

Socio-Economic Impact of Ethnobotanical Appraisal of Traded Medicinal Plants on Local Communities of District Astore (Gilgit Baltistan)

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Abstract

*Medicinal plants are the only possible solution to treat various complications of human beings. The local community of district Astore, Gilgit Baltistan are dependent on medicinal plants for their primary healthcare. The present study was conducted to identify and document the medicinal uses of traded medicinal plants and to assess their socio-economic impact and current status in the respective area. A total of 26 traded medicinal plants were explored from the various villages as informed by the experienced respondents. The collected plants were pasted on herbarium sheets for identification purpose. Ethno medicinal uses were also documented and the collected data was analyzed by using statistical indices i.e. Use value, Relative frequency citation, Fidelity level and Pearson correlation coefficient. Questionnaire survey was conducted and 80 respondents were interviewed to assess the socio-economic impact and current status of traded medicinal plants. The most frequent used part of medicinal plant was leaves followed by roots and seeds. The RFC (0.88) and UV (0.98) were recorded highest for *Thymus linearis*. The Pearson correlation coefficient value between RFC and UV was 0.944, indicating a strong relationship between RFC and UV. Survey results showed that the traded medicinal plants played a pivotal role by enhancing socio-economic condition of local communities. Findings also indicated that the traded medicinal plants are gradually decreasing due to anthropogenic activities like improper method of collection, illegal trade, unsustainable use and lack of protection and conservation measures.*

Keywords: Ethnobotanical, Medicinal Plants, Socio-economic Impacts, Gilgit Baltistan.

Introduction

The plants that are used to cure and prevent certain illnesses and diseases in humans are known as medicinal plants (Nwachukwu et al., 2010). In order to preserve local indigenous knowledge about therapeutic plants of a particular area, ethnobotanical surveys are crucial (Karous et al., 2021). These studies offers a chance to identify novel active substances in plants that can be used to treat certain fetal diseases (Arshad et al., 2014). The traditional ethnobotanical data on medicinal plants are important for the conservation, protection and development of medicinal plants (Zahoor et al., 2017). The therapeutic plants are being utilized for curing of numerous diseases from prehistoric

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times. Traditional medicine relies on medicinal plants as its "backbone" (Singh, 2015). They are commonly utilized as raw products for isolating active compounds which are utilized in the manufacturing of various drugs (Singh, 2015). Many of today's medicines are prepared from therapeutic plants (Gilani et al., 2010). In many cases, plants used as herbal remedies are not only essential as drugs, but they are also source of food supplements with minerals and vitamins (Okello et al., 2010).

There are approximately 258,650 kinds of higher plants worldwide (Shinwari, 2010), out of these plants more than 10% of them are being utilized medicinally (Gilani & Rahman, 2005). According to studies between 35,000 to 70,000 species of plants are employed in traditional medicine, worldwide (Ali & Qaiser, 2009). Medicinal plants have been used to cure ailments in local inhabitants throughout the world for thousands of years, and they continue to be an important part of primary health care for about 85 percent of the world's population (Pesic, 2015) and they are used for the preparation of 80 percent of all allopathic medicines (Bauer & Bronstrup, 2014). Medicinal plants are not only pivotal for the primary health care, but they also contribute significantly to the livelihoods of unprivileged people across the world (Saganuwan, 2010).

The Pakistan's flora is diversified, due to its varied climate, multiple ecological zones and soil conditions. According to a study performed by the Pakistan Forest Institute, 75 raw therapeutic plants are widely exported and over 200 are traded locally in Pakistan (Humayun, 2007). For all or majority of their medical requirements, more than 75 percent of Pakistan's population relies on traditional medicinal plants (Shinwari & Qaisar, 2011).

Gilgit-Baltistan is a hub for therapeutic plants and their use in Pakistan, with more than 300 species of therapeutic plants documented (Shedayi & Gulshan, 2012). If sufficient awareness is formed among local populations and end users, the northern portions of Pakistan offer good sources for the sustainable export of medicinal plant. It could be useful in terms of providing a source of income for the local community. Astore valley has been the major exporting location of medicinal plants in northern parts since the British era till now (Khan, 2004). So it is famous as a hub of traditional medicinal plants (Shinwari & Gilani, 2003). Approximately 95% of therapeutic plants are spread as wild plants in the Astore valley (Dickore & Nusser, 2000).

The various plant species found in a given area can be utilized as food, a source of revenue, or for therapeutic purposes (Hamayun, 2005). Medicinal plant trade accounts for around 30% of the global medicine market. The global trade in therapeutic plant products is currently valued at over US\$ 75 billion per year and is anticipated to achieve \$5 trillion by 2050, expanding at a rate of 12.5 percent per year (Shinwari, 2010).

Every year, Pakistan sells high-quality plant worth more than \$10.5 million dollars (Shinwari & Gilani, 2003). In Pakistan over last decades there is growing commercial and scientific interest in medicinal plants. It is because of economic potential of medicinal plants and their products (Sher et al., 2014). So beside health care medicinal plants gathered for trade play an essential contribution to household economies (Sher & Hussain, 2009).

Traditional knowledge about the ethnomedicinal importance of medicinal plants should be preserved for our future generations. It can be helpful for the development of new medicines. There was lack of information about the ethnomedicinal potential of traded medicinal plants their identification, current status and socio-economic impact on the local community of district Astore. So People harvest traded medicinal plants in an unsustainable way. Due to which a substantial number of traded medicinal plant species are becoming scarce, and several are on the verge of extinction. Therefore, the study was conducted to identify and collect the traditional

ethanobotanical knowledge about the economically important medicinal plants and to assess their status and socio-economic impact on local community of district Astore Gilgit Baltistan, Pakistan.

Significance of the Research

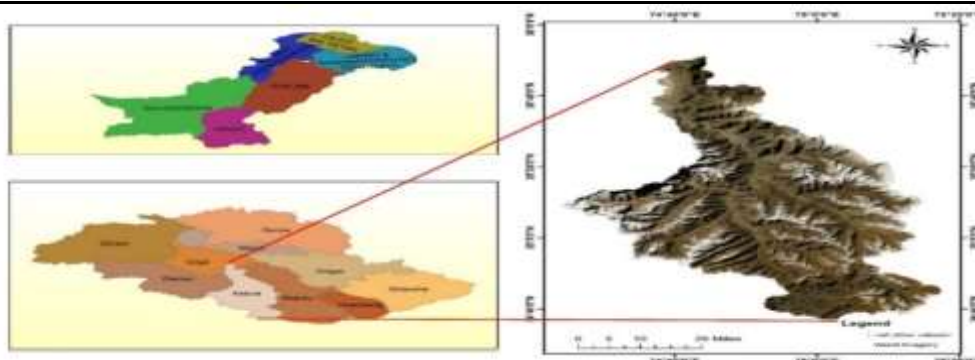
Medicinal plants are exchanged as intellectual property, resulting in the development of herbal companies which play a significant role in medicine discovery and the preservation of traditional information for the benefit of people's health and wealth. The medicinal plants which are traded are not only one of the most important components of healthcare, but they are also pivotal for the economic development of a nation (Alves & Rosa, 2007). The medicinal plant trade has been recognized as an alternate source of income for communities living close to forests, so because of its economic importance, it has been recommended that it may be used to support forest conservation (Jusu & Sanchez, 2013). The ethnobiological method of preserving indigenous knowledge is essential for medicinal plants sustainable use and conservation (Dalle et al., 2004). So the study promotes identification, documenting local uses of medicinal plants and preserves the knowledge and also helps in the conservation and sustainable use of medicinal plants.

Materials and Methods

Study Area

The study has been conducted in district Astore, Gilgit Baltistan. Astore valley lies between 34.5°-35.8° N latitude and 74.4°-75.2° E longitude, at an elevation of 8500 ft from sea level. The valley covers a total area of 5092 square kilometers, with temperatures ranging from -4.3 degrees Celsius in winter in the upper zone of Astore valley to 31 degrees Celsius in the summer. The summer month remains from May to August and is very short. The mean monthly precipitation is between 33.9 to 750 mm. The precipitation falls as rain in the lower areas and in the upper areas it falls as snow. Majority of the forest patches in district Astore are dry temperate coniferous forest with Kail (*Pinus wallichiana*), Spruce (*Picea smithiana*), Fir (*Abies pindrow*) and Juniper (*Juniperus communis*, *Juniperous exelsa*). The region is recognized as a medicinal plant center because of its vast variety of medicinal plants. The primary occupation of the people is livestock rearing. Patris (*Aconitum heterophyllum*), Zeera (*Carum carvi*), Sea buckthorn (*Hippophae rhamnoides*), Thumuro (*Thymus linearis*), Zakhm-e-Hayat (*Bergenia ciliata*), Kashmal (*Berberis lycium*) and Wild rose (*Rosa webbiana*) are the principal medicinal plants in the area (Ali et al., 2000).

Figure 1: Map of Astore district



Field Survey

The field survey was carried out from September 2021 to July 2022. During this survey different field trips were undertaken for collection of traded medicinal plants with the help of local community and to obtain information about the uses of traded medicinal plants for the treatment of various diseases by the natives of the study area. For it simple interviews and semi structured questionnaire was used. During the interviews local name and part of traded medicinal plants used for treatment of diseases were also documented. Questionnaire survey was also carried out to assess socio-economic impact and current status of traded medicinal plants. Before taking interviews and questionnaire survey verbal consent were taken from the respondents and the basic goal and objectives of the study were illuminated to remove any kind of confusion from the informants.

The data was collected from the 80 inhabitants, having 64 males and 16 females. The respondents who were selected for the survey were shepherds, hakeems and local community. Majority of the respondents were old aged because they have more knowledge about medicinal plants. Mostly the data was taken from male inhabitants because female inhabitants were reluctant for providing information due to some cultural and religious issues. So data was collected from few females after their consent and no photographs were taken with them. Different forms of traded medicinal plants were also reported throughout the entire survey consisting trees, shrubs and herbs.

Figure 2: Field visits for questionnaire survey



Herbarium Specimen Preparation

Different traded medicinal plant specimen was collected with their photographs and natural habitat of the plants were also noted. The plants were collected from various villages with the help of shepherds, local community and hakeems. After collection the traded medicinal plant specimen were pressed, dried, and mounted or fixed on the herbarium sheet with the help of scotch tape after removing unnecessary parts for the identification purpose. The plants were also preserved from insects. Plant samples were identified from the existing or available literature (Nasir and Ali, 1970) and were also confirmed by Botany Expert, Prof. Dr. Rahmatullah Qureshi (Department of Botany, Arid Agriculture University, Rawalpindi). After that the collected traded medicinal plant specimens were deposited in the respective Department for future studies and analysis.

Questionnaire Data Analysis

In this research, quantitative research method was used. Therefore the collected data was analyzed through frequencies and percentage. Statistical package for social science (SPSS) was used as an

efficient tool for analysis of data.

Quantitative Ethnobotanical Data Analysis

The collected data about the uses of therapeutic plants was quantitatively analyzed by using ethnobotanical indices i.e. Use value, Relative frequency citation, Fidelity level, and Pearson's correlation coefficient.

Relative Frequency Citation (RFC)

It indicates the importance of various medicinal plant species in an area. The relative frequency citation was calculated by using the given formula.

$$RFC = \frac{FC}{N} \quad (0 < RFC < 1)$$

Where "FC" is the number of informants who mentioned the use of a plant species and "N" is the total number of participants in the survey (Birjees et al., 2021).

Use Value (UV)

The Use Value (UV) indicates the relative importance of plants present in an area. It was calculated by using the following formula (Khan & Razzaq, 2018).

$$UV = \frac{\sum Ui}{N}$$

Where " $\sum Ui$ " is the sum of number of uses mentioned by each informant for a given species and "N" is the total number of participants.

Fidelity Level (FL)

It is the ratio between number of participants who mentioned the use of a plant species for a particular purpose and total number of informants who mentioned the use of that plant species for any purpose. "FL" tells us about the percentage of informants claiming the use of plant species for same major purpose (Friedman et al., 1986). It was calculated by using following formula.

$$FL = \frac{N_p}{N} \times 100$$

Where " N_p " indicates the number of participants who independently suggested the use of a plant species for a particular disease and "N" is the total number of informants who mentioned the use of same plant for any disease.

Pearson correlation coefficient

Pearson correlation coefficient is a good measure to numerically quantify the nature of the linear relationship between two variables. In order to check the strength of relationship between VU and RFC, Pearson correlation coefficient was used among the values of RFC and UV.

Results and Discussion

Identification of traded medicinal plants

A total of 26 different traded medicinal plants belonging to different families were collected from various high altitude villages of district Astore with the help of local community, hakeems and shepherds. After collection the traded medicinal plant specimen were pressed, dried, and mounted or fixed on the herbarium sheet with the help of scotch tape after removing the unnecessary parts. The plants were also preserved from insects. After that they were identified by using flora of Pakistan (Ali & Nasir, 1989) and confirmed by Prof. Dr. Rahmatullah Qureshi (Botany expert at

Department of Botany, Arid Agriculture University, Rawalpindi). After that the collected traded medicinal plant specimens were deposited in herbarium of Arid Agriculture University Botany Department which will be helpful for future studies.

Inventory of traded medicinal plants of district Astore

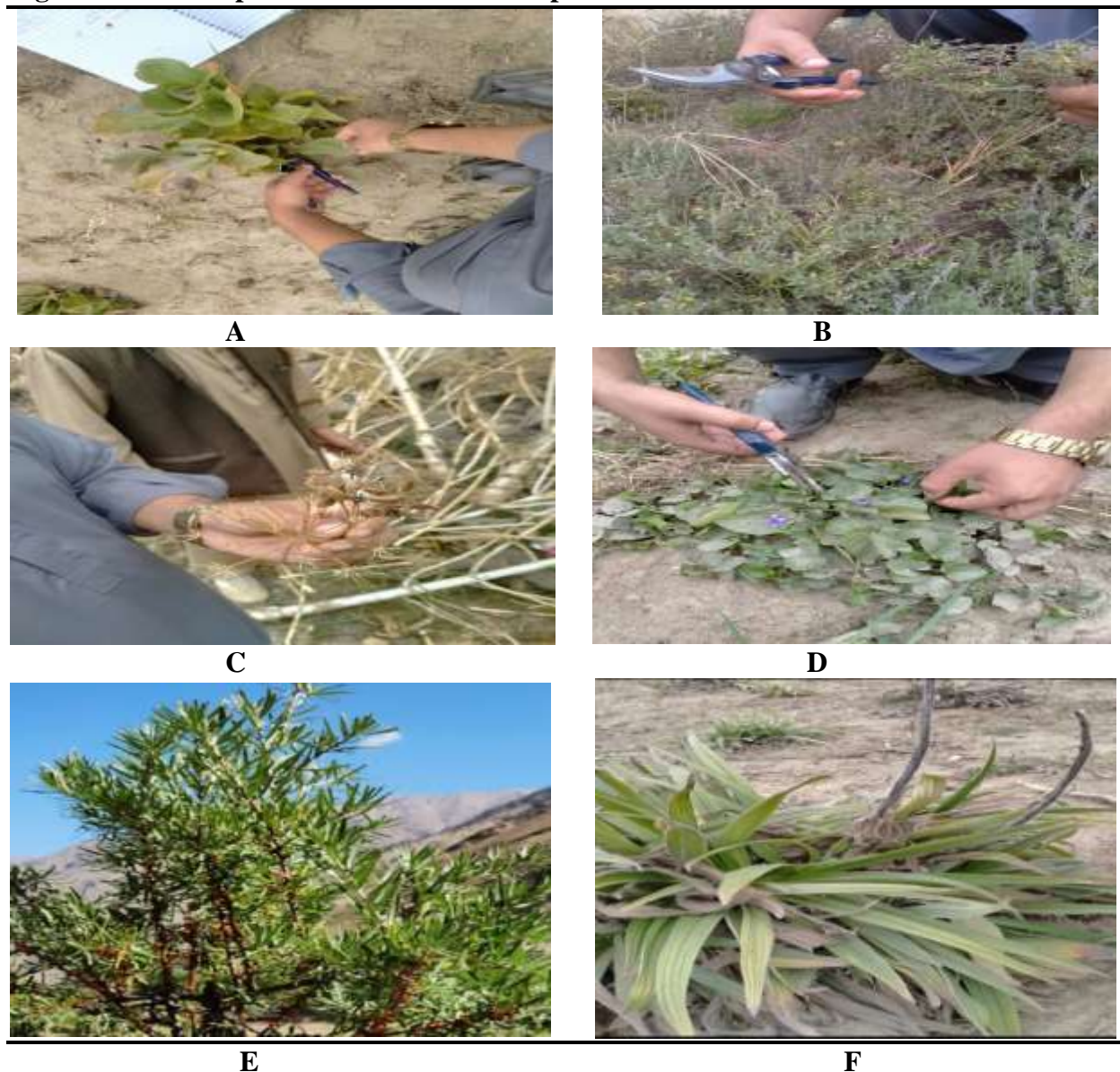
The role of medicinal plants for the treatment of ailments cannot be neglected. The therapeutic plants are not only used for the treatment of diseases but they are also used as a source of food and traded. So the trade of medicinal plants contributes significantly to the livelihoods of poor communities. Due to their cheap prices, less side effects and easy availability people of the study area use medicinal plants for curing diseases and they are also involved in the trade of medicinal plants. Total 26 medicinal plants having different families were collected from study area and people were interviewed about their uses for different diseases. The plants were used by the people of study area for trade and treatment of diseases. The plants which were collected from the study area along with their local names, scientific names, natural habitat, family, medicinal uses and plant part used are as under.

Table 1: Traded medicinal plants of the study area with medicinal uses

Local Name	Scientific Name	Family Name	Natural habitat	Habit	Part used	Medicinal uses
Buro (Specimen no. PMAS 1)	<i>Hippophae rhamnoides</i>	Elaeagnaceae	Pakora, Gorikot and Rattu etc.	Shrub	Fruit	Its fruit is used by making juices and jams for curing different diseases like blood pressure, stomach, sugar, and skin diseases.
Thumuro (Specimen no. PMAS 2)	<i>Thymus linearis</i>	Lamiaceae	Rattu, Pakora, Gorikot, Eidgah and Shogam etc	Small slow growing shrub	Leaves and flowers	It is used as a green herbal tea for reducing blood cholesterol level and it is effective against blood pressure diseases as well. It is also used for treating asthma and stomach disorder.
Chontal (Specimen no. PMAS 3)	<i>Rheum emodi</i>	Polygonaceae	Minimerg, Burzil top, Chillum and Kalapani etc	Herb	Root	It is used for reducing pain in joints and also applied on burn parts for healing. Some people use it to treat pimples on face and for constipation.
Minal (Specimen no. PMAS 4)	<i>Saussurea lappa</i>	Asteraceae	Minimerg, Chillum and Kalapani etc	Herb	Root	It is for stomach diseases, asthma, cough, and it also used in diseases of kidney and liver.
Karu (Specimen no. PMAS 5)	<i>Picrorhiza kurroa</i>	Plantaginaceae	Minimerg, Deosai and Nogam etc	Herb	root	It is used to treat liver and respiratory diseases.
Momiran (Specimen no. PMAS 6)	<i>Primula denticulata</i>	Primulaceae	Minimerg, Deosai, Chilum and Kalapani	Herb	Leaves	Its leaves are grind and converted into a powder which is mixed with water or milk and poured in eyes for treatment of eye diseases.
Goun espai (Specimen no. PMAS 7)	<i>Rubia cordifolia</i>	Rubiaceae	Nogam valley	Herb	Leaves and roots	It is used for teeth pain.

Choro (Specimen no. PMAS 8)	<i>Angelica glauca</i>	Apiaceae	Minimerg, Deosai and Chilum etc	Herb	Whole plant	It is use for treating constipation and also used for dyspepsia.
Gawo zaban (Specimen no. PMAS 9)	<i>Arnebia benthamii</i>	Boraginaceae	Pakora, Burzil top and Minimerg etc	Herb	Leaves, roots and flowers	It is for lowering blood pressure, also used to cure asthma, fever and irritation of stomach and bladder.
Suff (Specimen no. PMAS 10)	<i>Ferula foetida</i>	Apiaceae	Minimerg, Domail, and Rattu etc	Herb	Root	The roots are grinded and converted into a powder which is used for severe cold fever and cough. It is also for blood purification and used as a antiworm for babies as well.
Churka (Specimen no. PMAS 11)	<i>Berberis lycium</i>	Berberidaceae	Minimerg, Rattu, Pakora, Nogam and Kalapani etc	Shrub	Root	Its leaves are grinded and converted into powder which is used for healing of fractured bones, pain in joints and some people also use it for jaundice.
Zeera (Specimen no. PMAS 12)	<i>Carum carvi</i>	Apiaceae	Chilum, Rattu and Kalapani etc	Herb	Seeds	The seeds are used for heart diseases, diabetes, high blood pressure and it is mostly used in every food items by the people of study area.
Saowboma (Specimen no. PMAS 13)	<i>Aconitum heterophyllum</i>	Ranunculaceae	Minimerg, Deosai and Chilum etc	Herb	Roots	The root is grinded into a powder form and used for fever, typhoid, diabetes, asthma and abdominal pain.
Sapsar (Specimen no. PMAS 14)	<i>Bergenia ciliata</i>	Saxifragaceae	Minimerg, Deosai and Burzil top etc	Herb	Leaves and roots	The powder of root is used for healing of wounds, asthma, fever and ulcer cough. The leaves in dried form are also used for making tea.
Banafsha (Specimen no. PMAS 15)	<i>Viola rupestris</i>	Violaceae	Minimerg, Deosai and Chilum etc	Herb	Whole plant	It is used to cure fever, pneumonia, jaundice, abdominal pain and many other diseases.
Bankhakdi (Specimen no. PMAS 16)	<i>Podophyllum hexandrum</i>	Berberidaceae	Minimerg, Deosai and Chilum etc.	Herb	Fruit and roots	It is used as a antidandruff, anticancer. It is also used for treatment of various kinds of diseases like skin diseases and fever etc.
Makoti phonar (Specimen no. PMAS 17)	<i>Delphinium brunonianum</i>	Ranunculaceae	Minimerg, Deosai and Chilum etc	Herb	Leaves and flowers	It is used to treat asthma, diarrhea, baldness and also used for gastric trouble and trace release after delivery.
Ispandar (Specimen no. PMAS 18)	<i>Peganum harmala</i>	Zygophyllaceae	Pakora, Goroikot, Eidgah and Harcho etc	Herb	Leaves and seeds	The leaves and seeds are burnt and its smoke is used to treat ear infection and eye pain. Some people use its smoke for teeth

Soosar (Specimen no. PMAS 19)	<i>Rhododendron hypenanthum</i>	Ericaceae	Nogam, Gudai and Rattu etc	Herb	leaves, fruit, and flowers	pain. It is used to treat high blood pressure, irregular menses, and for headache. It is also used as insecticide.
Bushi phonar (Specimen no. PMAS 20)	<i>Saussurea simpsoniana</i>	Asteraceae	Minimerg, Chilum and Deosai	Herb	Flower	It is used for asthma, dysentery, joints pain, sore throat, fever, cough and pneumonia.
Chigeo (Specimen no. PMAS 21)	<i>Rosa webbiana</i>	Rosaceae	Pakora, Gorikot and Rattu etc	Shrub	Whole plant	Its fruit is used as food for reducing the incidence of cancer and also used to treat stomach aches. Some people boil its bark after removing thorns from the bark and use it as a tea for removing kidney and urinary bladder stones.
Hatcaso (Specimen no. PMAS 22)	<i>Allium schoenoprasum</i>	Alliaceae	Minimerg and Deosai	Herb	Leaves and bulb	It is used for coughing, asthma and also used to control irregular mensuration.
Pashki (Specimen no. PMAS 23)	<i>Lonicera quinquelocularis</i>	Caprifoliaceae	Rattu	Shrub	Fruit	Its ripened fruit is used as a skin moisturizer in order to keep hand and face moist during dry season.
Ghundair (Specimen no. PMAS 24)	<i>Elaeagnus angustifolia</i>	Elaeagnaceae	Gorikot, Eidgah, Pakora, Harcho, Dashkin and Doyyan	Shrub	Fruit	The fruit is consumed by boiling it in water or used as such in raw form to treat sour throats, the flu, colds, and other sorts of fevers.
Luni (Specimen no. PMAS 25)	<i>Cotoneastr affinis</i>	Rosaceae	Rattu	Shrub	Berries	Berries are consumed eaten raw and are thought to be blood stimulants and tonics.
Shatou (Specimen no. PMAS 26)	<i>Ribes orientale</i>	Grossulariaceae	Gorikot, Pakora and Nogam etc	Tree	Fruit	Berries are eaten due to its taste and used as blood stimulator and for curing constipation.

Figure 3: Some important traded medicinal plants collected from research area

(A) *Bergenia ciliata* (B) *Thymus linearis* (C) *Ferula foetida* (D) *Viola rupestris* (E) *Hippophae rhamnoides* (F) *Arnebia benthami*

Quantitative Ethanomedicinal Analysis

Relative Frequency Citation (RFC)

Relative frequency citation (RFC) value indicates the importance of any medicinal plant among local community of study area. The RFC values ranged from 0.21 to 0.88 (table 1). The RFC was recorded highest (figure 4) for *Thymus linearis* with 0.88 followed by *Bergenia ciliata* (RFC: 0.86), *Carum carvi* (RFC: 0.85), *Saussurea lappa* (RFC: 0.83), *Rheum emodi* (RFC: 0.81), *Hippophae rhamnoides* (RFC: 0.80), *Picrorhiza kurroa* (RFC: 0.79) and *Berberis lycium* (RFC: 0.78). These are those plants which are abundant in the study area and people have great knowledge

about them and the local people are also aware of their uses. The importance of these medicinal plants for the treatment of numerous diseases was famous among people of study area. The RFC was recorded lowest for *Cotoneaster affinis* (RFC: 0.21).

Use Value (VU)

The use value (UV) of different traded medicinal plants was found out to know about the relative importance of different important traded medicinal plants known locally. In this research the UV of different traded medicinal plants varied from 0.98 to 0.29 (table 1) The UV was reported highest for *Thymus linearis* with 0.98 followed by *Bergenia ciliata* and *Aconitum heterophyllum* with (UV: 0.9) and (UV: 0.89) respectively. The UV was recorded lowest for *Cotoneaster affinis* (UV: 0.29). The plants which are abundant in an area are studied more because people are more familiar about their properties and as a result of this people use them in different applications. The plants with low UV are not unnecessary, but their low values indicate that people are not familiar about their properties and applications. Therefore those plants should be investigated. So that people will be aware about their properties and applications and the knowledge will be transferred to the next generations.

Fidelity Level (FL)

The fidelity level (FL) was found out to know about the use of a specific plant for the treatment of specific diseases. In this study the values of fidelity level (FL) ranged from 52% to 100% (table 2). There are five plants which have 100% fidelity level. The medicinal plant with high value of fidelity level shows its specificity for particular diseases whereas the low value of fidelity level for a medicinal plants shows its random use for the treatment of various diseases randomly. The plants which have 100% fidelity level are *Bergenia ciliata*, *Berberis lycium*, *Primula denticulata*, *Hippophae rhamnoides* and *Lonicera quinquelocularis*. The fidelity level was recorded (FL: 95.71%) for *Thymus linearis* followed by *Rheum emodi* (95.38%), *Cotoneaster affinis* (94.11%), and *Ferula foetida* (87.5%). *Bergenia ciliata*, *Berberis lycium* are those plants which have highest FL and are used for healing of fractured bones. The study showed that *Primula denticulata* was used for eye diseases whereas *Lonicera quinquelocularis* was used as skin moisturizer in winter season to keep skin moist in winter.

Table 2: Particular medicinal use, RFC, UV, FL values of traded medicinal plants

S. No	Scientific name with specimen number	Particular medicinal use	FC	RFC	VU	NP	N	FL
1	<i>Thymus linearis</i>	Weight lose	70	0.88	0.98	67	70	95.71
2	<i>Bergenia ciliata</i>	Fractured bone healing	69	0.86	0.90	69	69	100.00
3	<i>Rheum emodi</i>	Healing of burn parts	65	0.81	0.81	62	65	95.38
4	<i>Saussurea lappa</i>	Asthma	66	0.83	0.85	57	66	86.36
5	<i>Carum carvi</i>	Diabetes	68	0.85	0.88	50	60	83.33
6	<i>Aconitum heterophyllum</i>	Fractured bone healing	60	0.75	0.89	62	62	100.00
7	<i>Berberis lyceum</i>	Blood pressure	62	0.78	0.86	64	64	100.00
8	<i>Hippophae rhamnoids</i>	Blood pressure	64	0.80	0.80	40	68	58.82
9	<i>Allium schoenoprasum</i>	Liver diseases	48	0.60	0.65	50	63	79.36
10	<i>Picrorhiza kurroa</i>	Blood pressure	63	0.79	0.88	40	48	83.33
11	<i>Angelica glauca</i>	Constipation	59	0.74	0.88	45	59	76.27

12	<i>Primula denticulate</i>	Eye diseases	55	0.69	0.73	55	55	100.00
13	<i>Arnebia benthamii</i>	Asthma	53	0.66	0.70	43	53	81.13
14	<i>Viola rupestris</i>	Pneumonia	50	0.63	0.71	40	50	80.00
15	<i>Ferula foetida</i>	Blood purify	40	0.50	0.51	35	40	87.5
16	<i>Podophyllum hexandrum</i>	Antidandruff	42	0.53	0.63	34	42	80.95
17	<i>Saussurea simpsoniana</i>	Fever and cough	54	0.68	0.71	40	54	74.07
18	<i>Elaeagnus angustifolia</i>	Flue and sour throat	40	0.50	0.75	30	40	75.00
19	<i>Delphinium brunonianum</i>	Stop bleeding after delivery	47	0.59	0.64	30	47	63.82
20	<i>Rhododendron hypenanthum</i>	Headache	57	0.71	0.73	45	57	78.94
21	<i>Rubia cordifolia</i>	Smoke for teeth pain	45	0.56	0.56	40	58	68.96
22	<i>Lonicera quinquelocularis</i>	For teeth pain	20	0.25	0.31	36	45	80.00
23	<i>Peganum harmala</i>	Keep skin moist	58	0.73	0.75	20	20	100.00
24	<i>Cotoneaster affinis</i>	Blood stimulant	17	0.21	0.29	16	17	94.11
25	<i>Ribes orientale</i>	Constipation	61	0.76	0.76	35	61	57.37
26	<i>Rosa webbiana</i>	Stomach aches	46	0.58	0.60	30	46	65.21

Figure 4: Traded medicinal plants with high RFC value

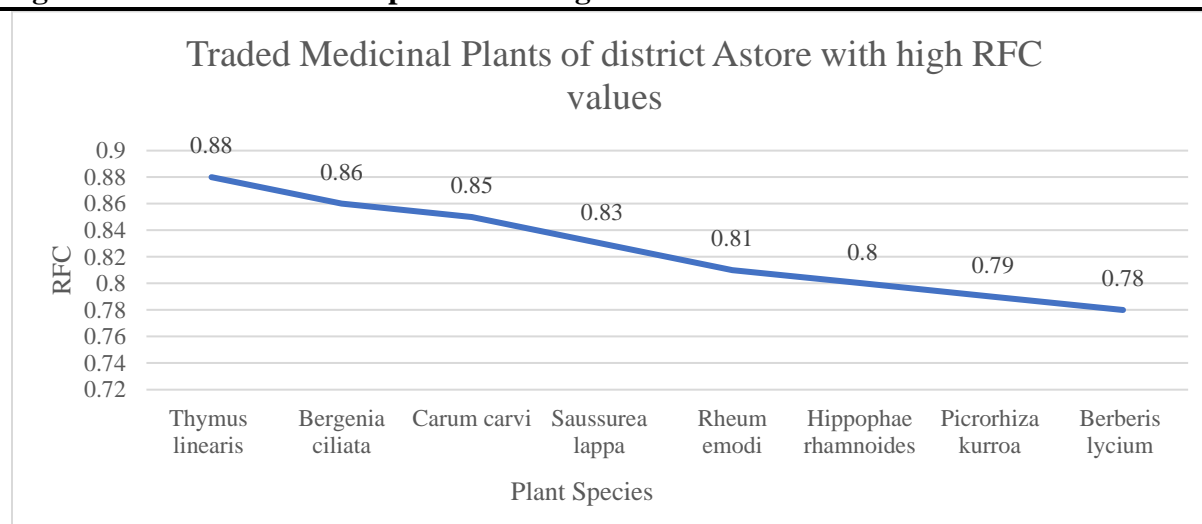
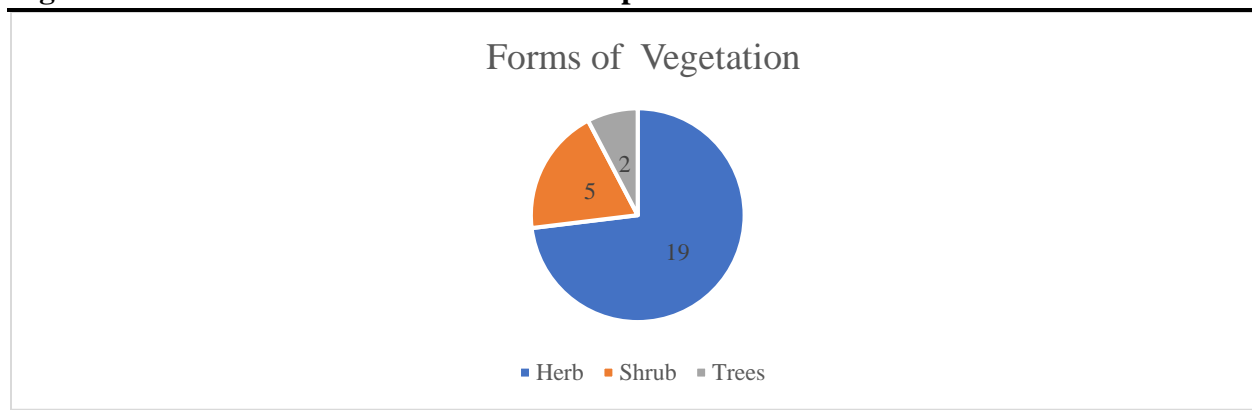


Figure 5: Growth forms of traded medicinal plants



Pearson Correlation Coefficient

Pearson Correlation was used to know about the type of relationship between RFC and UV. The value of $r = 0.944^{**}$. It indicates a strong relationship between RFC and UV. Here the value of r^2 , the coefficient of determination is 0.88. These results were supported by (Rajalakshmi et al., 2019). They also stated that there is a strong relationship between RFC and UV.

Socio-economic Impact of Traded Medicinal Plants

Gender and age of respondent

In this survey questions were asked from 64 males and 16 females, less females were selected because females were reluctant to respond due to cultural and Islamic issues. Most of the respondents (40%) were between the ages of 45 and 55 years. These respondents were followed by those between the ages of 25 and 35 years (25%) and 55 and 65 years (16.25%) while others were between the ages of 35 and 45 years (15%) and above 65 years (3.75). Majority of the respondents were old aged and they had more knowledge about medicinal plants.

Education and marital status

Majority of the respondents (53.75%) were uneducated, 37.5% were having qualification of primary passed, 1.25% intermediate pass and 3.75% were having graduation qualification. Most of the respondents (77%) were married while (23%) were unmarried.

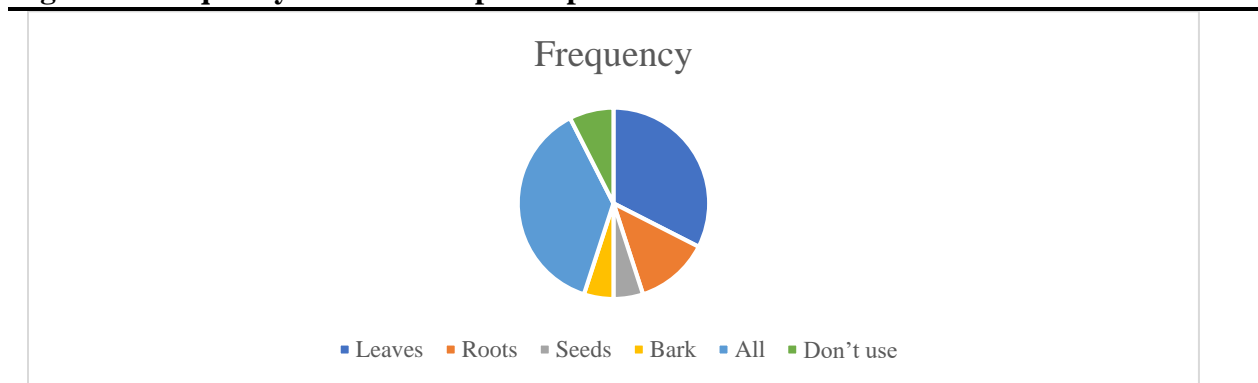
Use of medicinal plants for the treatment of diseases

Local inhabitants were inquired about the use of medicinal plants for the treatment of ailments, 92.5% respondents responded that they use therapeutic plants for the treatment of ailments. While 7.5% respondent that they don't use medicinal plants for the treatment of diseases. It shows that most of the people use medicinal plant for the treatment of diseases.

Part of medicinal plants used for treatment of diseases

Data collected from the respondents shows that 37.5% respondent use all parts of medicinal plants 32.5% respondents said that they use leaves for the treatment of diseases. Whereas, 12.5% respondents responded that they use roots. While few respondents responded that they use only seeds and bark for the treatment of diseases. 7.5% respondents said that they don't use medicinal plants for the treatment of diseases. It indicates that leaves are abundantly used for the treatment of diseases. It is consistent with the study of (Biswas & Rahman, 2017).

Figure 6: Frequency of medicinal plants parts used for treatment of diseases



Sale of traded medicinal plants

When respondents were asked about sale of traded medicinal plants 82.5% respondents responded that they sale traded medicinal plants while 17.5% respondents responded that they don't sale traded medicinal plants. Data indicates that most of the people of study area involve in trade of medicinal plants.

Table 3: Sale of traded medicinal plants by respondents

Response	Frequency	Percent
Yes	66	82.5
No	14	17.5
Total	80	100.0

Income earned from the sale of traded medicinal plants

The study showed that 58.75% respondents earn 20000-40000 income from the sale of traded medicinal plants, 13.75% respondents earn less than 20000, income from the sale of traded medicinal plants. While 10% respondents earn more than 40000, income. 17.5% respondent responded that they don't earn any income because they don't sale traded medicinal plants. Data analyzes showed that most of respondents earn stipulated amount of income from the sale of traded medicinal plants. Which indicated that traded medicinal plants have an important role in improving their economic condition.

Table 4: Income earned from the sale of traded medicinal plants

Response	Frequency	Percent
Less than 20000	11	13.75
20000-40000	47	58.75
More than 40000	8	10.0
Do not sale	14	17.5
Total	80	100.0

Status of Traded Medicinal Plants

Main threats for treaded medicinal plants

Most of the people (90%) were of the opinion that anthropogenic activities are main threats for the traded medicinal plants in the study area. 8.75% of the whole respondent said increasing population of livestock is main threat for traded medicinal plants. While 1.25% respondent responded other factors like floods and climate change etc. are main threat for traded medicinal plants. The data revealed that anthropogenic activities are main threat for traded medicinal plants in the study area.

Table 5: Main threats for traded medicinal plants

Response	Frequency	Percent
Livestock	7	8.75
Anthropogenic	72	90.0
Natural	1	1.25
Total	80	100.0

Current status of traded medicinal plants

Local people were asked about the current status of traded medicinal plants and 72.5% responded that the traded medicinal plants are decreasing, 25% respondent said that the plants are constant whereas, 2.5% respondent responded that the plants are increasing. Data showed that traded medicinal plants are decreasing in the study area.

Table 6: Current status of traded medicinal plants

Response	Frequency	Percent
Increasing	2	2.5
Decreasing	58	72.5
Constant	20	25.0
Total	80	100.0

Discussion

The results showed that most of the people have knowledge about only few traded medicinal plants like *Carum carvi*, *Thymus linearis*, *Aconitum heterophyllum*, *Hippophae rhamnoids*, *Rheum emodi*, and *Allium schoenoprasum* because they don't have adequate and sufficient knowledge about identification of traded medicinal plants. So local people use few plants for trade and medicinal purposes. (Yazdanshenas et al., 2016) also stated that local people of Ghasem Abad rangeland, west of Isfahan province, Iran don't have proper knowledge about identification of medicinal plants so they use only few plants for the treatment of diseases. It is also in line with the study conducted by (Qureshi et al., 2007) in Gilgit and surrounding areas of Pakistan and also stated that the indigenous people of Pakistan's northern regions have been using a wide range of economically and medicinally significant plants since prehistoric times. But they have relatively little information about the extensive use of the medicinal plants. Therefore it is important to organize such priceless data. Research findings shows that leaves are more abundantly used part of therapeutic plants for the treatment of ailments. (Biswas & Rahman, 2017) conducted a research in Bangladesh and stated that leaves are most abundantly used part of medicinal plants for treatment of different diseases. Results shows that most of the people of study area use medicinal plants for the treatment of various ailments. (Usman et al., 2021) conducted a study in high temperature areas of southern Punjab, Pakistan and stated that the local inhabitants in the study area primarily use therapeutic plants for the treatment of different ailments. Majority of the people of study area are involved in the trade of medicinal plants. So the medicinal plants have an important role in improving their economic condition. Bari et al. (2017) also stated that sale of traded medicinal plants have an important role in improving socio-economic condition of local community. The study documented traditional uses of medicinal plants which is important for the conservation, sustainable use and preservation of traditional knowledge. If further research is not conducted the knowledge will decrease with the passage of time (Abbas et al., 2017) conducted a research in Shiger valley Baltistan Karakorum range-Pakistan. They documented traditional knowledge of medicinal plants and stated that the traditional knowledge about uses of medicinal plants is decreasing due to allopathic drugs and change of life style. Therefore detailed research is needed for conservation of this important traditional knowledge. According to research findings the traded medicinal plants are decreasing in the study area and most of the respondents were of the opinion that anthropogenic activities are main threats for the traded medicinal plants (Ali et al., 2012) also stated that medicinal plants are decreasing day by day in Swat, Pakistan and said that over-exploitation for sale of medicinal plants is the main factor causing decline of medicinal

plants (Khan et al., 2015) also conducted a research on medicinal plants of Turmic valley Gilgit Baltistan, Pakistan and stated that over exploitation, habitat destruction and over grazing are major threats for the medicinal plants.

Conclusion

The study divulged different uses of therapeutic plants by the local people of district Astore for the treatment of various kinds of diseases. With the advancement the traditional knowledge about the uses of medicinal is going to be diminished. So this research can be very useful for future ethnomedicinal studies. Local people of the respective area have knowledge about few traded medicinal plants which have more economical value and are mostly traded in the area and this knowledge is mostly limited to old age people and people who are involved in the trade of medicinal plants. The study also played a significant role in quantitative ethnobotanical appraisal and identification of 26 economically important therapeutic plants. Most of the Local people use medicinal plants for the treatment of diseases due to their easy availability, less cost and less side effects. Plants with greater use value are abundant in the study area and people are more familiar about them. The study also illustrated socio-economic impact of traded medicinal plants in the study area. As most of the people of study area are involved in the trade of medicinal plants so medicinal plants have great role in improving economic condition of people. Overall research findings showed that the traded medicinal plants are gradually decreasing due to anthropogenic activities like unsustainable use, illegal trade and improper method of collection. Furthermore, there is pressing need to create awareness among local people for the sustainable use and conservation of traded medicinal plants. This will be helpful for the conservation and sustainable use of medicinal plants.

Recommendations

- Illegal trade of medicinal plants should be controlled for the protection and conservation of traded medicinal plants.
- Traded medicinal plants should be grown on farm lands for reducing high pressure on traded medicinal plants.
- Proper training should be given to local community for proper collection of traded medicinal plants.
- Awareness about important traded medicinal plants should be given to local people. So that they will participate in the conservation and sustainable use of traded medicinal plants.
- Laws and policies should be formed about traded medicinal plants to curb unsustainable use and illegal trade of traded medicinal plants.
- Local markets should be established for the trade of medicinal plants.

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