

Ethnobotanical and economic uses of some medicinal plants from native saline areas

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Abstract

Man is using plants for curing different diseases for several hundred years. In Pakistan, rangelands and forests are the major sources of medicinal plants, and the residents of different areas including those of the Vanhar Valley depend upon local plants for the medication of several diseases. However, this study was planned to enlist the indigenous medicinally important flora, which will help in conservation of the vanishing knowledge about the indigenous plants of the area by proper documentation. In order to document the uses of indigenous plants, some surveys were conducted for the collection of all available species. For the documentation of uses of these indigenous plant species, 55 experts were interviewed and their knowledge was documented. A total of 41 species belonging to 25 families were recorded from the Vanhar Valley. High numbers of species of families Fabaceae, Amaranthaceae and Asteraceae were used for the cure of several diseases like sexual disorders, piles, asthma, sputum, stomach disorders, diabetes, etc. It was evident that the older people had most of the knowledge about the indigenous plants of the Valley, while the young lacked such knowledge due to the death of older people without documenting or transferring the knowledge to them. With conservation of the knowledge, these plants can be used as a low-cost and effective treatment of many common diseases.

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Introduction

Ethnobotany is the interaction between humans and plants, in which human populations depend on plants (Kimondo et al., 2015). Man started to use plants for the purpose of shelter, food and medicine from the beginning of his life on earth with the passage of time, and learnt to use plants in many modern ways by increasing his dependency on plants. Ethnobotanical information about the plants of an area is critically important as these plants can be used for the well-being of humans (Soni and Agrawal, 2018). In addition to documenting the conventional uses of plants, ethnobotanical information also helps taxonomists, ecologists and pharmacologists to socioeconomically uplift the poor people of an area (Tiwari et al., 2020).

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Ethnobotanical information mainly focuses on the economic importance of plants and the methodology of using plants as medicines. Studies conducted by researchers and international organizations like WHO show that up to 90% of rural populations use plants for the cure of many of diseases. Previous studies also show that human populations use plants mainly for the purpose of food and medicines (Gaoue et al., 2017). Many studies have been performed to document the ethnobotanical knowledge in Asia, Arab states, Palestine, and Morocco (Ali-Shtayeh et al., 2000; Jouad et al., 2001; Azaizah et al., 2003), as well as Pakistan (Malik et al., 2015; Abbas et al., 2016).

In the Salt Range (32° 35' 39.78" N – 72° 20' 46.75" E), a very rich diversity of plants is found. *Senegalia modesta*, *Dodonaea viscosa*, *Olea europaea* subsp. *cuspidata*, *Salvadora oleoides* and *Monothea buxifolia* were abundant species in the semi-evergreen forests of the Salt Range. Kallar Kahar (32° 46' 53.83" N – 72° 41' 59.05" E), a historical city is located in the North-East of the Vanhar Valley. Local people of Kallar Kahar use wild herbs of the area in their routine lives. These herbs are easily available and also have no side effects. The people of Kallar Kahar are poor and have a simple life style. It is difficult for them to afford expensive treatments of common diseases like fever, cold, cough, and diarrhea. Local herbs of the area provide them with an inexpensive cure to many of the common diseases. The local communities of Kallar Kahar use mainly 29 medicinal species that were inexpensive and had low side effects. Some of the common medicinal plants of the Kallar Kahar region include *Amaranthus viridis*, which is used to cure snakebite and scorpion stings. *Carthamus oxycantha* is another plant, which is used for treating ulcer and itch (Ahmad and Husain, 2008). *Sonchus arvensis* is an antiseptic, which is used to cure cough and asthma. *Cannabis sativa* is taken as a drink for narcotic action, and used as a refrigerant. *Solanum surattense* is used for toothache (Bibi et al., 2014).

No measures have been taken for the protection of wild plants in the Vanhar Valley. Young people of the Valley lack the knowledge about the right time of collection and the correct use of these plants. It may lead to misuse of the species. The quality of therapeutically active ingredients can be determined by collecting desired plant parts of specific age at appropriate timings. However, the present study was designed to document the ethnobotanical knowledge about the indigenous plants of the area, and suggest the location within this area where the plants are found more frequently.

Materials and Methods

Study Site

Vanhar Valley (32° 39' 19.83" N – 72° 32' 46.75" E) is located in district Chakwal. Its terrain is mostly hilly. The average temperature during winter normally ranges between –4 °C and 25 °C, while in summer the average temperature is between 15 °C and 40 °C, and the average rainfall is about 650 mm (Ahmad et al., 2010). The Vanhar Valley is surrounded by the mountainous region of the Salt Range in the East, District Talagang in the West, District Khushab in the South, and Potohar plateau in the North (Figure 1). The Vanhar Valley consists of degraded scrubs under severe grazing pressure. Its elevation ranges from 520 to 1000 m a.s.l.

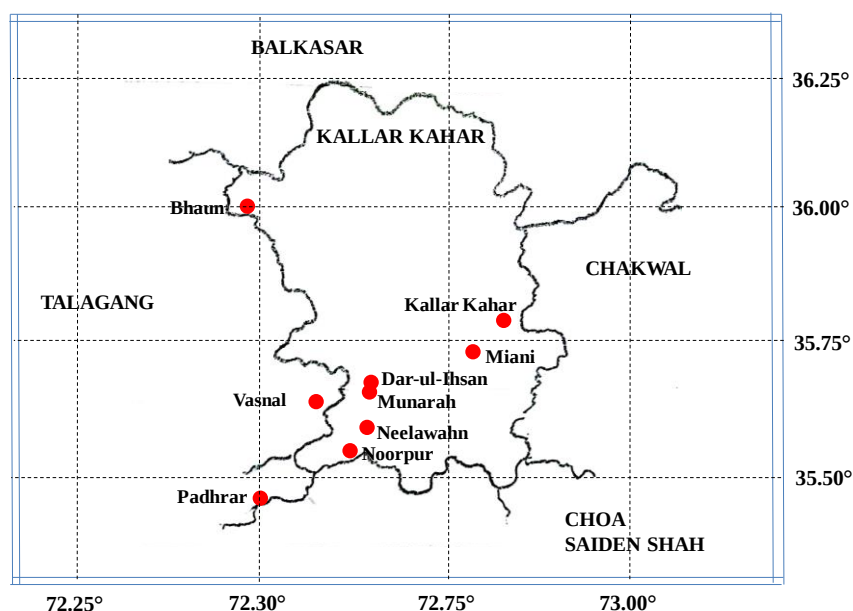


Figure 1: Plant sampling sites in the Vanhar Valley, Punjab, Pakistan

Data Collection

Indigenous plants of the Vanhar Valley were collected after getting permission from the rural community as per the concerns of Kyoto protocol about the property rights of residents of the area (Böhringer, 2003). All the indigenous plant species of the area were collected, photographed, and preserved. Afterwards, they were identified by some expert taxonomists of the University of Agriculture Faisalabad, but their local names were confirmed by the local community. The plants were mounted on herbarium sheets and submitted to the Herbarium, Botany Department, University of Agriculture Faisalabad. In order to document the conventional knowledge about the vegetation of the Vanhar Valley, 55 experts including farmers and local medical practitioners (Hakeems) were interviewed and their knowledge about the local plants and their use in the folk medicines were documented. The interviews were carried out in local Punjabi language. The interviewed 55 local experts aged between 20 to over 80 years. Most of the plants were known to the old people and a descending trend was observed in the ethnobotanical knowledge of relatively young people (Figure 2). The interviews were conducted after explaining the aims and importance of the study. The most frequently asked questions during the interviews were about the local names and uses of plants for different diseases.

Results and Discussion

A total of 41 species belonging to 25 families were recorded from the Vanhar Valley (Table 1). These plants were collected during several surveys of the Valley and their local uses were documented after collecting appropriate information from the local experts. The results showed that the most dominant medicinally important family in the area is Fabaceae consisting of six species, followed by Amaranthaceae and Asteraceae each comprising four species. The dominance of families Fabaceae, Asteraceae and Amaranthaceae has been recorded in other parts of the world such as Italy (Cornara et al., 2009) and sub-Saharan Africa (Van Wyk, 2020). The most widely used plants in the Valley included *Achyranthes aspera*, *Conyza bonariensis*, *Peganum harmala*, *Justicia adhatoda* and *Olea europaea* subsp. *cuspidata*, and the mostly used life forms for the ethnobotanical purpose were herbs 17 species out of 41 followed by 13 shrubs and 11 tree species. Generally, the whole plant of herbaceous species is used for preparing medicines. A total of twenty plants including herbs, shrubs and trees were reported under use for medicinal and economic purposes, followed by the use of fruit of 11 and leaves of 7 plants (Figure 3). In addition, roots, twigs, flowers, seeds, pods, gum, and latex of the plants were also used. A similar use of the herbs was also reported by Shinwari and Khan (2000). Most of the prepared medicines were in powder form, and were advised orally to the patients. The treatment of different diseases by administering medicines orally was also confirmed in other similar studies (Macía et al., 2005).

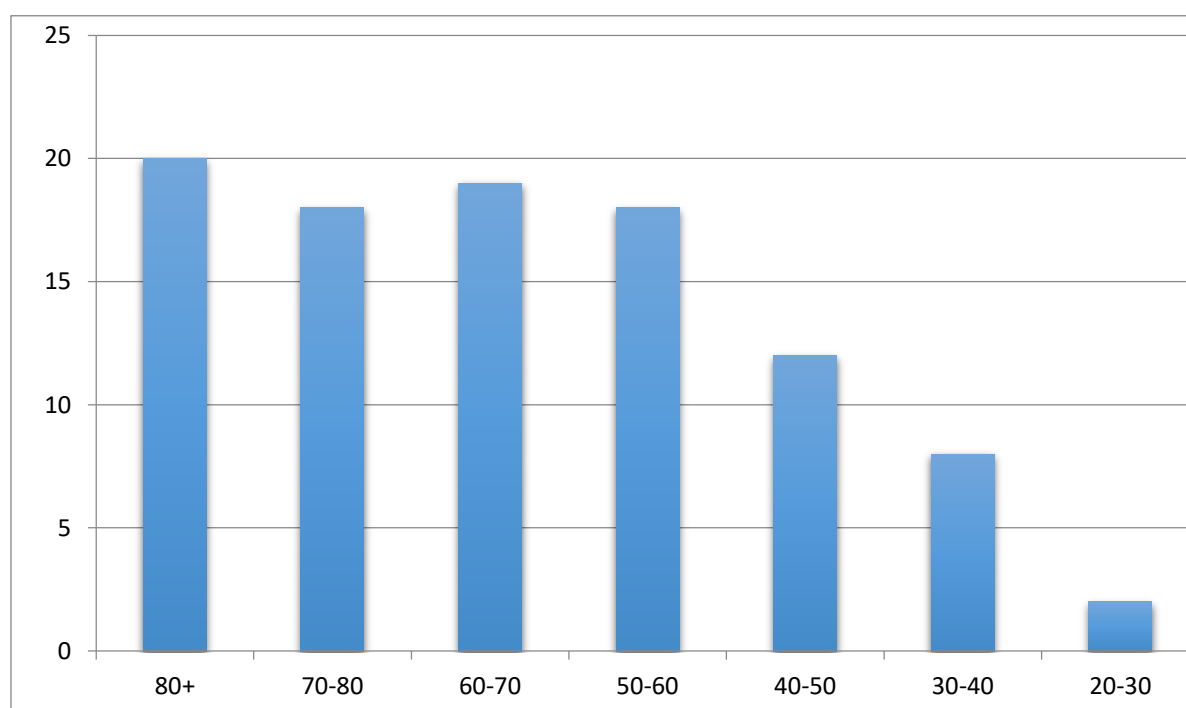


Figure 2. Number of medicinal plants known to persons of different age groups

Table 1: Ethnobotanical uses of some indigenous plants of Vanhar Valley, Punjab, Pakistan

Botanical Name	Local Name	Location	Habit	Part Used	Medicinal Uses
Acanthaceae					
<i>Justicia adhatoda</i> L.	Vahekar,	Throughout Vanhar			Cough, sputum, asthma
Amaranthaceae					
<i>Aerva javanica</i> (Burm. f.) Juss. ex J.A. Schultes var. <i>javanica</i>	Ont Katara	NeelaWahn			Diuretic
<i>Alternanthera pungens</i> Kunth	Itsit	Dar-ul-Irfan			Constipation, diarrhea
<i>Amaranthus viridis</i> L.	Kerand Bathu	Kallar Kahar			Body pains, aphrodisiac
<i>Achyranthes aspera</i> L. var. <i>aspera</i>	Puth Kanda	Padhrar			Cough, asthma, sputum
Apocynaceae					
<i>Periploca aphylla</i> Decne.	Bata	Vasnal			Sputum, back pain, stomach disorders, kidney disorders
<i>Calotropis procera</i> (Aiton) W. T. Aiton	Ak, Madar	Throughout Vanhar			Piles, asthma, sputum and stomach acidity
Asparagaceae					
<i>Asparagus adscendens</i> Roxb.	Doosh	Vasnal			Fever, stomach disorders
Asteraceae					
<i>Parthenium hysterophorus</i> L.	Kaabli Bota	Miani			Diabetes
<i>Launaea procumbens</i> (Roxb.) Ramayya & Rajagopal	Pevari	Vasnal			Aphrodisiac, liver inflammation
<i>Carthamus oxyacanthus</i> M.Bieb.	Pohli	Noorpur			Blood cleansing, itch
<i>Erigeron bonariensis</i> L.	Baboona	Throughout Vanhar			Kidney disorders, kidney stone
Bignoniaceae					
<i>Tecomella undulata</i> (Sm.) Seem.	Lahura	Dar-ul-Irfan			Liver and spleen diseases, tumors
Boraginaceae					
<i>Trichodesma indicum</i> (L.) Sm.	Kanghi Boti	Dar-ul-Irfan			Chest infections, pneumonia, intestine disorders, fever
Cactaceae					
<i>Opuntia monacantha</i> Haw.	Thor	Bhaun			Piles, diabetes
Cannabaceae					
<i>Cannabis sativa</i> L. subsp. <i>sativa</i>	Qanab, Bhang	Kallar Kahar			Relaxant
Celastraceae					
<i>Gymnosporia royleana</i> Wall. ex M. A. Lawson	Kandair	Noorpur			Blood pressure
Euphorbiaceae					
<i>Euphorbia clarkeana</i> Hook.f.	Jins Amala	Dar-ul-Irfan			Cancer, rheumatism, neuralgia, asthma, bacterial infections
Fabaceae					
<i>Prosopis juliflora</i> (Sw.) DC. var. <i>juliflora</i>	Angreezi Kikar	Throughout Vanhar			Bacterial infections
<i>Dalbergia sissoo</i> Roxb. ex DC.	Tahli	Miani			Blood purifier, intestine infections, mental disorders
<i>Albizia lebbek</i> (L.) Benth.	Sharenh, Serish	Throughout Vanhar			Eye-sight, piles, hyperglycemia
<i>Millettia pinnata</i> (L.) Panigrahi	Sukh Chain	Miani			Tumors, piles, skin diseases, ulcers
<i>Senegalia modesta</i> (Wall.) P. J. H. Hurter	Phulahi	Throughout Vanhar			Itch
<i>Vachellia nilotica</i> (L.) P. J. H. Hurter & Mabb. subsp. <i>indica</i> (Benth.) Kyal. & Boatwr.	Babool	Throughout Vanhar			Likoria, hepatitis
Lamiaceae					
<i>Otostegia limbata</i> (Benth.) Boiss.	Awani Jhari	Dar-ul-Irfan			Antispasmodic, antiulcer, antidepressant, sedative, anxiolytic, anti-inflammatory
<i>Salvia moorcroftiana</i> Wall. ex Benth.	Jangli Tambaku	Dar-ul-Irfan			Asthma

Table 1 continues on next page

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Meliaceae					
<i>Melia azedarach</i> L.	Dhrek, Bakayn	Noorpur			Piles
Moraceae					
<i>Ficus benghalensis</i> L.	Borh, Bargad	Noorpur			Backbone pain, likoria, diabetes, tonic
<i>Ficus palmata</i> Forssk.	Khabari	Noorpur			Wounds, skin diseases, eye diseases, leucorrhea, diabetes, diarrhea
Nitrariaceae					
<i>Peganum harmala</i> L.	Hermal	Kallar Kahar			Antiseptic, blood purifier, fever
Oleaceae					
<i>Olea europaea</i> L. subsp. <i>cuspidata</i> (Wall. ex G. Don) Cif.	Kahu	Munarah			Cancer, constipation, piles
Oxalidaceae					
<i>Oxalis corniculata</i> L.	Khatti Boti, Khattitar,	Munarah			Liver disorders, jaundice, anemia
Pteridaceae					
<i>Adiantum capillus-veneris</i> L.	Hansraj	Neelavahn			Circulatory disorders, asthma
Rhamnaceae					
<i>Ziziphus mauritiana</i> Lam.	Biar	Throughout Vanhar			Piles
<i>Ziziphus nummularia</i> (Burm. f.) Wight & Arn.	Malha Biar	Throughout Vanhar			Hepatitis
Rosaceae					
<i>Eriobotrya japonica</i> (Thunb.) Lindl.	Lokaat	Kallar Kahar			Hyperglycemia, thirst
Sapindaceae					
<i>Dodonaea viscosa</i> Jacq. subsp. <i>viscosa</i>	Sanatha	Throughout Vanhar			Laxative, spasmolytic, antiviral, anti-inflammatory, antimicrobial, hypotensive
Solanaceae					
<i>Solanum incanum</i> L.	Mahaukri	Munarah			Typhoid, toothache
<i>Solanum virginianum</i> L.	Choti Mahaukri	Noorpur			Abdomen diseases, chronic fever
Zygophyllaceae					
<i>Tribulus longipetalus</i> Viv. subsp. <i>longipetalus</i>	Choi booti	Dar-ul-Irfan			Kidney diseases
<i>Fagonia indica</i> Burm. f. var. <i>indica</i>	Dhmasah, Dhmanh	Dar-ul-Irfan			Cancer, piles, blood purifier

Life forms: Herb



Shrub



Small tree



Tree



Parts Used: Whole plant



; Root



; Twig



; Leaves



; Flowers



; Fruit



; Pod



; Seed



; Bark



; Wood



; Latex



; Gum



The highest numbers of plant species (8) were used to address the sexual disorders followed by seven plant species for piles, five for blood cleansing and against asthma, four for curing sputum, stomach disorders and diabetes, three for low fever, toothache, tooth worms and a variety of itches (Figure 4). In addition, two plants were used against hepatitis, cough, urinary disorders, intestinal infections, pain in backbone, liver disorders, and as relaxant. The problems like cancer, high fever, mental disorders, constipation, flu, high blood pressure, lice, ticks, headache, typhoid, abdomen diseases, gonorrhea, pneumonia, jaundice, anemia, and wounds were also treated by the local plants. Moreover, the local plants were also used to improve sight, as refrigerant and as antiseptic. Thus, the medicinal plants of the Vanhar Valley were used to cure 37 different types of diseases on local levels. Similarly, some plants were used for other economic uses such as fuel-wood and for manufacturing furniture. The use of local plants for blood purification, wound healing, and as diuretic and anti-diabetic has also been recorded by Adnan et al. (2014) in NWFP. Bano et al. (2014) also noted the use of local plants at Karakoram-Himalayan range for the treatment of stomachache, wounds, asthma, diabetes, and jaundice. Moreover, the older people and local medical practitioners (hakeems) use their expertise to diagnose different diseases and then treat them with the help of herbal medicines prepared from the local plants.

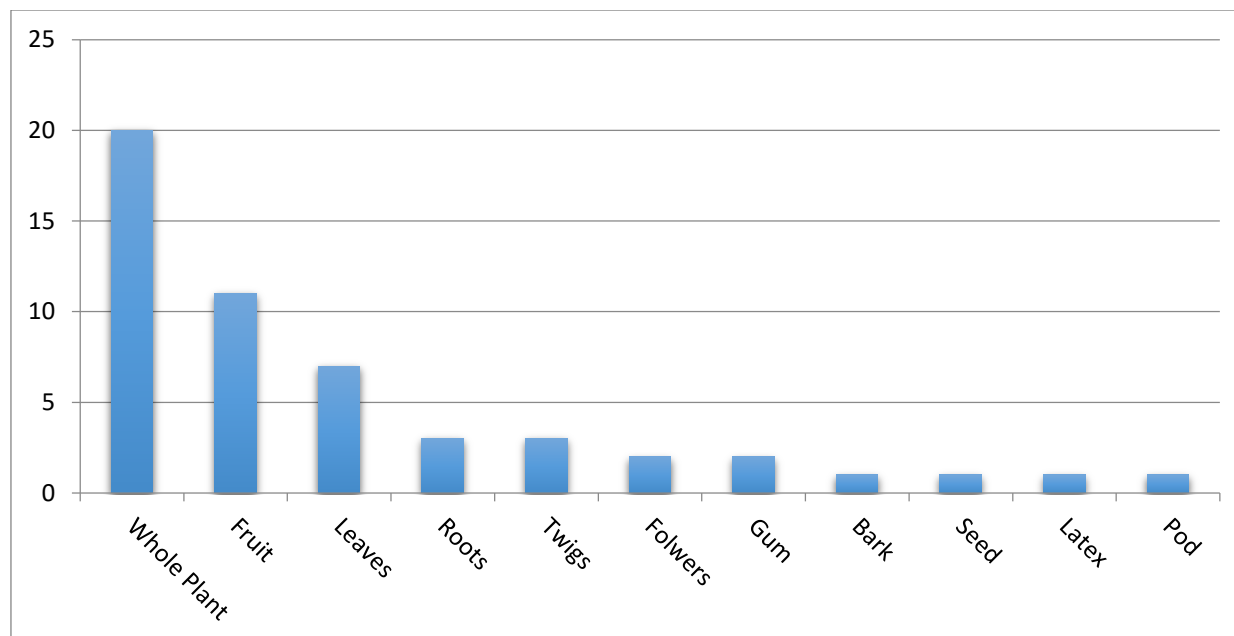


Figure 3: Frequently used plant parts for curing different diseases

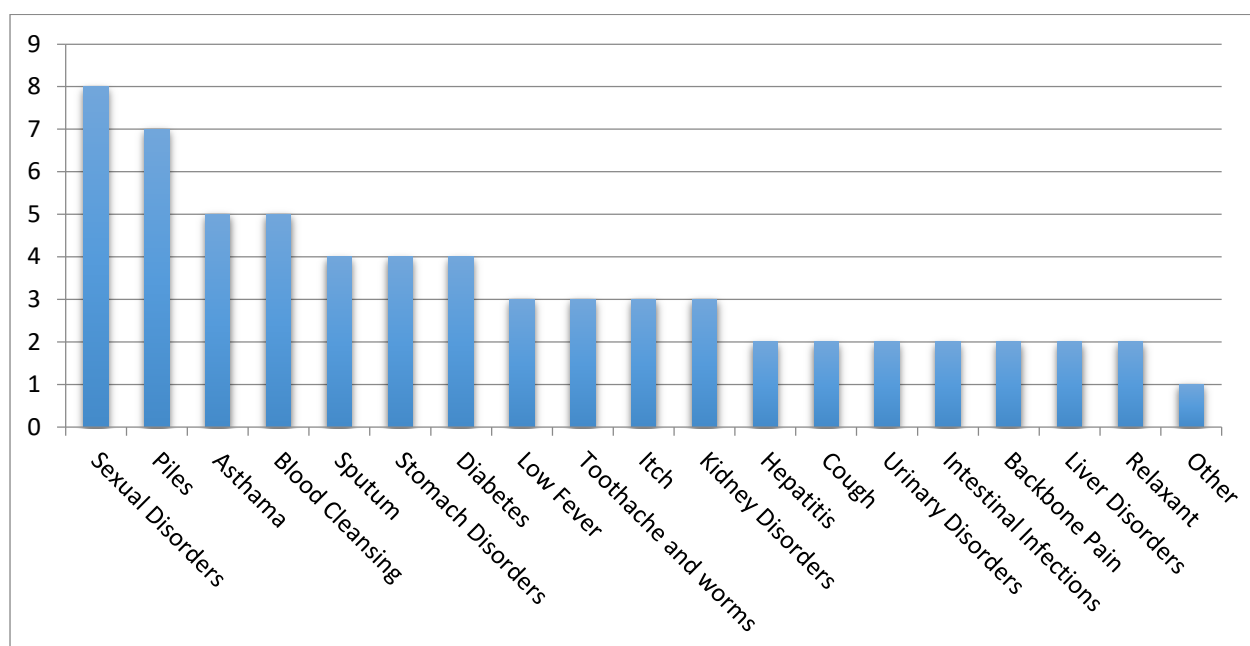


Figure 4: Number of plants used to treat different diseases

Variation in ethnomedicinal knowledge is always a good sign, because this new information about medicinally important plants may lead to a better treatment of several diseases. In our study, a variation in the uses of plants was evident as compared to that in other studies (Nankaya et al., 2020; Schultz et al., 2020). This variation makes the conservation of ethnobotanical knowledge of the people of the Vanhar Valley critically important. It is also evident from **Figure 2** that most of the older people had the ethnobotanical knowledge. However, the young lack knowledge about the indigenous plants of their area. This is because of the death of older people in the area without transferring the indigenous knowledge to the young, thus imposing a threat to the conservation of knowledge of indigenous flora of the Vanhar Valley.

Conclusion

In our study, 41 medicinally important species belonging to 25 different families were found, which were used to cure 37 different types of diseases, and of these 41 species, most life forms were herbs. Most of these herbs were ground completely to make powder which is used to treat many diseases. In

addition, fruits of some plants were also important, which were used to make aphrodisiac medicines. The most important disease being treated by indigenous plants of the Valley included sexual disorders, piles, asthma, sputum, stomach disorders, and diabetes. The most widely used plants in the Valley included *Achyranthes aspera*, *Conyza bonariensis*, *Peganum harmala*, *Justicia adhatoda* and *Olea europaea*. The older people had most of the knowledge about the indigenous plants of the Valley, while the young lacked such knowledge due to the death of older people without documenting or transferring the knowledge to them.

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Ethical approval

This study does not involve Human/animal subjects and no ethical approval is needed.

Handling of bio-hazardous materials

The author(s) certify that all experimental materials were handled with care during collection and experimental procedures. After completion of experiment, all materials were properly discarded to minimize any types of bio-contamination(s).

Availability of primary data and materials

As per editorial policy, experimental materials, primary data or software codes are not submitted to the publisher. These are available with corresponding author and/or with other author(s) as declared by the corresponding author of this manuscript.

Author's consent

All authors contributed in designing and execution of the experiment. All contributors have critically read this manuscript and agree for publishing in IJAEB.

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