tradition.<sup>[1]</sup> It is estimated that traditional medicine is used by approximately 80% of world's population.<sup>[2]</sup> There are around 9% tribal population living in Rajasthan state having eight tribal

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**How to cite this article:** Dwivedi R, Goyal P, Yadav SS, Dwivedi P, Singh P, Singh K. Mapping of traditional healthcare providers and their healing approaches in a tribal community of district Sirohi, Rajasthan. J Family Med Prim Care 2023;12:1150-7.

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**DOI:**  
10.4103/jfmprc.jfmprc\_1610\_22

subpopulation zones.<sup>[3]</sup> Tribal community and ethnic races have their unique culture, folk practices, etc., Multiple plants (wild or cultivated) are being used by the tribal community for the treatment of many diseases/conditions; thus, adequate information about medicinal use of plants is available with these communities.<sup>[4]</sup> Three major tribes including Bhil, Meena, and Garasia are widely distributed in the state of Rajasthan which have a well-developed system of application of traditional herbal medicines and traditional treatment practices.<sup>[5]</sup> The common ailments treated by traditional practices included multiple fractures, pain, fever, blood pressure, snake bite, toothache, asthma, and eczema.<sup>[6]</sup> According to various studies, approximately 25,000 plant-based formulations used in India to cure various ailments and mostly originated from traditional knowledge and practice.<sup>[7]</sup> In tribal and remote areas, general healthcare delivery system is not as good in urban areas; therefore, dependency on traditional practices to fulfill their healthcare need is much demanding among these communities. In Rajasthan, various tribal healers (TH) called “bhopas” practicing in these areas act as primary caregiver for treating various diseases using their knowledge.<sup>[8]</sup> Traditional tribal healers employed a variety of therapeutics herb formulation derived from variety of natural resources (animal, minerals, etc.). The Sirohi district has five tehsils including Sirohi, Pindwara, Sheoganj, Aburoad, and Reodar with population of 10,36,346 of which 5,34,231 were males and 5,02,215 were females (Census India 2011). The population of Sheoganj is 1,42,329, Pindwara is 261,686, and Abu Road is 224,404.<sup>[9]</sup> The Sirohi district is one of the aspirational districts, and all three blocks have majority of tribal community. Tribal healers migrate from time to time from the hills of Abu Road, Rajasthan to plains of Gujarat state. The tribal healers of these communities acquire their knowledge through tradition and from other communities while migrating and use herbs available in and around their villages for treatments of various ailments.

## Material and Methods

It was a community-based cross-sectional study conducted in tribal subpopulation of district Sirohi, Rajasthan. We have managed to trace and identify 1015 tribal healers (bhopa) with the help of local communities, community voluntaries, and healthcare workers among three blocks (TSP zones) Sheoganj, Pindwara, and Abu Road. Mapping tribal healers in district Sirohi was a daunting task, as there were no secondary data about them with any district authorities. A two-level approach was followed by looping district magistrate (high level) in a WhatsApp group of Sarpanch to indirectly facilitate mapping work in the field through Chief Medical and Health Officer (CM&HO), Subdivisional Magistrate (SDM), Child Development Project Officer (CDPO), Block Chief Medical Officer (BCMO), and Medical Officer (MO) approaching ASHA/ANM (ground level), meetings with tribal community leaders and NGOs directly. Post-tracing the tribal healers, we have recorded their sociodemographic characteristic, details of treatment methodology including doses and method

of application, characteristics of plants used in treatments covering their traditional medicinal knowledge for analysis and applying scientifically. Collected data are uploaded in Epicollect5 for analysis. Data were entered in Microsoft Excel 2010 spreadsheet, and frequencies were presented in along with percentages wherever appropriate. The SPSS, statistical software package version 23, was used for statistical analysis, and the findings were reported in the form of descriptive statistics. Institutional Ethics Committee approval was obtained from the Institute (Certificate Reference Number: AIIMS/IEC/19-20/1054).

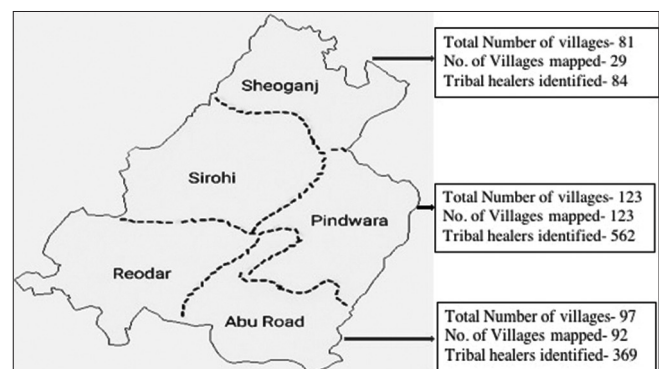
## Results

### Mapping of tribal healers in district Sirohi

The Sirohi district is situated in the southwest part of Rajasthan in between 24°20'N and 25°17'N latitude and 72°16'E and 73°10'E longitude [Figure 1]. The area is inhabited by various ethnic groups, namely Bhil, Damor, Damriya, Garasia, Kathodi, Kokna, Kolidhor, Meena, Patelia, and Seharja. We identified 1015 tribal healers (68% male and 32% female), and all belong to Bhil, Meena, and Garasia communities of Sirohi district. Traditional tribal healers were practicing their unique ways of healing practices. Every tribal healer had their own method of diagnosis of disease and healing practice (treatment). As method of healthcare practice, we can subdivide tribal healers as herbalist, diviners, female tribal healers, bone setters, etc., Herbalist prescribing healing herbs/herbal medicine for different illnesses using different modes of application with doses. Herbalists are locally known as “bhopa” in the state of Rajasthan. Diviners use prayer, candlelight, or water for curing different diseases. They are locally called as “Devala.” They perform puja for protecting health from any diseases. Female traditional healers are birth attendants practicing delivery of child commonly called as “Sujadi” in Rajasthan. Bone setters have specialty in setting bone fracture and dislocation of joints as well as pain in the body [Figure 2].

### Sociodemographic profile of tribal healers

Out of total tribal healers (TH), there were 32% female healers, and most of them were housewife. Some of the female tribal



**Figure 1:** Location map and blockwise details of area covered for mapping of tribal healers in district Sirohi, Rajasthan, India

healers were also working as an ASHA or ANM. There were 92% tribal healers, who were married, and 96% TH were nomadic (originally belonging from the hills of Pindwara and Abu Road), and only 4% TH were non-nomadic who actually migrated from villages of Gujarat state. There were 82% uneducated male tribal healers, while only 18% were educated, in which 128 (12.6%) completed their primary education, 37 (3.6%), secondary education, and only 12 (1.2%) completed their graduation. Most of TH were in 41–60 years age group. We also found 27.3% tribal healers were providing temple-based services, 35.8% were agriculturists, while 4.2% were in government jobs like teacher/ASHA/ANM/MGNREGA workers, etc., [Table 1]. Female tribal healers were less secondary educated compared to male tribal healers. Gender was significantly associated with various sociodemographic characteristics of tribal healers such as education status, level of education, occupation, and average

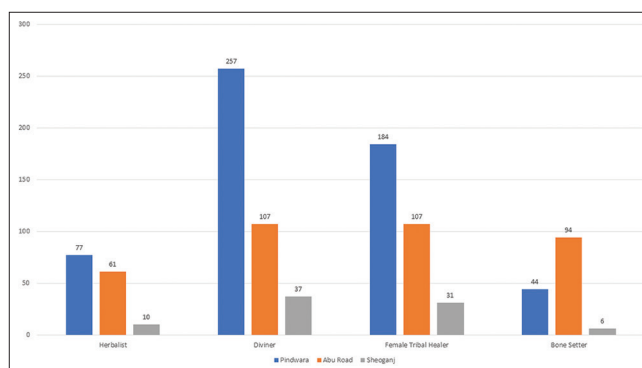
monthly income; however, it was comparable with age group and years of healing practices.

### Documentation of traditional healing practices by tribal community of Sirohi district

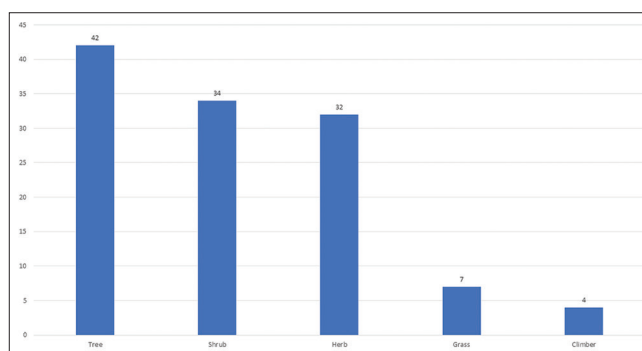
We recorded 88 herbal practices using from tribal communities of district Sirohi [Table 2]. Almost all parts were useful for ethnomedical preparation in various practices including leaves, root, bark, fruit, stem, whole plant, and seeds. Different parts of the medicinal plants were used to cure various diseases, and mostly leaves (37.17%) were used followed by stem 4%, root (30.76%), fruit (11.53%), bark (3.84%), bud (3.84%), and seeds (2.56%) [Figure 3]. Most of the plants used for medicinal purpose were tree (35.29%) followed by shrub (28.57%),

**Table 1: Sociodemographic variables of tribal community of district Sirohi, Rajasthan**

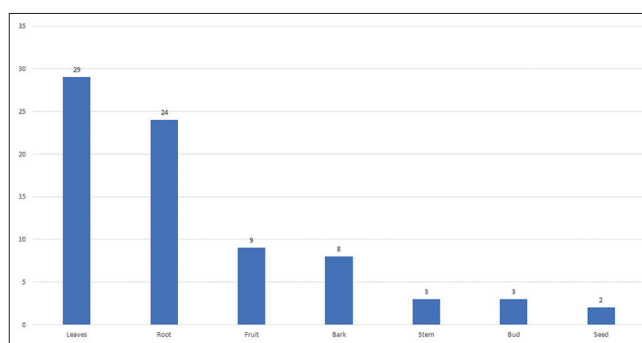
Variables	Frequency	Percentage
<b>Gender</b>		
Male	693	68.2
Female	322	31.7
<b>Age (Years)</b>		
20-40	153	15.1
41-60	533	52.7
61-80	308	30.0
<b>Educational Status</b>		
Uneducated	838	82.6
Educated	177	17.4
<b>Level of Education</b>		
Uneducated	838	82.6
Primary	128	12.6
Secondary	37	3.6
Graduation	12	1.2
<b>Marital Status</b>		
Married	929	91.5
Unmarried	86	8.5
<b>Experience of healing practices (Years)</b>		
1-10	304	29.9
11-20	321	31.6
21-30	201	19.8
31-40	124	12.3
41-60	65	6.4
<b>Income (Indian Rupees)</b>		
V - below 1130	175	23.0
IV - 1130-2259	146	19.2
III - 2260-3765	41	5.4
II - 3766-7532	202	26.6
I - 7533 and above	108	14.2
<b>Occupation</b>		
Worker/labor	223	22.0
Agriculture	363	35.8
Temple service	301	27.3
Housewife	105	10.3
Govt job	23	2.3
<b>No of cases referred by tribal healers to near health centers</b>		
No	97	9.6
Yes	918	90.4



**Figure 2: Distribution of tribal healers according to their healing practices in study area**



**Figure 3: Percentage of growth form of the plants used by tribal healers**



**Figure 4: Percentage of plant parts used by tribal healers for the preparation of folk medicine**

Table 2: List of herbal healthcare practices used by tribal community of district Sirohi, Rajasthan

Diseases	Plant	Botanical name	Plant part used	Family	Habitat	Method/dosage
Leukorrhea	Sheesham, Belpatra	<i>Dalbergia sissoo + Aegle marmelos</i>	Leaves	Fabaceae, Rutaceae	Tree	Crush the leaves and filter the juice with muslin clothes and add 2 g of mishri. Take 100 ml juice twice in a day.
Baldness	Bordi, Gundi, Pepper	<i>Ziziphus nummularia + Piper nigrum + Cordia dichotoma</i>	Leaves	Rhamnaceae, Piperaceae, Boraginaceae	Shrub, Tree	Five-gram ash mixed with sesame oil and apply on affected area thrice in a day.
Burns	Mango	<i>Mangifera indica</i>	Leaves	Anacardiaceae	Tree	Five-gram ash mixed with butter. Apply paste on burn area.
Piles	Ubera, Bordi,	<i>Ficus racemose + Ziziphus nummularia</i>	Root	Moraceae, Rhamnaceae	Shrub	Five-gram dried root powder take with cow milk, twice in a day.
Heat stroke	Palash tree	<i>Butea monosperma</i>	Flower	Fabaceae	Tree	Bath with dried Palash flower once in day.
Weakness	Konch, Safed musli, ashwagandha, shatavari	<i>Mucuna pruriens + Chlorophytum borivilianum + Withaniasomnifera + Asparagus racemosus,</i>	Root	Fabaceae, Asparagaceae, Solanaceae, Asparagaceae	Shrub, herb, shrub, herb	Take 10 gm of root powder with cow milk twice in a day.
Scorpion bite	Tobacco	<i>Nicotiana tabacum</i>	Leaves	Solanaceae	Herb	Tobacco leaves juice. Apply 2 drops of leaves extract twice in a day.
Asthma	Aak, adsu	<i>Calotropis gigantea + Adhatoda vasica</i>	Leaves, root	Apocynaceae, Acanthaceae	Shrub, Herb	Take 5 gm, Dried powder of leave and root with honey in empty stomach.
Dermatitis	Satyanashi	<i>Argemone Mexicana</i>	Leaves	Asparagaceae	Herb	2 ml juice, apply thrice in a day at affected area.
Arthritis	Shatavari	<i>Asparagus racemosus</i>	Root	Asparagaceae	Herb	4 gm dried root powder dissolve in 500 ml hot water and take orally twice a day.
Stone	Bermuda grass	<i>Cynodon dactylon</i>	Grass	Poaceae	Grass	5-6 leaves chew, once in a day.
Mouth ulcers	Guler	<i>Ficus racemose</i>	Stalk	Moraceae	Shrub	Brush with stalk of guler thrice a day.
Cough	Khazoor	<i>Phoenix dactylifera</i>	Fruit	Arecaceae	Tree	5 dates with milk at sleeping time.
Weakness	Shatavari	<i>Asparagus racemosus</i>	Root	Asparagaceae	Herb	10 gm dried root powder with milk twice in a day.
Dermatitis	Pepper	<i>Piper nigrum</i>	Fruit	Piperaceae	Shrub	Fry black pepper in cow's ghee. Take 5 fry pepper twice in day.
Asthma	Hemp	<i>Cannabis sativa</i>	Leaves	Cannabaceae	Herb	Making ashes by burning hemp leaves. Take 5 gm hemp ash with honey at empty stomach, twice in a day.
Malaria	Aank	<i>Calotropis gigantea</i>	Bud	Apocynaceae	Shrub	Take 5 buds with warm water at empty stomach in morning.
Jaundice	Aank	<i>Calotropis gigantea</i>	Bud	Apocynaceae	Shrub	50 gm powder of bud, mix with jiggery. Take 1 spoon paste at empty stomach in morning.
Back pain	Safed musli	<i>Chlorophytum borivilianum</i>	Leaves	Asparagaceae	Herb	Heat leaves, apply 10-15 leaves at affected area.
Dermatitis	Aank, garlic	<i>Calotropis gigantea + Allium sativum</i>	Leaves, cloves	Apocynaceae, amaryllidaceae	Shrub, herb	Cook leaves of aak with ghee, make a paste, then add garlic paste 10 gm paste, and apply 3 times in a day at affected area.
Vomiting	Jijana	<i>Artemisia pallens</i>	Root	Asteraceae	Herb	Boil jijana root, take 50 ml solution twice in a day.
Piles	Neem	<i>Azadirachta indica</i>	Leaves	Meliaceae	Tree	Apply leaves paste twice a day.
Tongue scraper	Thulia bush	<i>Thuja occidentalis</i>	Leaves	Cupressaceae	Tree	Apply 2 gm leave ash on tongue.
Piles	Jijana	<i>Artemisia pallens</i>	Root	Asteraceae	Herb	Take 5 gm root powder with warm water twice in a day.
Dematitis	Aank	<i>Calotropis gigantea</i>	Leaves	Apocynaceae	Shrub	Fry leaves of aak in cow ghee, then apply a paste at affected area thrice a day.
Cough	Kumatiya	<i>Senegalia senegal</i>	Bark	Fabaceae	Tree	Boil a bark, and then strain extract with muslin cloth. Take 50 ml, solution twice in a day.
Toothache	Kerr	<i>Capparis deciduas</i>	Branch	Capparaceae	Shrub	Grind branch, and extract juice. 2-2 drop in ear twice in a day.
Dermatitis	Cheetrai	<i>Plumbago zeylanica</i>	Root	Plumbaginaceae	Herb	Make a paste of root with water. 10 ml, paste apply thrice in a day.

Contd...

Table 2: Contd...

Diseases	Plant	Botanical name	Plant part used	Family	Habitat	Method/dosage
Kidney stone	Khakhra,	<i>Butea monosperma</i>	Root	Fabaceae	Tree	Take, 4 gm root powder with warm water twice in a day.
Abdominal pain	Guda	<i>Cordia myxa</i>	Leaves	Boraginaceae	Tree	Heat leaves of guda with butter milk. Apply leaves at affected area.
Scorpion bite	Chirmi	<i>Abrus precatorius</i>	Fruit	Fabaceae	Herb	Take 5 gm fruit paste, apply at affected area.
Asthma	Khakhra,	<i>Butea monosperma</i>	Bark	Fabaceae	Tree	5 gm, bark powder taken with honey twice in a day.
Blood in stool	Aval	<i>Senna auriculata</i>	Root	Fabaceae	Tree	Take 2 gm root powder with warm water in empty stomach.
Diarrhea	Bordi bush	<i>Zizyphus nimmularai</i>	Root	Rhamnaceae	Shrub	2-2 spoon dried root powder with curd twice a day.
Itching in the eye	Neem	<i>Azadirachta indica</i>	Root	Meliaceae	Tree	1-1 drop neem juice twice a day.
Burns	Ubera	<i>Ficus racemosa</i>	Leaves	Moraceae	Tree	2 gm leaves paste apply on burn area.
Skin diseases	Neem	<i>Azadirachta indica</i>	Leaves	Meliaceae	Tree	2 gm, leaves paste apply at affected area.
Dengue fever	Papaya	<i>Carica papaya</i>	Leaves	Caricaceae	Tree	2-2 spoon papaya leaves paste take with warm water, twice a day.
Snake bite	Palash tree	<i>Butea monosperma</i>	Root	Fabaceae	Tree	10 gm, root paste apply at bite area.
Uterine bleeding	Palash tree	<i>Butea monosperma</i>	Gum	Fabaceae	Tree	Apply 2 gm paste of gum on empty stomach for one hour.
Arthritis	Ginger, black-cumin, turmeric, carom seeds, black salt	<i>Zingiber officinale</i> + <i>Elwendia persica</i> + <i>Curcuma longa</i> + <i>Trachyspermum amni</i>	Rhizome, fruit, Rhizome, seed,	Zingiberaceae, apiaceae	Herb, Herb	Take 5 gm all ingredients and make a powder. Take 10 gm powder with warm water twice a day.
Delivery pain	Oot-kantilo	<i>Echinopsechinantus roxb</i>	Root	Asteraceae	Herb	Take 5 gm root powder with warm water.
Epilepsy	Aakarkra	<i>Anacyclus pyrethrum</i>	Root	Asteraceae	Herb	5 gm root powder twice a day with cow milk.
Cancer	Aank, datura	<i>Calotropis gigantea</i> + <i>Datura stramonium</i>	Leaves	Apocynaceae, Solanaceae	Shrub, herb	Put the aak leaves and datura in a pot and burn it. 5 gm ash with cow milk, twice a day.
Sexual disorders	White musli	<i>Cholorophytum borivilianum</i>	Root	Aspargaceae	Herb	5 gm powder with milk twice a day.
Epilepsy	Gum katera	<i>Astragalus gummifer</i>	Shrub	Tragacanthin	Tree	10 gm of katera soaked in water at night, take with cow milk, jaggery, and almonds. Take 10 gm mixture in morning.
Gynecology	Blackberry	<i>Rubus laciniatus</i>	Fruit	Rosaceae	Herb	100 gm of blackberry juice at empty stomach twice a day.
Cold and cough with fever	Chirayta	<i>Swertia perennis</i>	Root, Stem	Gentianaceae	Herb	50 gm of root and stem paste. Boil with water and make it half. Take at night.
Snake bite	Aak	<i>Calotropis gigantea</i>	Leaves	Apocynaceae	Shrub	5 gm powder of dried leaves with water. If vomit not comes, then take 3 gm more.
Chronic cough	Kumatiya	<i>Senegalia senegal</i>	Bark	Fabaceae	Tree	2 gm bark powder with warm water twice a day.
Itching	Hegu	<i>Andrographis paniculata</i>	Bark	Acanthaceae	Herb	Boiled bark powder. apply an affected area.
Jaundice	Papaya	<i>Carica papaya</i>	Fruit	Caricaceae	Tree	250 gram of papaya taken orally an empty stomach for a week.
Leukorrhea	Bordi	<i>Zizyphus nimmularia</i>	Root	Fabaceae	Shrub	1 kg of root boil in 5 liter water. 1-1 cup twice a day.
Piles	Malabar nuts	<i>Justicia adhatoda</i>	Leaves	Acanthaceae	Shrub	Boil 1 kg of adsu leaves and 2g of kali jiri and 10 g of black salt. 1-1 cup twice a day.
Piles	Satyanashi, guda	<i>Argemone mexicana</i> + <i>Saccharum officinarum</i>	Seed	Papaveraceae	Crop weed	Paste of satyanashi seeds, mix with jiggery, and make small tablets. Twice a day 1-1 tablet.
Arthritis	Datura, sarsoo, garlic, cloves, tobacco	<i>Datura stramonium</i> + <i>Brassica campestris</i> + <i>Allium sativum</i> + <i>Syzygium aromaticum</i> + <i>Nicotiana tabacum</i>	Leaves, seed, fruit,	Solanaceae, Brassicaceae, Myrtaceae, Solanaceae	Herb, shrub, herb	Add 5 black datura seed, garlic clove and tobacco, in mustard oil, until the color change red massage with oil twice a day.

Contd...



Table 2: Contd...

Diseases	Plant	Botanical name	Plant part used	Family	Habitat	Method/dosage
Wound	Khirani	<i>Manilkara hexandra</i>	Latex of stem	Sapotaceae	Tree	Apply 4 ml khirni milk at injury area.
Arthritis	Castor	<i>Ricinus communis</i>	Leaves	Euphorbiaceae	Tree	Castor leaves heat with mustard oil. Massage 3 times with this oil.
Cold	Aak	<i>Calotropis gignacta</i>	Wood	Fabaceae	Tree	Burn dry wood of aak. Smell smoke.
Physical weakness and tiredness	Konch	<i>Mucuna pruriens</i>	Leaves	Fabaceae	Shrub	Take leave powder with cow milk twice in a day.
Burns	Palash tree	<i>Butea monosperma</i>	Bark	Fabaceae	Tree	4 gm bark ash apply on affected area.
Knees and back pain	Maalkankaani	<i>Celastrus paniculatus</i>	Fruit	Celastraceae	Shrub	Extract oil from fruit. Massage with oil twice a day.
Cold	Vicks	<i>Plectranthus hadiensis</i>	Leaves	Lamiaceae	Shrub	Chew 2-2 leaves in the morning and evening.
Neck pain	Chitrasani roots	<i>Hemidismus indicus</i>	Root	Apocynaceae	Shrub	Apply root paste at neck and nibble area for 2 hrs.
Male infertility	Lady's finger	<i>Abelmoschus esculentus</i>	Root	Malvaceae	Herb	10 gm root powder of okra with cow milk take twice a day.
Dental caries	Yellow fruit nightshade (cuteri)	<i>Solanum virginianum</i>	Seeds	Solanaceae	Herb	Apply on teeth's surface.
Wound	Bermuda grass	<i>Cynodon dactylon</i>	Grass	Poaceae	Grass	Apply paste of Bermuda grass, twice a day at affected area.
Ringworm	Khejri	<i>Prosopis cineraria</i>	Leaves	Fabaceae	Tree	Dried leaves powder. Apply paste of khejri leaves on affected area.
Ringworm	Peepal tree	<i>Ficus religiosa</i>	Bark	Moraceae	Tree	Paste of dried bark powder, apply 2 ml paste on affected area.
Stammer	Wild onion	<i>Allium sativum</i>	Root	Amaryllidaceae	Shrub	Take 5 gm dried root powder in empty stomach, twice a day.
Leukorrhoea	Safed musli	<i>Chlorophytum borivilianum</i>	Root	Asparagaceae	Herb	Take 2 gm dried root powder of musli with cow milk.
Stone	Neem	<i>Azadirachta indica</i>	Root	Meliaceae	Tree	3 gm root powder with warm water.
Urinary disorder	Guggal	<i>Commiphora wightii</i>	Latex	Burseraceae	Tree	Take 2 ml milk extract with warm water.
Headache	Aak	<i>Calotropis gigantea</i>	Leaves	Fabaceae	Shrub	Take fumes leaves extract.
Heart disease	Arjuna	<i>Terminalia arjuna</i>	Bark	Combretaceae	Tree	Take 2 gm dried bark powder with cow milk.
Wounds	Sal tree	<i>Shorea robusta</i>	Leaves	Dipterocarpaceae	Tree	Apply leaves paste for 5 days.
Anorexia	Goolar	<i>Ficus racemosa</i>	Leaves	Fabaceae	Tree	100 ml leaves extract twice day.
Scorpion bite	Aak	<i>Calotropis procera</i>	Stem	Fabaceae	Shrub	2 ml milk on affected area.
TB	Aarni	<i>Premna serratifolia</i>	Leaves	Lamiaceae	Shrub	5-6 aarni leaves chew twice a day.
Headache	Ram tulsi	<i>Ocimum gratissimum</i>	Leaves	Lamiaceae	Herb	Pour 5-6 drop of tulsi extract in noise.
Skin disease	Dhudhi	<i>Euphorbia thymifolia</i>	Leaves	Euphorbiaceae	Herb	Apply milky latex on affected area.
Jaundice	Guduchi	<i>Tinospora cordifolia</i>	Stem	Menispermaceae	Tree	2 gm, guduchi stem powder with warm water.
Mouth ulcers	Safed chirmi	<i>Abrus precatorius</i>	Leaves	Fabaceae	Herb	Chew 5-6 leaves twice a day.
Partial blindness	Nirgundi	<i>Vitex negundo</i>	Seed	Lamiaceae	Shrub	2 gm seed powder with cow milk twice a day.
Snake bite	Ardu	<i>Ailanthus excelsa</i>	Bark	Simaroubaceae	Tree	100 ml extract of bark apply on bite area.
Asthma	Amberbel	<i>Cuscuta reflexa</i>	Stem	Convolvulaceae	Herb	2 g of dried plant powder mixed in 500 ml hot water and take two spoons twice a day.
Diabetes	Harsingar	<i>Nyctanthes arbor-tristis</i>	Leaves	Oleaceae	Shrub	Fresh leaves of plants grinded in water and filtered through muslin cloth. 2 ml of filtered juice taken morning and evening after meal.
Joint pain	Methi, Azwain, kali mirch	<i>Trigonella foenum graecum + Trachyspermum ammi + Piper nigrum</i>	Seeds, fruit, seed	Fabaceae, Apiaceae Piperaceae	Herbs	0.5 g of each ingredient mixed in 3 ml of cow ghee and take it in the night time.

herb (26.89%), grass (5.88%), and climbers (3.36%) [Figure 4]. The Fabaceae family was credited with highest number (17%) of plants used by herbal healers. Preparation method for therapies included decoction, drying, extraction, plant infusion, smoke, juice, latex milk, oil paste, powder, raw fruit, and resins were applied. The data was recorded scientifically which included common name of plant in the area, botanical name of plant, family, plant part, habitat, diseases, diagnosis methods for disease, and dosage of herbal preparation. These plants are being used tribal community of Sirohi district to treat major ailment such as burns, piles, jaundice, fever, asthma, arthritis, scorpion bite, hydrocele, leucorrhoea, peptic ulcers, stomachache, toothache, body pain, cough, and cold. The majority of plant products are taken orally after being formulated, whereas medicines for skin diseases and bone fractures are not prescribed for oral intake. It was revealed that in the majority of cases, plant products are made with a combination of other plants or items. Although not all of the plants used in the mixture have qualities that can help with a specific ailment, some of them may have fewer adverse effects during therapy.

## Discussion

Indian culture has rich tradition of using folk and traditional medicines for the maintenance of good health, also in the prevention, diagnosis, and treatment of several diseases.<sup>[10]</sup> However, proper documentation of medicinal utility of plants or plant-derived product is still lacking which causes underutilization of natural resources. Plant materials utilized in traditional medicine should be scientifically documented to help with general health care, forest protection, and environmental or ecological studies. People often feel safer with indigenous treatments, and the expenses of medication would be far lower than contemporary pharmaceuticals; therefore, such medicinal plants might be introduced into basic health care.<sup>[11]</sup> Traditional medical practitioners in tribal community or tribal healers treat people of all ages and diagnose and treat them with easily available and affordable remedies. Their medical care is thorough and based on ancient knowledge and regular practice. Depending on the origin of the ailment, their therapy is extensive and includes therapeutic, protective, and preventive measures. It can be natural, ritual, or both. In Sirohi district, tribal population resides in remote area and uses plants either from their surroundings or from remote forest or hilly areas; therefore, proper documentation and awareness are required. Tribal communities have low socioeconomic and educational levels; they are more likely to seek treatment from tribal healers.<sup>[12]</sup> The tribal population still relies on medicinal plants, for management of common ailments such as cough, cold, coryza, diarrhea, fever, skin infections, scorpion bite, heatstroke, fever, piles, and tooth infections, etc., As tribal healers believe in the treatment of various ailments by the traditional way using medicinal plant rather than modern medical treatment, our research group is also creating awareness among tribal healers regarding need of modern medicine for various life-threatening diseases; therefore, nowadays, they refer patient to nearest public healthcare center if patient is serious. Data collected from the

tribal healer illustrate that skin disorders, inflammatory diseases, and common infections are treated with the highest number of tribal practices. A study conducted by Meena *et al.*,<sup>[13]</sup> 2010 among the Garasia tribe of in the Sirohi district, reported that traditional plants like *Plumbago zeylanica*, *Anogeissus sericea*, *Cissampelos pareira*, *Dendrophthoe falcata*, *Ensete superbum*, *Grewia asiatica*, *Habenaria marginata*, etc., were used for topical or external use for various conditions like wound, pain, swelling, joint pain, or inflammation. Another study by Goyal *et al.*<sup>[14]</sup> 2011 in Jodhpur region of Rajasthan reported the use of *Achyranthes aspera* for asthma, cough, and gynecological purposes; *Abrus precatorius* for urinary disorders, abortion, and contraception; *Acacia catechu* as astringent, antidiarrheal, hemostatic; *Capparis decidua* as an antidiabetic, antihyperlipidemic, analgesic, and anti-inflammatory; *Euphorbia caducifolia* in leukoderma and earache, while *Ziziphus nummularia* as antidiarrheal and anti-infective for skin diseases. In our study, *Argemone mexicana* leaves extract commonly used in skin disorders. Another plant *Abrus percutarius* has reported to use as abortifacient,<sup>[15]</sup> while in our study whole plant used in scorpion bite which is a new indication. The therapeutic and palliative effects of certain herbs and shrubs are well known among tribal populations all over the world, and this indigenous knowledge is usually transferred from one generation to another generation by elders in folk traditional communities.

In recent times, human interventions in the natural process resulted in the extinction of traditional medicinal plants, which has resulted in the loss of vital indigenous knowledge linked with these plants.<sup>[16]</sup> Therefore, ethnobotanical research and scientific documentation of medicinal plants and indigenous knowledge are required. These studies are incredibly helpful in identifying endangered medicinal plant species and taking immediate conservation efforts. In our study, we have observed that some plants used for medicinal purpose are critically endangered like *Commiphora wightii* and it is over-harvested in the area. Rare *Calotropis gigantea* and *Withania coagulans* (R), *Oligochaeta ramosa* (VU), and *Ziziphus truncata* are endangered species.<sup>[17,18]</sup> According to red book data category, *Commiphora wightii* comes as a critically endangered species (CS) because of its use in traditional medicine *C.wightii* has been over-harvested and has become so scar. Other rare *Calotropis gigantea* and *Withania coagulans* (R), *Oligochaeta ramosa* (VU), and *Ziziphus truncata* are endangered species.<sup>[18,19]</sup> The findings of this study provide a concise description of prevailing traditional healing practices in the tribal area. Ethnomedicine is considered the source of all traditional and complementary systems of medicine and even modern medicine. The study on ethnomedicine analysis is considered to be helpful for the scientific community to provide data on the therapeutic value and safety of herbal medication.

## Conclusion

To the best of our knowledge, this study is the first one to map the tribal healers and document their healing knowledge in such an extensive way in district Sirohi, Rajasthan. Indigenous remedies and ethnopharmacological uses have become

acknowledged instruments in the hunt for new sources of pharmaceuticals in modern therapeutic medicine. As a result, accurate documentation, identification of plant species utilized, herbal preparation, and dose are required to conserve this indigenous knowledge on traditional remedies. Phytochemistry and pharmacological study of traditional remedies play an important role in medicinal plant research and indigenous knowledge systems at the moment. Sharing such knowledge is critical for keeping conventional medical options, especially since alternative medicine is becoming more popular due to its lower costs and increased trust in herbal medications. Validating the relationships between ethnomedical applications, bioactive compounds, and biological and pharmacological effects is critical and will continue to be the focus of future research.

### Acknowledgement

Authors are thankful to all the participants and whole research team of Centre of Excellence for Tribal Health, AIIMS, Jodhpur. Authors are extremely thankful to Dr. naval Jit kapoor, Joint Secretary, Ministry of Tribal Affairs, Government of India for his constant guidance and support.

### Financial support and sponsorship

The study was funded by Ministry of Tribal Affairs, GOI, with file no 15025/10/2019-R&M (15849).

### Conflicts of interest

There are no conflicts of interest.

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