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Research Article

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An Ethnobotanical Survey of Medicinal Plants Used for Primary Health Care from Patan Sher Khan and Surrounding Areas of District Sudhnoti, Azad Jammu and Kashmir, Pakistan

Iqra Liaqat[1], Sajjad Hussain[1], Hajira Abid[1], Imtiaz Ahmad[2], Shameen Arif[3], Muhammad Anwar ul Haq[4], Fozia Parveen Shaikh[5], Hafiz Matee-ur-Rehman[6], Basharat Mahmood*[6]

[1]Department of Botany, University of Poonch Rawalakot, Azad Jammu and Kashmir, Pakistan
[2]Department of Veterinary Basic Sciences, University of Poonch Rawalakot, Azad Jammu and Kashmir, Pakistan
[3]Department of Botany, Mohi-ud-Din Islamic University Nerian Sharif Trarkhel, Azad Jammu and Kashmir, Pakistan
[4]Plant Pathology Research Institute, Faisalabad, Pakistan
[5]Institute of Pharmacy SMBB Medical University Larkana, Sindh, Pakistan
[6]Department of Plant Pathology, University of Poonch Rawalakot, Azad Jammu and Kashmir, Pakistan
*Corresponding author's email; rajabasharat@upr.edu.pk

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Abstract:

Life on mountains is difficult and people depend on medicinal plants for primary health care. Many of mountain areas of Azad Kashmir are unexplored from taxonomic and ethnobotanical point of view. This study was conducted to document the indigenous knowledge of medicinal plants of village Patan Sher Khan and allied areas of District Sudhnuti Azad Kashmir Pakistan. Field surveys were conducted during March 2020 to March 2021 for collection of medicinal plants knowledge following standard ethnobotanical methods. A total of 120 key informants were interviewed by using semi-structured questioners. The data were analyzed through ethnobotanical indices i.e., Relative frequency of citation (RFC), Use value (UV), Informant consensus factor (ICF) and Fidelity level (FL). A total of 37 medicinal plant species belonging to 32 genera and 25 families were recorded during the study. Dominant ethnomedicinal families were Fabaceae with 4 species followed by Moraceae and Rosaceae with 3 species each. Leaves were the most frequently used parts (36 %) and decoction was preferred medicinal preparation (19 use reports). Highest relative frequency of citation was recorded for *Ficus palmata* (0.15) followed by *Melia azedarchta* (0.14) and highest use value was found for *Dodonaea viscosa* (0.58). The most valuable plant species of the study area are *Ficus carica* with 8 use reports and 48 use citations, *Bauhinia variegata* with 7 use reports and 45 use citations. The maximum value of FL was recorded for *Berberis lyceum* (100 %) and *Plantago lanceolate,* (100%). Based on documented data the reported ailments were grouped into 9 categories, The ICF values ranges between 0. 33 (sexual) to 0.90 (teeth and urinary). Medicinal plant knowledge is still alive and large papulation of area still depend on medicinal plants for primary healthcare. But medicinal plant knowledge is declining especially among younger people. Hence, there is an urgent need to document such precious knowledge by continuous ethnobotanical studies.

Keywords: *Ethnobotany, Medicinal plants, Traditional knowledge, Use value, Fidelity level, Patan Sher Khan*

Introduction

People of all cultures have always been depended on plants for their primary needs (food, shelter, warmth, medicines, etc.), and have naturally learned diverse applications of plants. (Pandey & Tripathi, 2017). They learnt about edible materials and medicines through trials, errors, experience, believes, and theories (Gao, Zhang, Zhang, Guo, & Zhong, 2007). This interaction between humans and plants leads to the establishment of traditional medicinal system in which natural products are used for the treatment of ailments. Indigenous medicinal plant knowledge is widespread in India (Ayurveda), China (Traditional Chinese Medicine, TCM), Pakistan (Tibb-e-Unani, Ayurveda and Homoeopathy), Sri Lanka (Ayurveda, Siddha, Unani and Deshiya Chikitsa) Japan (Kampo), and Korea (Traditional Korean Medicine, TKM) (Jima and Megersa 2018). The use of herbal medicines has been greatly increased over the last three decades and about 80% of the world population depend on herbal products for some part of their primary healthcare (Ekor, 2013). World health organization estimated that 80 percent of population of developing countries depends on traditional medicines (Beyene, Beyene, & Deribe, 2016). Out of about 422, 000 flowering plants 50,000 are used for medicinal purpose (Govaerts, 2001; Schippmann,

Leaman, & Cunningham, 2002). In Pakistan out of 6000 species of vascular plants about 400-600 are medicinal (Hussain, Murtaza, Mehmood, & Qureshi, 2017). Azad Jammu and Kashmir is rich in floral diversity and western part of the Himalaya hosts about 10,000 species of medicinal plants (Shengji, 2001). In Kashmir about 60 % of rural population depends on medicinal plants (Dani, 1986).

Azad Kashmir can be divided into two distinct geographical zones; North and East are mostly hilly and mountainous while South and West are valleys and plains. Being an integral part of Western Himalaya, the area is rich in floral diversity but most of areas are still underexplored or unexplored. Systematic and ethnobotanical studies on flora and indigenous knowledge are urgently needed because of hilly topography, demographic, and geographic reasons. The traditional practitioners play vital role in primary health care of inhabitants living in villages. A variety of herbal preparations are used by large number of populations for treating common diseases especially by older people. This precious knowledge conserved by older people is the unique wealth of the area that should be documented for future generations. Therefore, people every year turn to herbal medicine because they believe plant remedies are free from undesirable side effects (George, 2011; Haq, 2004; Kazemipoor, Wan Mohamed Radzi, Cordell, & Yaze, 2012; H. Nasir, 2013). A lot of different compounds are present in herbal medicines (Karimi, Majlesi, & Rafieian-Kopaei, 2015) and most of the plants have antioxidant activities (Kazemipoor *et al.*, 2012). On the other hand, synthetic drugs have side or adverse effects on human health. About 100, 000 people die each year in USA due to synthetic medicines toxicities (George, 2011). For example, aspirin cause side effects which could be avoided by using bark of *Salix alba* which contains saliein (Shinwari & Gilani, 2003). Cardiovascular risk reduced by using non-nutrient phytochemicals. Some herbs identified were *Achillea millefolium, Allium sativum, Convallaria majalis, Crataegus laevigata, Cynara scolymus, Gingko biloba* and *Viburnum opulus*. Fragmented ethnobotanical studies are available from the study area (Ahmad & Habib, 2014; Ahmad, Kayani, Hameed, Ahmad, & Nawaz, 2012; Ajaib, Khan, Khan, & Wahab, 2010; Amjad, 2015; Awan & Murtaza, 2013; Ishtiaq, Mumtaz, Hussain, & Ghani, 2012; Khan, Khan, Mujtaba, & Hussain, 2012; Qureshi *et al.*, 2009; Shaheen, Qaseem, Amjad, & Bruschi, 2017). Unfortunately, quantitative ethnobotanical studies are rare in the area. This study aims to document not only indigenous knowledge of medicinal plants but also to analyze the data by using ethnobotanical indices. This provides numerical value or importance of plant taxon in the study area.

Materials and Methods

Study area: Pattan sher Khan (figure 01) lies between 33°55'44.25" N 74°04'07.43" E at an elevation range of 3500 ft to 5000 ft above the sea level. It is in Tehsil Mong of District Sudhnoti. Mehna, Naarorri, Darr, Dhara, Thaneliyan Khoor, Kanchi and Dhingroon are allied villages.

Data collection: The indigenous ethno medicinal knowledge was collected from native inhabitants of village Patan Sher Khan and allied villages during March 2020 to March 2021. Out of 500 native inhabitants 120 (80 males, 40 females) informants were randomly selected as key informants belonging to different demographic profile and professions (Table 1). The information on local uses of plants, local names, parts used, mode of preparation and application was recorded by using semi-structured questioners, face to face interviews and group discussions. All the interviews were conducted in local language Pahari.

Plant preservation and identification: All the plants species cited by local interviewees were collected and given the voucher number. The collected plant specimens were treated with 4% formalin solution, pressed and dried. Dried specimens were mounted on herbarium sheets. Plants were identified and authenticated by flora of Pakistan (Ali & Nasir, 1992; Ali & Qaiser, 2009; E. Nasir & Ali, 1989); Flora of China, International Plant Names index (IPNI) and Web of Science. Identified and authenticated species names were supplemented with locality, vernacular names, families, life form and indigenous medicinal uses. Finally, all the specimens were brushed with $HgCl_2$ and were submitted in herbarium of Department of Botany University of the Poonch Rawalakot.

Data analysis: The data obtained was analyzed statistically by using quantitative Ethnobotanical indices of Relative Frequency of citation (RFC), Use Value (UV), Fidelity Level (FL %), Informant consensus factor (ICF).

Relative frequency of citation (RFC): To quantify consensus between the informants on the use of medicinal plants RFC is used (Rashid *et al.*, 2015). This index shows importance of medicinal plant species in the study area and is calculated by following standard protocol of Vitalini *et al.* (2013). It is calculated by following formula;

$$RFC = \frac{FC}{N}$$

FC= Number of informants mentioning the indigenous uses of plant species

N= 120 (total number of informants interviewed in the study area)

Use value (UV): Use value is the measures of relative importance of medicinal plant species in the study area by considering total number of use reports for given plant species. It is calculated by following the protocol of `Šavikin *et al.* (2013) where number of use reports for a given plant species (Ui) is divided by total number of informants mentioning the use reports of that species (Ni).

$UVi = \sum Ui/Ni$

U_i = number of use reports for a given plant species i
N_i=total number of informants interviewed for a given plant species i.

Fidelity level (FL): Fidelity level (FL %) is the ratio between number of informants who independently mention the one use of plant species and total number of informants mention all uses for that plant species initially proposed by Friedman, Yaniv, Dafni, and Palewitch (1986). It is calculated by number of informants mentioning a use of species (Np) divided by total number of informants mentioning all the uses of that species (N) multiply by 100. A high FL for particular use of a plant species means that species is preferred by local inhabitants for that use. The species with high FL authenticates its uniqueness to treat a disease (Shil, Choudhury, & Das, 2014).

$$FL\% = \frac{Np}{N} \times 100$$

N_p=number of informants citing the use of the plant species for the treatment of a disease
N= total number of informants citing the species for disease.

Informant consensus factor (ICF): To estimate usage variability of medicinal plants by local informants ICF was used (Heinrich, Edwards, Moerman, & Leonti, 2009). It is a consensus between local informants for the treatment of a disease or disease category. ICF was calculated by following formula;

$$ICF = \frac{Nur - Nt}{Nur - 1}$$

N_{ur}= total number of use citations for each disease category
N_t= total number of species listed in that category

The values of ICF ranges between 0 to 1. A higher value means there is well define criteria for medicinal of the areas for specific disease category (Rashid *et al.*, 2015). A low value indicates that plants are not preferred and there is not exchange of informants about their use (Heinrich *et al.*, 2009).

Results

Demography of study area: In the present survey a total of 120 key informants including 80 males and 40 females of different demography were interviewed. Demography of 120 informants was placed age wise in 4 categories (70+, 50-70, 30-50 and below 30 years of age) belonging to 6 professions (housewives, shopkeepers, farmers, laborer, teachers, and Hakims) and 6 education levels (18, 16, 14, 12, 10 years of education and illiterate) (Table 1). The maximum knowledge about use of medicinal plants was shared by informants above the age of 50 years.

Table 1. Demographic profile of the local informants interviewed (N = 120).

Informants	Demographic Information	Total	Percentages (%)
Indigenous people	Male	75	62.5
	Female	40	33.33
Traditional healers	Male	05	4.16
Age groups	70 and above	09	7.5
	50-70	60	50
	30-50	37	30.83
	Below 30	14	11.66
Educational	18 years of education	10	8.33
	16 years of education	18	15
	14 years of education	13	10.83
	12 years of education	11	9.16
	10 years of education	16	13.33
	Illiterate	30	25
Professions	Housewives	25	20.83
	Shopkeepers	20	16.66
	Farmers	15	12.5
	Laborer	20	16.66
	Teachers	35	29.16
	Hakims	05	4.16

Medicinal plant diversity: Ethnobotanical surveys documented 37 species belonging to 32 genera and 25 families. The documented medicinal herbs, shrubs, trees, with their botanical names, local names, parts used, mode of preparation of recipes and medicinal uses have been summarized in table 2 and recipes of medicinal plants are given in table 4. Dominant ethnomedicinal families were Fabaceae with 4 species followed by

Moraceae and Rosaceae (3 species each) and Apocynaceae, Euphorbiaceae, Lamiaceae, Meliaceae and Rhamnaceae (2 species each).

Plant part used: Indigenous people prefer to use leaves for the treatment of disease. Leaves were the most frequently used plant parts (36 %) followed by fruits (26 %), stem (11 %) and roots and bark (9 % each), flowers and whole plant (4 % each) and seeds (1 %).

Mode of preparation of herbal recipes: Mode of preparation of recipes was decoction (19 reports) followed by powder (17 reports), paste and extract (10 reports), juice (5 reports), oil (4 reports), Mixture (3 reports), latex, pulp, and resin (1 report each) (figure 2).

Relative frequency of citation (RFC): The relative frequency of citation (RFC) authenticates the frequency of citation of a medicinal plant species used for various ailments (Umair, Altaf, & Abbasi, 2017). Relative frequency of citation ranges between 0.04-0.15. Highest Relative frequency of citation was recorded for *Ficus palmata* followed by *Melia azedarch* (0.14), *Zanthoxylum armatum*, *Olea ferruginea*, *Ficus carica* and *Acacia modesta* (0.12). Least frequency of citation was recorded for *Cedrela serrata* and *Plantago lanceolata* (0.04) and *Otostegia limbata*, *Euphorbia helioscopia and Prunus armeniaca* (0.05)**.**

Use value (UV): In the present investigation use value (UV) data lies between 0.09 to 0.58 (Table 2). Highest use value for *Dodonaea viscosa* (0.58), *Dalbergia sissoo* (0.54) and *Ficus carica* (0.53) supports the impression that these medicinal species are the most important plants in the treatment of different diseases in the study area. The high use value of *Dodonaea viscosa* is due to its greater diversity in the study are and is used against cold, cough, rheumatism, swellings, burns, gout and as astringent. *Dalbergia sisso* is used against Stomachic, gonorrhea, constipation and as stimulant. *Ficus carica* used for the treatment of constipation, asthma, kidney stone, urinary troubles, skin infection and as emollient and expectorant. The lowest value of this index was recorded for *Menthe longifolia* (0.09), *Ziziphus spina-christi* (0.11) and *Euphorbia helioscopia*, *Prunus armeniaca* and *Mentha spicata* (0.14).

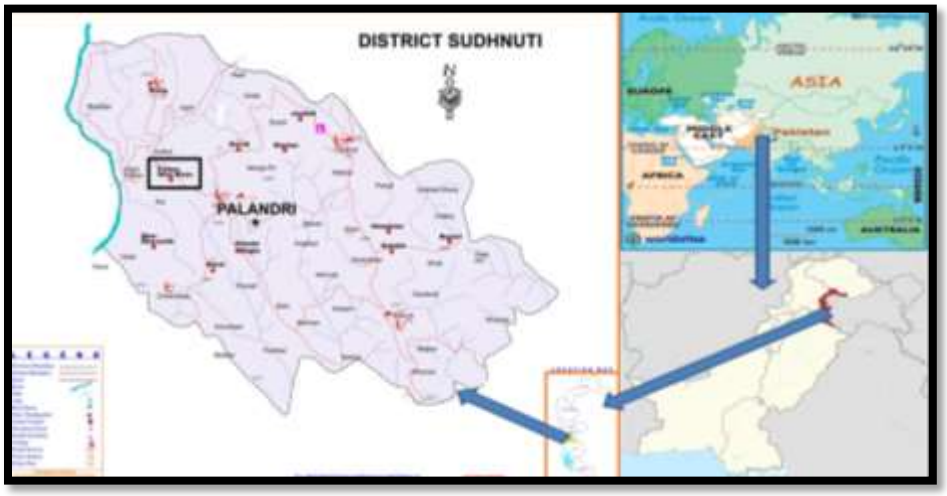

Figure 1. Geographical location of study area (Right) and sampling sites (Left).

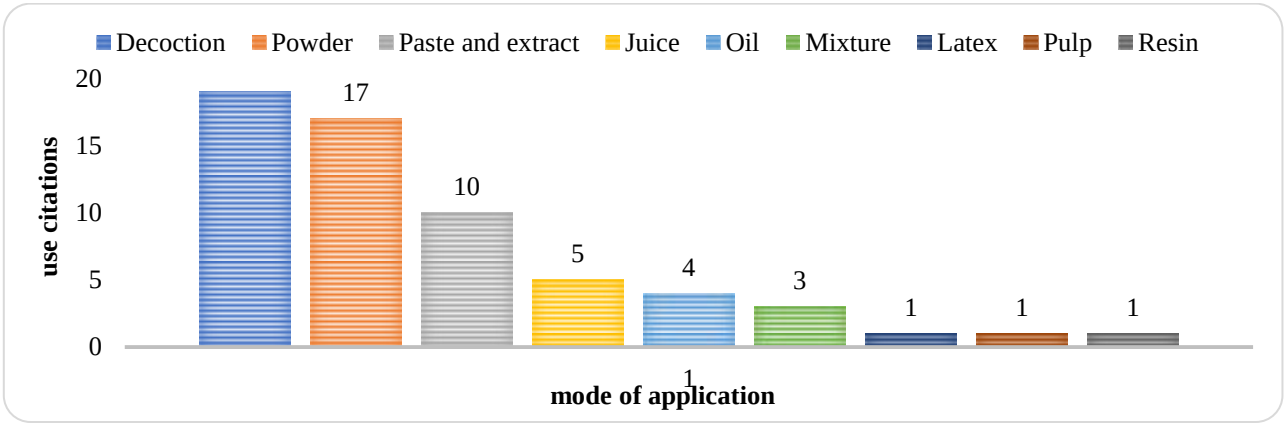

Figure 2. Mode of preparation of herbal recipes in Patan Sher Khan.

Table 2. List of medicinal plants of study area with quantitative attributes. Vouchers specimens in square brackets [ ].

S.No.	*Taxa*	Local name	Part use	Preparation	Use reports (Bold for Fidelity Level, superscript = use citations)	**Ur**	**FC**	**RFC**	**UV**	**FL %**
1.	*Acacia modesta* Wall. [1073] Fabaceae	Plai	Bark	decoction	**Toothache**[9], diuretic[7], analgesic[4], respiratory problems[5]	5	15	0.12	0.33	60
2.	*Acacia nilotica (*L.) Delile. [1084] Fabaceae	Kikar	Bark	Decoction	**Toothache**[9], stimulent[3]	2	11	0.09	0.18	81.8
3.	*Bauhinia variegata* L. [1074] Fabaceae	Kulyar	Bark Flowers	Decoction	**Dysentery**[11], Astringent[9], anthelmintic[5], ulcer[6], skin infections[3], blood purifier[4], Dyspepsia[7]	7	14	0.11	0.5	78.5
4.	*Berberis lycium* Royle [1067] Berberidaceae	Sumbulu	root, fruit	Powder Raw	**Diabetes**[10], Bone fractures[9], dysentery[9]	3	10	0.08	0.3	100
5.	*Cannabis sativa* L. [1072] Cannabinaceae	Bhung	whole plant	Raw	**Sedative**[10], Narcotic[7]	2	10	0.08	0.2	100
6.	*Carissa spinarum* L. [1068] Apocynaceae	Garanda	Leaves	Decoction	**Purgative**[8], asthma[3]	2	9	0.07	0.22	88.8
7.	*Cedrela serrata* Royle [1075] Meliaceae	Kakrai	leaves, fruits	decoction	**Diabetes**[3], tuberculosis[1]	2	5	0.04	0.4	60
8.	*Celtis australis* L. [1085] Ulmaceae	Khirck	Fruits	Raw	Colic[3], amenorrhea[5], **allergy**[8]	3	9	0.07	0.33	88.8
9.	*Dalbergia sissoo* DC. [1076] Fabaceae	Taali	Stem	Decoction	Stomachic[7], stimulant[3], gonorrhea[1], astringent[8], **laxative**[9], piles[2]	6	11	0.09	0.54	81.8
10.	*Debregeasia saeneb* (Forssk.) Hepper & J.R. I. Wood [1077] Urticaceae	Sandari	fruit,roots	Infusion	**Diabetes**[8], Skin rashes[6], eczema[3]	3	11	0.09	0.27	72.7
11.	*Dodonaea viscosa* (L.) Jacq. Sapindaceae [1071]	Sanatha	leaves,stem	Decoction	Cold[7], cough[8], **Astringent**[9], antirheumatic[7], swellings[7], burns[2], gout[3]	7	12	0.1	0.58	75
12.	*Euphorbia helioscopia* L. [1070] Euphorbiaceae	Doodal	root, stem	Decoction	Constipation[7]	1	7	0.05	0.142857	100
13.	*Ficus carica* L. [1078] Moraceae	Tosi	Fruit	Raw	**Constipation**[13], emollient[4], expectorant[5], asthma[7]	8	15	0.12	0.53	86.6
14.	*Ficus palmata* Forssk. [1079] Moraceae	Phagwara	Fruits	Raw	**Constipation**[11], Tonic[7], expectorant[5]	3	19	0.15	0.15	57.8
15.	*Juglans regia* L. [1086] Juglandaceae	Akhroot	leaves, bark	Infusion Raw	**Toothache**[11], Astringent[4], emollient[4], carminative[3]	7	13	0.10	0.53	84.6
16.	*Justicia adhatoda* L. [1080] Acanthaceae	Baikar	Leaves	Decoction	**Diabetes**[9], stomach[4], Bronchiti[7]	3	11	0.09	0.27	81.8

17.	*Melia azedarach* L. [1087] Meliaceae	Dareek	Leaves	Extract	Diabetes[9], sour throat[3], **jaundice[13]**	5	17	0.14	0.29	76.4
18.	*Mentha longifolia* (L.) [1097] Lamiaceae	Breena	Leaves	Raw	**Acidity[7]**, insect repellent[5]	1	11	0.09	0.09	63.6
19.	*Mentha spicata L.* [1096] Apiaceae	Podina	Leaves	Raw	Acidity[9], stomach pain[3]	2	13	0.10	0.15	53.8
20.	*Morus alba* L. [03] Moraceae	Toot	Fruit	Raw	Tuberclusis[7], **cough[9]**	3	11	0.09	0.27	81.8
21.	*Nerium oleander* L. [1081] Apocynaceae	Kanera	Stem	Decoction	**Toothache[9]**, scabies[3], inflamation[5]	3	11	0.09	0.27	81.8
22.	*Olea ferruginea* Wall.ex Aitch [1082] Oleaceae	Koo	Leaves	Decoction	**Allergy[9]**, antiseptic[5], uuretic[3], toothache[5], gonorrhea[2]	5	15	0.12	0.33	60
23.	*Origanum vulgare* L. [1083] Verbenaceae	Ganeyar	whole plant	Decoction	Cold[5], **cough[6]**	2	9	0.07	0.22	66.6
24.	*Otostegia limbata* (Benth.) Boiss [1092] Lamiaceae	Chitajand	Leaves	Extract	Stomach pain[3], Antiseptic[2], **wound healing[5]**	3	7	0.05	0.42	71.4
25.	*Plantago lanceolata* L. [1088] Plantaginaceae	Batti	Leaves	Decoction	**Stomach pain[5]**, refrigerant[4]	2	5	0.04	0.2	100
26.	*Prunus armeniaca* L. [1089] Rosaceae	Harri	Fruits	Raw	**Laxative[7]**	1	7	0.05	0.14	100
27.	*Punica granatum* L. [1064] Punicaceae	Droona	Fruit	Extract	Jaundice[5], Eyes infections[7], **blood production[8]**	3	11	0.09	0.27	72.7
28.	*Ricinus communis* L. [1100] Euphorbiaceae	Harnoli	roots seeds	Extract	Toothache[5], **constipation[7]**,	2	9	0.07	0.22	77.7
29.	*Rosa brunonii* Lindl. [1090] Rosaceae	Chal	Leaves	Extract	Allergy[5], **eye infections[8]**	2	13	0.10	0.15	61.5
30.	*Rubus fruticosus* L. [1091] Rosaceae	Aakhry	Leaves	Decoction	Jaundice[5], cold[3], **cough[7]**	3	9	0.07	0.33	77.7
31.	*Rumex hastatus* D.Don [1093] Polygonaceae	Chukhri	Leaves	Raw	Sour throat[6], **blood pressure[8]**	2	11	0.09	0.18	72.7
32.	*Solanum nigrum* L. [1093] Solanaceae	Kachmach	Leaves, fruit	Infusion Raw	**Stomach pain[7]**, sour throat[3]	2	8	0.06	0.25	87.5
33.	*Taraxacum officinale* Web. [1094] Asteraceae	Hand	Leaves	Decoction	**Stomach disorders[6]**, jaundice[5], blood purifier[3]	3	10	0.08	0.3	60
34.	*Viola odorata* L. [1095] Violaceae	Banafsha	Flower	Powder	Cold[3], **cough[8]**, throat infection[7]	3	13	0.10	0.23	61.5
35.	*Z. spina –christi* (L.) Desf. [1104] Rhamnaceae	Bairee	fruit, roots	Raw, decoction	**Diabetes[9]**	1	9	0.07	0.11	100
36.	*Zanthoxylum armatum* DC. [1066] Rutaceae	Timber	fruits, stem	Infusion, Raw	**Toothache[11]**, Stomachache[7], carminative[8], piles[3]	4	15	0.12	0.26	73.3
37.	*Ziziphus oxyphylla* Edgew [1099] Rhamnaceae	Unmoi	roots	Decoction	**Allergy[7]**, Jaundice[6], intestinal worms[5], Gastrouble[3],	5	13	0.10	0.38	53.8

Fidelity level (FL %): In the present study, values of Fidelity level were between 53.8 % to 100 %. Maximum value of FL (100%) was recorded for *Berberis lyceum*, *Plantago lanceolata*, *Prunus armeniaca*, *Euphorbia helioscopia* and *Ziziphus spina –christi* for treating Diabetes, Stomach pain and constipation. On the other hand, least FL was recoded for *Mentha spicata* and *Ziziphus oxyphylla* (53.8), *Ficus palmata* (57.8), *Taraxacum officinale*, *acacia modesta*, *olea ferruginea*, *cedrela serrata* (60).

Informant consensus factor (ICF): Based on recorded data diseases were grouped into 9 categories. The ICF values ranges between 0. 33 to 0.90 (Table 3). Results of the present study reveals that urinary and teeth problems are the most prevalent in the study area with the ICF value of 0.90 followed by blood (0.89) and digestive tract disorders with the ICF of 0.89 and 0.88.

Table 3: ICF of categories of Diseases.

S. No.	Diseases	Number of species	% age of species	Number of use citations	% age of use citations	ICF 653
1	Sexual	3	8.11	4	0.61	0.33
2	Skin	12	32.43	61	9.34	0.81
3	Respiratory	17	45.95	98	15.01	0.84
4	Metabolic	21	56.76	138	21.13	0.85
5	Digestive track	27	72.97	209	32.01	0.88
6	Wounds	3	8.11	17	2.60	0.88
7	Blood	5	13.51	36	5.51	0.89
8	Teeth	7	18.92	59	9.04	0.90
9	Urinary	4	10.81	31	4.75	0.90

Discussion

There is a close association between biological diversity and cultural diversity (Carlson & Maffi, 2004). The knowledge of this relationship is crucial in efforts to conserve the biodiversity of unique planet earth. The dependence of human on plants dates to start of human civilization (Aslam & Ahmad, 2016). This ancient interaction leads to develop well known systems of medicines such as Ayurvedic, Chinese and Unani and about 80 % population in developing countries still depends on traditional herbal medicines (Yaniv & Bachracheds, 2005). About 25 % of worldwide drugs are obtained or extracted from plant sources (Tyler, Brady, & Robbers, 1988). Out of all drugs known to the world more than 100 are of plant origin and 75 % are those that are used in traditional systems of medicines (Kong, Goh, Chia, & Chia, 2003). Presently, scientists are isolating more active pharmacological compounds from plants to cope with diseases. People are now turning from synthetic medicines to towards herbal medicines.

The indigenous knowledge of medicinal plants comes from family traditions as indicated by Brasileiro, Pizziolo, Matos, Germano, and Jamal (2008); Oliveira and Menini Neto (2012) and Bieski *et al.* (2012). Although most of the knowledge comes from family traditions however, other sources are also very important such as nomads and immigrants. The study area Patan sher Khan is one of the remote areas of District sudhnoti where most of the population belongs to Pahari speaking sudhan tribe. The area is dominated with subtropical vegetation with temperate species at higher altitude. The use of 37 plant species in a small area indicates that ethnobotanical knowledge is still alive in the study area. The maximum knowledge about use of medicinal plants was shared by informants above the age of 50 years. Regarding education level verses traditional knowledge illiterate respondents have more traditional knowledge and experience than educated respondents. The reason for the strong belief of elderly inhabitants on plant-based remedies is due to influence of traditional healers equipped with spiritual component of treatment (Khan *et al.*, 2012). The young and educated population less belief on spiritual concepts more believe on allopathic treatments. Similar findings have also been reported from allied areas of study area (Hussain *et al.*, 2019) from Bangladesh (Kadir, Sayeed, & Mia, 2012) from Turkey (Hayta, Polat, & Selvi, 2014) and from Pakistan (Umair *et al.*, 2017).

In this study Fabaceae was the dominant family. *Acacia modesta* is used to treat Toothache respiratory problems and as diuretic and analgesic. *Acacia nilotica* is used against Toothache and stimulant. *Bauhinia variegata* is used to treat, ulcer, skin infections, anthelmintic and blood purifier. *Dalbergia sissoo* used to cure piles, stomach problems, as stimulant, laxative and stringent. The medicinal value of Fabaceae lies in its effectiveness in the treatment of variety of human diseases. The diversity of chemical compounds like alkaloids, flavonoids, tannins, and terpenes with high biological activity in this family suggest a global pattern of ethnobotanical knowledge (Leonti, Sticher, & Heinrich, 2002; Moerman, Pemberton, Kiefer, & Berlin, 1999). High preference of plants in traditional medicine can also be attributed to its abundance and availability. Due to

variety of active biological compounds abundance and availability in subtropical climate Fabaceae was also dominant medicinal plant family in number of studies (Abera, 2014; Asima & Satyesh, 1994; Bukhari, Khan, Gilani, Ahmed, & Saeed, 2010; Kapoor, 1990; Khairiah, Nisyawati, & Silalahi, 2017; Khan *et al.*, 2012). *Berberis lycium* root bark powder is used to treat diabetes, dysentery, and sore throat. All parts of this plant are used for medicinal purposes. *Berberis lycium* is also well known medicinal plant in ayurvedic and Unani system of medicine. In Unoni system it is used for the treatment of leprosy (Gupta, Singh, & Joshi, 2015). It is also used for the treatment of broken bones, Jaundice, piles, menorrhagia wounds, as expectorant, diuretic, chronic ophthalmic, throat inflammations, stomachic, aperient, carminative and febrifuge, diabetes (Gupta *et al.*, 2015; Shabbir *et al.*, 2012; Singh & Rawat, 2000). *Carissa spinarum* leaves decoction is purgative and used to treat asthma, diabetes, and tuberculosis. The medicinal value of *Carrissa* plant is also well known in other cultures and reported in number of studies (Adhikari, Babu, Saklani, & Rawat, 2007; Fatima *et al.*, 2013; Jabeen, Khan, Ahmad, Zafar, & Ahmad, 2009; Saghir *et al.*, 2001). Indigenous people prefer to use leaves for the treatment of disease. Leaves were the most frequently used plant parts (36 %). The reason may be the leaves are available most part of the year and contain most active secondary metabolites, alkaloids and terpenoids (Shaheen *et al.*, 2017). Mode of preparation of recipes was decoction (19 reports). Processing of plants parts by heating in water may result in extraction of most of the active compounds which can be used efficiently for the treatment of disease (Ahmad *et al.*, 2017). Water soluble substances includes phenolics which are important antioxidants (Das, Tiwari, & Shrivastava, 2010). Herbal treatments were reported as internal and external use (Scherrer, Motti, & Weckerle, 2005) and in most of the cases water acts as a dilution medium (Giday, Asfaw, Elmqvist, & Woldu, 2003). The results of present finding are in accordance with (Macía, García, & Vidaurre, 2005). Relative frequency of citation was calculated to determine most preferred medicinal plant species for the treatment of various diseases.

The relative frequency of citation (RFC) authenticates the frequency of citation of a medicinal plant species used for various ailments (Umair *et al.*, 2017). Relative frequency of citation ranges between 0.04-0.14. Highest Relative frequency of citation was recorded for *Ficus palmata* followed by *Melia azedarch*, followed by *Zanthoxylum armatum*, *Olea ferruginea*, *Ficus carica* and *Acacia modesta*. These plant species are easily available in the study area and frequently reported in other parts of the regions. To authenticate the relative importance of a species or family for a population is quantitatively analyzed by use value (Vendruscolo & Mentz, 2006). Higher use value of a species indicates its frequent use for the treatment of various disease by high number of informants and use reports (Kayani *et al.*, 2014). In the present investigation use value (UV) data lies between 0.09 to 0.58. Highest use value for *Dodonaea viscosa*. The high use value of *Dodonaea viscosa* is due to its greater diversity in the study are and is used against cold, cough, rheumatism, swellings, burns, gout and as astringent. In the present study, values of Fidelity level were between 53.8 % to 100 %.

Maximum value of FL (100%) was recorded for *Berberis lyceum, Plantago lanceolata, Prunus armeniaca*, *Euphorbia helioscopia* and *Ziziphus spina –christi* for treating Diabetes, Stomach pain and constipation. Fidelity Level indicates that all the informants mentioned same plant species for the treatment of same disease (Srithi, Balslev, Wangpakapattanawong, Srisanga, & Trisonthi, 2009). *Berberis lycium* contain berberine (Gulfraz, Arshad, Nayyer, Kanwal, & Nisar, 2004) which possess antidiabetic properties (Steriti, 2010). Informant consensus factor (ICF) is a method to determine consensus among informants for the use of plant species to treat a disease category (Shah, Bharati, Ahmad, & Sharma, 2015). The ICF value illustrates the cultural coherence of the selection of medicinal plants used in the treatment of a certain illness category (Heinrich *et al.*, 2009). The highest ICF value for any disease reflects high level of similarity in agreement concerning medicinal uses of plant species among population of study area (Rashid *et al.*, 2015). The medicinal plants with higher citation frequency and informant agreement value are economically important and have potential to serve mankind in the future (Shil *et al.*, 2014).

Conclusion

This study evaluated the role of medicinal plants in local healthcare system of Patan Sher Khan, District Sudhnoti, Azad Jammu and Kashmir. Local inhabitants used medicinal plants for the treatment of various diseases symptoms. It is concluded from the above study that traditional medicinal plant knowledge is still alive in the study area. The population of study area above the age of 50 have enough knowledge about the use of medicinal plants but young population especially educated population is least interested in traditional uses of medicinal plants. As a result, knowledge of medicinal plant is threatened. There is a need of similar studies to document and conserve this precious knowledge in the smaller patches of mountains area.

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