Research Article

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Study of plant resources with ethnomedicinal relevance from district Bagh, Azad Jammu and Kashmir, Pakistan

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Abstract: An ethnomedicinal expedition was conducted to collect and record indigenous knowledge about the use of medicinal plants by local inhabitants of four villages (Chittra, Topi, Pandi, and Kalri) of district Bagh, Azad Jammu and Kashmir. Ethnomedicinal data were obtained from 60 randomly selected local inhabitants of the study area through semi-structured questionnaires and interviews. These data were analyzed quantitatively through different ethnobotanical indices including family importance value, relative frequency of citation, use value (UV), fidelity level (FL), informant consensus factor (ICF), and Jaccard index (JI). Our study reported 69 medicinal plants belonging to 39 families. Rosaceae (9 species) was a dominant family of the study area. Herb (54.83%) was dominant growth form of plants used for medicinal purpose. Leaves contributed maximum usage (44.29%) for curing diseases. Decoction (23 records) was most used mode of utilization. Relative frequency of citation and UV ranged from 0.03–0.85 and 0.05–1.17, respectively. There were 4 plant species with 100% FL. Highest ICF (0.88%) was found for gastrointestinal diseases. By comparing results with previous study, JI ranged from 0.54 to 24.43%. Our results found that there were 18 plant species not reported with ethnomedicinal aspect in previous studies from district Bagh region. The research of this study concludes that

the area is rich with medicinal plants and the local inhabitant of this area still prefer medicinal plants over allopathic medicines for treating different ailments. Comparative analysis has shown some novel uses of plant species which may be due to cultural differences of the study area. However, awareness and pharmacological study are needed to conserve and unveil pharmaceutically important plants.

Keywords: Chittra, diseases, ethnomedicine, Kalri, medicinal plants, Pandi, Topi

1 Introduction

Plants are considered indispensable for sustenance of life because rural communities belonging to different countries use local plants for different purposes. Plants not only provide food, shelter, and oxygen to human beings but are also pivotal source of chemicals used in various drugs [1]. Medicinally important plants are considered as a main source of medicine for majority of population inhabited in rural areas. To gather information about medicinal plants, interest was prevailing in all ancient civilizations. Ethnobotany correlates the medicinal use of plants by local inhabitants of an area. Ethnobotanical study of an area reflects the awareness among local inhabitants about medicinal usage and application of plants against diseases. World Health Organization estimated that 80% of population in developing countries depend on herbal medication for fulfilling their health care necessities. Almost all plants have active constituents effective for diseases but some plants are much rich with these chemicals and are preferred for disease treatment [2]. These phytochemicals include b-amyron, stigmasterol, luteolin, arachidic acid, palmitic acid, flavonoids, etc. [3].

It is estimated that out of 4,22,000 flowering plants, 35,000–70,000 plant species are being used for herbal medication throughout the world [4]. It is stated in previous studies that about 25% of allopathic drugs are

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being produced from plants or byproducts extracted from plants. These drugs are more preferred than synthetic ones because of fewer side effects, low cost, and easy accessibility. This can be explained by comparing the medicinal plant *Salix alba* with synthetic drug, aspirin. It is confirmed by different studies that bark of *Salix alba* is effective against side effects caused by aspirin [5]. Pakistan is bestowed with variety of medicinal plants due to its different climatic and soil conditions. Traditional Unani medicine system is practiced by large population of Pakistan. This Unani medicinal practice largely relies on medicinal plants. A total of 6,000 flowering plants are present in Pakistan, from these around 400–600 plants are considered as medicinally important [6]. It is also noteworthy that about 80% of total angiospermic plants of Pakistan are present in western and northern mountainous regions of Pakistan. In 1950s, 84% of Pakistan's population was dependent on medicinal flora for treating various diseases, but due to rapid change in lifestyle and modernization, now the use of medicinal plants is restricted to remote areas [7]. Azad Jammu and Kashmir (AJK) is a state that lies in the foothills of Himalayas between 33–36° latitude and 73–75° longitude. This area is comprised of 13,297 km² [8]. This area is rich with plant diversity because of rivers, springs, streams, and grasslands. The number of medicinal plants are restricted in this area. The people of this area have significant knowledge about the use of medicinal plants but this knowledge about usage of medicinal plants is decreasing with death of aged people. So, a proper attention is needed to conserve these natural resources before the information related to important medicinal plants species is lost forever.

Previously, few studies had been conducted about the traditional use of medicinal plants from AJK [9–11] and district Bagh. Safeer et al. [12] reported 34 medicinal plant species from moist temperate Himalayas of district Bagh. Amjad et al. [13] documented 150 plants used for medicinal purpose by the people of Harighal, district Bagh, AJK. Qureshi et al. [14] reported 33 medicinal plants from Sudhan Gali and Ganga Chotti hills, district Bagh. However, no previous ethnobotanical research is found of these study areas in district Bagh. Our hypothesis behind this research was that there would be difference in ethnobotanical knowledge of plants among people of these areas due to different cultures. The aims of this study were: (i) To explore the medicinal plants from four villages (Chittra, Topi, Pandi, and Kalri) of district Bagh, AJK. (ii) To analyze the information with quantitative ethnobotanical indices. (iii) To compare the ethnobotanical information with previous studies reported from district Bagh.

2 Materials and methods

2.1 Study area

Present study has been conducted in four villages (Chittra, Topi, Pandi, and Kalri) of district Bagh, AJK. This area is located in western Himalayas region (Figure 1). Bagh district, as indicated by its name (garden) is one of the greenest sites of AJK. Average annual precipitation is 1,500 mm. Temperature ranges from 21 to 40°C in summer and about 2°C during winter. Various ethnic groups including Rajput, Sudhan, Gujar, Jat, and Maldial live in this area. Most common languages are Gojri, Kashmiri, Hindko, and Pahari. Its vegetation falls in subtropical as well as moist temperate regions [15].

2.2 Data collection

Current Survey is conducted directly by interacting with the native people through interviews as well as by group discussions following the method as in ref. [16]. For recording information, questionnaires were distributed among local people particularly herbalists (Hakeems) and old age people who are usually more acquainted with medicinal plants uses. The questionnaire was designed following Edward et al. [17] methodology.

2.3 Collection, identification, and preservation of plants

During the entire survey, plants were collected from diverse localities. Collected plants were placed in old newspapers for drying. Collected samples were identified by using flora of Pakistan. Each collected sample was dumped in the herbarium of PMAS – Arid Agriculture University, Rawalpindi.

2.4 Data analysis

Quantitative data analysis was done by using following ethnobotanical indices.

2.4.1 Family importance value (FIV)

FIV tells us about most frequently used family by the aboriginal people in the study area. It was calculated by the following formula [18].

Figure 1: Map of study area.

$$FIV = \frac{FC}{N} \times 100.$$

Here N is total number of informants and FC is the frequency citation of plant families.

2.4.2 Relative frequency of citation (RFC)

The RFC of medicinally important plants in the study area was calculated by using the following formula:

$$RFC = FC/N, \quad (0 < RFC < 1),$$

where “ FC ” indicates the number of participants that report the use of specific species and N indicates the total informants who are involved in the study [19].

2.4.3 Use value (UV)

UV of plant species was calculated by using the following formula [20].

$$UV = \sum Ui/N,$$

where “ $\sum Ui$ ” is the sum of all uses mentioned by each informant. N indicates the total number of participants.

2.4.4 Fidelity level (FL)

FL was used to find out the species domination over other species for curing specific complaints [21]. It is commonly calculated by the use of following formula.

$$Fl = N_p/N \times 100,$$

where N_p demonstrates the number of those contributors that specify the use of species for particular illness category and N designates number of those informers that use them for any type of disease category.

2.4.5 Informant consensus factor (ICF)

In order to categorize the most reliable medicinal plants for those diseases that are considered to be most frequent in the area, ICF was used by the following formula [22].

$$ICF = Nur - Nt/Nur - 1,$$

where Nur represents the number of use reports of a specific plant for a particular ailment and Nt indicates the total species that are used by all participants for this ailment category.

2.4.6 Jaccard Index (JI)

JI was used for comparing the reported research species with the previous data published from adjoining areas, at regional and global level. This was done by analyzing the quoted plant species as well as their medicinal uses with previous published articles by using the following formula:

$$JI = c \times 100/a + b - c.$$

Here “ c ” is the number of plants common to study area and previously published article, while “ a ” is the number of plant species reported in previously published article, and “ b ” is the number of plant species reported from study area [23].

3 Results and discussion

3.1 Qualitative ethnobotany

3.1.1 Demographic of informants

Data related to ethnomedicinal plants was recorded from 60 inhabitants through interview as well as by the use of questionnaires and group discussion. With regards to gender, 68.33% female and 31.67% male participants were involved for giving ethnomedicinal information. Much information was collected from the females of study area because it was much easier due to same gender rather than from the males. Our study results were also in agreement with refs. [24,25]. Similarly, 3.33% herbalists (Hakeems) and 96.67% other native people contributed in this survey. Age data showed that majority of informants were in the age range of 55–80 years (56.67%). It was followed by 35–50 years (30%), and above 80 were 13.33% (Figure 2). Mostly old age people prefer use of herbal medicines over allopathic drugs.

3.1.2 Diversity of medicinal plants

Present study showed that a total of 69 plant species belonging to 39 families were being used by local inhabitants of district Bagh, AJK. Four different growth forms having medicinal values were recorded from study area. It was found that 54.83% plant species are herbs. Other plant species were trees (24.53%), shrubs (17.31%), and climbers (4.33%) (Figure 3). Maximum use of herbs for

Figure 2: Demographic profile of informants interviewed.

medicinal purposes was due to more abundance and easily accessibility of these plants in study area. Our results also corroborate with the results of refs [26,27].

3.1.3 Plant parts used and mode of utilization

Plant parts used for medicinal purpose in the study area includes leaves, seeds, roots, branches, fruits, cones, flowers, and plant exudates. Leaves were most frequently used plant part for preparation of medicines with 44.29%. It was followed by whole plant (34.29%), fruits (27.14%), barks (11.43%), roots (11.42%), seeds (10%), branches and plant exudates (8.57%), and cones and flowers (2.86%) (Figure 4). Leaves showed maximum usage percentage (44.29%) for treatment of different ailments. Umair *et al.* [28] and Ajaib *et al.* [9] showed similar results regarding usage of plant parts against disease treatment in their studies. Leaves are the main photosynthetic organ containing

Figure 3: Growth forms of medicinal plants.

Figure 4: Percentages of plant parts used.

high level of secondary metabolites, essential oils, and phytochemicals. These metabolites are very useful against various disorders [29,30]. It is also noted that the confiscation of roots and whole plants may have destructive effects on existence and regeneration of plants. So, the use of leaves against diseases is advantageous for sustainability of local flora [31]. Plant parts with maximum usage percentages by traditional healers can be further investigated for phytochemical screening of important medicinal constituents in these parts. This can also help in confirmation of authentic information regarding medicinal uses of plant parts suggested by indigenous people or traditional healers.

Local inhabitants use different mode of utilization including decoction, plant extract, powder, juice, and paste. The most common usage forms were decoction (23 records), plant extract (17 records), powder (14 records), juice (10 records), and paste (7 records) (Figure 5). The most common mode of utilization for medicinal purpose was decoction with 23 records. It was also reported in literature that therapists mostly used medicinal plants in the form of decoction [32,33].

Decoction is also most frequently used mode of utilization in Pakistan for herbal medicines [34]. The use of medicinal plants in the form of decoction is preferred because it can be easily made by using water, tea, soup, or milk [35]. Decoction is usually made by mixing two or three different plant parts or plant species. This phenomenon of making decoction with more than one plant part is of great value among traditional healers

■ Decoction ■ Plant Extract ■ Powder ■ Juice ■ Paste

Figure 5: Mode of utilization of medicinal plants.

because it is richer with medicinal constituents as compared to single part [36].

3.2 Quantitative ethnobotany

3.2.1 FIV

Ethnomedicinal flora showed that the most represented family was Rosaceae contributing (22.5%) followed by Asteraceae (20%), Lamiaceae, Polygonaceae, Moraceae, and Mimosaceae (7.5% each), Ebenaceae, Solanaceae, Pinaceae, Amaranthaceae, Convolvulaceae, Fagaceae, and Apiaceae (5% each) followed by other families (2.5%) (Table 1). Highest FIV was reported for family Rosaceae (22.5%). This is due to the abundance of this family in the study area. These results were analogous with the findings of refs [37,38].

3.2.2 RFC and UV

RFC value of plant species tells us about the importance of plant species among informants citing its use for medicinal purpose. Highest RFC values were calculated for *Berberis lyceum* (0.85), *Mentha longifolia* (0.80), *Zanthoxylum armatum* (0.75), *Bergenia ciliata* (0.72), *Viola odorata* (0.63), *Taraxacum officinale* (0.58), *Solanum nigrum* (0.55), *Melia azedarach* (0.53), *Punica granatum* (0.52), *Diospyros lotus* (0.50), *Persicaria amplexicaulis* (0.47), *Amarathus viridis* (0.43), and *Achyranthus aspera* (0.42) (Table 1). Our results

showed that highest UV containing species in the study area were *Berberis lyceum* (1.17), *Mentha longifolia* (1.17), *Bergenia ciliata* (1.13), *Zanthoxylum armatum* (1.13), *Viola odorata* (1.03), *Persicaria amplexicaulis* (1.02), *Diospyros lotus* (0.98), *Melia azedarach* L. (0.98), *Taraxacum officinale* (0.98), *Solanum nigrum* (0.97), *Punica granatum* (0.97), *Amarathus viridis* (0.93), and *Juglans regia* (0.88) (Table 1).

Highest RFC for *Berberis lyceum* Royle (0.85) shows that this plant is very familiar among people of study area and most of the people know about its medicinal values and usage. UV was used to find out the relative importance of plant species among traditional healers according to their usage. This technique helps in authentication of different uses of plant species among number of people [39]. In present investigation UV ranges from 0.05–1.17. Our results of highest RFC and UV values for *Berberis lyceum* also corroborate with the findings of ref. [40]. Local people use this plant against various diseases like mouth and teeth problems, diabetes, rheumatic pain, dysentery, constipation, blood diseases, respiratory problems, flu, and jaundice. UV is not constant for a plant species among different areas or even within same area. Its value goes on changing over time. For example, highest UV was reported for *Mentha longifolia* (1.05) and *Olea ferouguinea* (1.02) from the tehsil Harighal [13] of same district Bagh. High UV of *Berberis lyceum* shows that it is very important among the people of district Bagh for healing various diseases. Lowest UV was 0.08 for *Stellaria media* L. Low UV does not mean that this plant is of low medicinal components or of less importance but it can be due to the fact that people are less familiar with this plant and its usage in particular area [41].

3.2.3 FL

FL was used to find out the species domination over other species for curing specific complaints. FL value ranged from 28.95 to 100%. Four plant species with 100% FL, were *Stellaria media*, *Rumex hestatus*, *Fragaria nubicola*, and *Prunus armeniaca* (Table 2). The lowest FL was found for *Viola odorata* with a value of 28.95%. Plants with 100% FL were used for curing constipation, female reproductive disorders, and healing wounds. *Urtica dioica* with 85.71% FL was used as a tonic and *Hedera nepalensis* with 83.33% FL was used for joint pain by local inhabitants of study areas. High FL of a plant species reflects its extensive usage and uniqueness for treating a specific disease in an area [42,43]. The plant species with high

Table 1: List of medicinal plants with their uses by the people of district Bagh, Azad Jammu and Kashmir, Pakistan

Plant family	Plant species/ Voucher no.	Local name	Plant part used	FIV	RFC	UV	Medicinal uses	Previous reports
Amaranthaceae	<i>Amaranthus viridis</i> L./ Tas 01	Ganiyar	Whole plant	5	0.43	0.93	Roots are used against menstrual irregularity . Leaves are used for constipation and weight loss	1A,2●,3Δ,4Δ,5⊙,6Δ,7Δ,8Δ,9Δ,10●,11Δ,12Δ,1-3Δ,14●,15Δ,16Δ,17Δ,18Δ
	<i>Achyranthes aspera</i> wall./Tas 02	Puthkanda	Whole plant		0.42	0.8	Herb juice is used against diarrhea and skin diseases . Leaves are used against insect bite	1A,2⊙,3Δ,4Δ,5●,6Δ,7Δ,8Δ,9●,10⊙,11Δ,12●,13Δ,14Δ,15Δ,16Δ,17Δ-18Δ
Apiaceae	<i>Coriandrum sativum</i> L./Tas 04	Dhania	Leaves and seeds	5	0.20	0.33	Plant has carminative property and is used in chattiness	1A,2Δ,3Δ,4Δ,5⊙,6Δ,7Δ,8●,9Δ,10⊙,11⊙,12Δ,13Δ,14⊙,15●,16Δ,17Δ,18●
	<i>Anethum graveolens</i> L./Tas 03	Soya	Whole plant		0.12	0.25	Leaves are cooked as vegetable. Fruits are used against fever, cough, ulcer, asthma and for skin allergies	1A,2Δ,3Δ,4Δ,5●,6Δ,7Δ,8⊙,9Δ,10Δ,11Δ,12●,1-3Δ,14Δ,15Δ,16Δ,17Δ,18Δ
Araceae	<i>Arisaema jacquemontii</i> Blume/Tas 06	Hathpees	Fruits and rhizome	2.5	0.10	0.1	Dried rhizome is used in numerous mental and nervous ailments	1⊙,2Δ,3Δ,4Δ,5Δ,6Δ,7Δ,8Δ,9Δ,10Δ,11Δ,12Δ,1-3Δ,14Δ,15Δ,16Δ,17Δ,18Δ
Araliaceae	<i>Hedera nepalensis</i> K.Kosh./Tas 05	Batkail	Leaves and fruits	2.5	0.10	0.13	Leaves are used to cure diabetes . Its fruits are helpful for joint pain	1Δ,2Δ,3⊙,4Δ,5●,6Δ,7⊙,8Δ,9Δ,10Δ,11Δ,12Δ,-13Δ,14Δ,15Δ,16●,17Δ,18Δ
Asteraceae	<i>Achillea millefolium</i> L./Tas 07	Kangi	Leaves and roots	2.5	0.25	0.5	Leaves provide relief from toothache, stomach problem , and bleeding gums. Roots are used for fever	1A,2⊙,3⊙,4Δ,5Δ,6Δ,7●,8Δ,9Δ,10Δ,11Δ,12Δ,-13Δ,14Δ,15Δ,16Δ,17Δ,18Δ
	<i>Taraxacum officinale</i> Weber./Tas 12	Hand	Leaves and roots		0.58	0.98	Roots are used against kidney, liver diseases, constipation, and stomach problems. Leaves cure jaundice	1⊙,2Δ,3Δ,4Δ,5Δ,6Δ,7⊙,8Δ,9Δ,10Δ,11Δ,12Δ,1-3Δ,14Δ,15●,16Δ,17Δ,18Δ
	<i>Gerbera gossypina</i> (Royle) Beauverd/Tas 08	Paproola	Whole plant		0.08	0.08	Plant is considered as tonic	1A,2●,3Δ,4Δ,5Δ,6,7●,8Δ,9Δ,10Δ,11Δ,12Δ,13Δ,14Δ,15●,16Δ,17Δ,18Δ
	<i>Sonchus oleraceus</i> (L.) L./Tas 09	Dudhi	Stem, leaves, and latex		0.12	0.17	Stems are sedative and tonic. Sap latex is used for warts treatment	1A,2●,3Δ,4Δ,5Δ,6Δ,7Δ,8Δ,9Δ,10Δ,11Δ,12Δ,13Δ,14Δ,15Δ,16Δ,17Δ,18Δ
	<i>Cichorium intybus</i> L./Tas 10	Kasni	Whole plant		0.38	0.52	Roots decoction is used in curing fever . Leaves are effective against constipation	1A,2Δ,3Δ,4Δ,5Δ,6Δ,7Δ,8●,9Δ,10Δ,11●,12Δ,13Δ,14Δ,15Δ,16Δ,17Δ,18Δ
	<i>Parthenium hysterophorus</i> L./Tas 11	Gandi booti	Leaves and flowers		0.05	0.05	Used to treat diabetes	1A,2Δ,3Δ,4Δ,5Δ,6Δ,7Δ,8Δ,9Δ,10Δ,11Δ,12Δ,13Δ,14Δ,15Δ,16Δ,17Δ,18Δ
	<i>Artemisia vulgaris</i> L./Tas 14	Choou	Leaves		0.07	0.1	Leaves regulate menstrual cycle , also valuable for sleeplessness and anxiety	1A,2●,3Δ,4Δ,5Δ,6Δ,7Δ,8Δ,9Δ,10●,11Δ,12Δ,13Δ,14Δ,15●,16Δ,-17Δ,18Δ

(Continued)

Table 1: Continued

Plant family	Plant species/ Voucher no.	Local name	Plant part used	FIV	RFC	UV	Medicinal uses	Previous reports
Brassicaceae	<i>Silybum marianum</i> (L.)/Tas 13	Kandyara	Whole plant		0.05	0.05	Plant is useful for diabetes	1A,2●, 3A,4A,5A, 6A,7A,8A,9A, 10A, 11A,12A,13A,14A,15A,16A,17A,18A
	<i>Brassica campestris</i> L./Tas 15	Sarsoon	Leaves and seeds	2.5	0.22	0.42	Leaves are useful for stomach acidity. Seed oil is effective ear painkiller	1A,2A,3A,4A,5●,6A,7A,8A,9A,10●,11A,12A,1-3A,14A,15A,16A,17A,18A
Buxaceae	<i>Sarcococca saligna</i> Mull.Arg./Tas 16	Nazroon	Branches	2.5	0.05	0.05	This plant defends children from wicked eye	1●,2●,3●,4A,5A, 6A,7●,8A,9A,10A, 11A,12A,13A,14A,15A,16A,17A,18A
Cannabaceae	<i>Cannabis sativa</i> L./Tas 17	Bhang	Whole plant	2.5	0.38	0.73	Useful for jaundice and stomach heat . Flowers are valuable in regulating menstrual cycle	1A,2●,3A,4A,5A, 6A,7A,8A,9A,10●,11A,12●,13A,14●,15●,16A,17●,18A
	<i>Viburnum cotinifolium</i> D.Don/Tas 19	Gush	Fruits and Leaves	2.5	0.35	0.85	Fruits cure constipation and whooping cough. Leaves treat menorrhagia	1A,2A,3●,4A,5A, 6●,7●,8●,9A, 10A, 11A,12A,13A,14A,15A,16A,17A,18A
Caryophyllaceae	<i>Stellaria media</i> L./Tas 18	Ladroo	Whole plant	2.5	0.08	0.08	Plant is very effective for menstrual distress	1A,2A,3A,4A,5A, 6A,7A,8A,9A,10●,11A,12A,13A,14A,15A,16A,17A,18A
Convolvulaceae	<i>Cuscuta reflexa</i> Roxb./Tas 20	Neela tari	Whole plant	5	0.30	0.78	Plant is also considered as anti-lice, anti-anemic , and anti-pyretic	1A,2●,3A,4A,5A, 6A,7A,8A,9A,10A,11●,12●,13A,14A,15●,16A,17A,18A
	<i>Convolvulus arvensis</i> L./Tas 21	Lilli	Whole plant		0.18	0.27	Plant is used against constipation . Leaves are good to bath skin to cure skin rashes	1A,2●,3A,4A,5A, 6A,7A,8A,9A,10●,11A,12●,13A,14A,15A,16A,17A,18A
Dryopteridaceae	<i>Dryopteris ramosa</i> (C.Hope) C./Tas 22	Langeri	Leaves	2.5	0.10	0.13	Leaves are used to treat constipation and ulcer	1A,2A,3A,4A,5A, 6A,7A,8A,9A,10A,11A,12A,13A,14A,15A,16A,17A,18A
	<i>Diospyros lotus</i> L./Tas 23	Amlook	Fruits	5	0.50	0.98	Fruits are used for curing fever, high blood pressure, and constipation	1A,2A,3A,4A,5A, 6●,7A,8●,9A,10A, 11A,12A,13A,14A,15A,16A,17A,18A
Ebenaceae	<i>Zanthoxylum armatum</i> DC. Prodr/Tas 24	Timber	Fruits and Branches		0.75	1.13	Fruits are helpful for piles and power to eject gas from the body. Young branches are used as miswak	1A,2●,3A,4A,5●,6●,7●,8A,9A,10●,11A,12A-13A,14A,15●, 16A,17●,18A
	<i>Euphorbia hirta</i> L./Tas 25	Dodhal	Whole plant	2.5	0.23	0.33	Plant is used against diarrhea and constipation	1A,2●,3A,4A,5A,6A, 7A,8●,9A,10●,11A,12A,13A,14A,15A,16A,17A-18A
Fabaceae	<i>Medicago polymorpha</i> L./Tas 27	Maina	Whole plant	2.5	0.03	0.05	Plant is useful against constipation and other digestive complications	1A,2●,3A,4A,5A 6A, 7A, 8A,9A,10A, 11A,12A,13A,14A,15A,16A,17A,18A
Fagaceae	<i>Indigofera heterantha</i> Wall. ex Brandis/Tas 26	Jhand	Leaves	5	0.15	0.2	Leaves are used against skin allergy and are also given to cattle for curing dysentery	1●,2A,3A,4●,5A 6A, 7A,8A,10●,11A,12A,13A,14A,15A,16A,17A,18A

(Continued)

Table 1: Continued

Plant family	Plant species/ Voucher no.	Local name	Plant part used	FIV	RFC	UV	Medicinal uses	Previous reports
Juglandaceae	<i>Quercus incana</i> Roxb./Tas 28	Rein	Bark		0.05	0.05	Bark is very helpful for treating joint pain . It also has a cooling effect	1A,2A,3A,4A,5A,6A,7A,8A,9A,10A,11A,12A,1-3A,14A,15A,16A,17A,18A
	<i>Juglans regia</i> L./ Tas 29	Akhroot	Fruits and bark	2.5	0.45	0.88	Fruit reduces high blood pressure. Bark is used for teeth and gums	1A,2A,3A,4A,5A,6A,7A,8A,9A,10A,11A,12A,1-3A,14A,15A,16A,17A,18A
Lamiaceae	<i>Mentha longifolia</i> (L.) L./Tas 30	Poodina	Whole plant	7.5	0.80	1.17	Helpful for diarrhea, stomach problem , rheumatic pain, dysentery, and vomiting	1A,2A,3A,4A,5A,6A,7A,8A,9A,10A,11A,12A,1-13A,14A,15A,16A,17A,18A
	<i>Otostegia limbata</i> (Benth.) Boiss./ Tas 32	Chita jand	Leaves		0.07	0.15	Boiled leaves extract is useful for mouth ulcers, fever, and skin infections	1A,2A,3A,4A,5A,6A,7A,8A,9A,10A,11A,12A,1-13A,14A,15A,16A,17A,18A
Lathyraceae	<i>Mentha longifolia</i> (L.) Hudsu/Tas 31	Bareena	Whole plant		0.67	1.12	Leaves are used for vomiting , diarrhea, and blood purification	1A,2A,3A,4A,5A,6A,7A,8A,9A,10A,11A,12A,1-3A,14A,15A,16A,17A,18A
	<i>Punica granatum</i> L./ Tas 33	Daaroo	Whole plant	2.5	0.52	0.97	Fruits are edible and are used for blood purification, eradication of cough, and dysentery	1A,2A,3A,4A,5A,6A,7A,8A,9A,10A,11A,12A,1-2A,13A,14A,15A,16A,17A,18A
	<i>Malvastrum coromandelianum</i> L./Tas 34	Lafa	Leaves	2.5	0.10	0.13	Leaves are used to cure diabetes	1A,2A,3A,4A,5A,6A,7A,8A,9A,10A,11A,12A,1-3A,14A,15A,16A,17A,18A
Meliaceae	<i>Melia azedarach</i> L./ Tas 35	Dherak	Leaves, fruits, and seeds	2.5	0.53	0.98	Fresh leaves can be used as a blood purifier and to reduce mouth swelling	1A,2A,3A,4A,5A,6A,7A,8A,9A,10A,11A,12A,1-13A,14A,15A,16A,17A,18A
Mimosaceae	<i>Morus nigra</i> L./ Tas 36	Kala toot	Fruits	7.5	0.15	0.32	Fruit is used against anemia and also for sore throat	1A,2A,3A,4A,5A,6A,7A,8A,9A,10A,11A,12A,1-13A,14A,15A,16A,17A,18A
	<i>Acacia nilotica</i> Willd./Tas 37	Kiker	Leaves and bark		0.12	0.2	Bark is used for painful throat and also against toothache	1A,2A,3A,4A,5A,6A,7A,8A,9A,10A,11A,12A,1-13A,14A,15A,16A,17A,18A
Moraceae	<i>Ficus palmata</i> Forssk./Tas 38	Phagwari	Milky secretions and fruits	7.5	0.33	0.63	Fruits are used as blood purification and for quick wound healing	1A,2A,3A,4A,5A,6A,7A,8A,9A,10A,11A,12A,1-3A,14A,15A,16A,17A,18A
Myrsinaceae	<i>Conyza Canadensis</i> (L.) Cronq./Tas 39	Chti booti	Whole plant		0.05	0.05	Plant is used against flatulence and other stomach disorders	1A,2A,3A,4A,5A,6A,7A,8A,9A,10A,11A,12A,1-3A,14A,15A,16A,17A,18A
	<i>Morus alba</i> L./ Tas 40	Safed toot	Roots		0.28	0.65	Roots are effective for toothache and cough	1A,2A,3A,4A,5A,6A,7A,8A,9A,10A,11A,12A,1-13A,14A,15A,16A,17A,18A
	<i>Myrsine africana</i> L./ Tas 41	Gogal	Leaves	2.5	0.08	0.12	Leaves help in the treatment of liver diseases like jaundice	1A,2A,3A,4A,5A,6A,7A,8A,9A,10A,11A,12A,1-3A,14A,15A,16A,17A,18A
Myrtaceae	<i>Eucalyptus camaldulensis</i> Dehnh./Tas 42	Safatda	Leaf and bark	2.5	0.12	0.2	Young shoots and leaves give momentary relief in cough	1A,2A,3A,4A,5A,6A,7A,8A,9A,10A,11A,12A,1-3A,14A,15A,16A,17A,18A

(Continued)

Table 1: Continued

Plant family	Plant species/ Voucher no.	Local name	Plant part used	FIV	RFC	UV	Medicinal uses	Previous reports
Oleaceae	<i>Olea ferruginea</i> Royle/Tas 43	Kao	Leaves and bark	2.5	0.25	0.3	Helpful for gonorrhea and toothache	1A,2●,3Δ,4Δ,5Δ,6●,7Δ,8Δ,9●,10●,11Δ,12Δ,- 13Δ,14Δ,15Δ,16Δ,17Δ,18Δ
Oxalidaceae	<i>Oxalis corniculata</i> L./Tas 44	Khattahulla	Whole plant	2.5	0.15	0.22	Plant is helpful in curing jaundice and stomach acidity	1A,2●,3Δ,4Δ,5Δ,6Δ,7Δ,8●,9,10●,11Δ,12Δ,1- 3Δ,14●,15Δ,16●,17Δ,18Δ
Papilionaceae	<i>Melilotus indica</i> (L.)/ Tas 45	Singi	Leaves and seeds	2.5	0.12	0.15	Leaves are rubbed on skin to cure eczema . Seeds are effective against diarrhea	1A,2Δ,3Δ,4Δ,5Δ,6Δ,7Δ,8Δ,9Δ,10Δ,11Δ,12Δ,1- 3Δ,14Δ,15Δ,16Δ,17Δ,18Δ
Pinaceae	<i>Pinus roxburghii</i> Sarg./Tas 46	Chir	Cones and resin	5	0.08	0.12	Resin is usually used against tumors and bleeding from wounds . Cones are used to cure diabetes	1A,2●,3Δ,4Δ,5●,6●,7●,8Δ,9●,10●,11Δ,12Δ- 13Δ,14Δ,15●,16Δ,17Δ,18Δ
	<i>Pinus wallichiana</i> A. B. Jackson/Tas 47	Bayar	Bark, leaves, and resin		0.07	0.13	Resin is used for quick healing and cough. Leaves are useful for dysentery	1●,2Δ,3Δ,4Δ,5Δ,6●,7●,8●,9Δ,10Δ,11Δ,12Δ,1- 3Δ,14Δ,15●,16Δ,17Δ,18Δ
Plantaginaceae	<i>Plantago lanceolata</i> L./Tas 48	Butti	Whole plant	2.5	0.13	0.25	Acts as a cooling agent for stomach. Leaves are useful for wound sores and swollen surfaces	1A,2●,3●,4Δ,5Δ,6Δ,7●,8Δ,9Δ,10Δ,11Δ,12Δ,- 13Δ,14●,15●,16Δ,17Δ,18Δ
Poaceae	<i>Cynodon dactylon</i> (L.) Pers./Tas 49	Khabal grass	Whole plant	2.5	0.10	0.17	Fresh plant paste is useful for healing of fractured bones and against dysentery	1●,2●,3Δ,4Δ,5●,6,7Δ,8Δ,9Δ,10Δ,11Δ,12●,1- 3Δ,14Δ,15●,16Δ,17Δ,18Δ
Polygonaceae	<i>Rumex hestatus</i> D.Don./Tas 50	Chukhreey	Leaves	7.5	0.13	0.27	Leaves are used for treating jaundice and bleeding wounds	1●,2●,3Δ,4Δ,5Δ,6Δ,7●,8●,9,10●,11Δ,12Δ,1- 3Δ,14Δ,15Δ,16Δ,17Δ,18Δ
	<i>Persicaria amplexicaulis</i> (D Don) Ronse Decr./ Tas 51	Masloon	Leaves and rhizome		0.47	1.02	Dried rhizome is used to cure backache and joints pain . Herbal tea of leaves is useful for stomach ulcer, flu, and bleeding gums	1A,2Δ,3Δ,4Δ,5Δ,6Δ,7Δ,8●,9Δ,10Δ,11Δ,12Δ,1- 3Δ,14Δ,15Δ,16Δ,17Δ,18Δ
Pteridaceae	<i>Polygonum aviculare</i> L./Tas 52	Darubra	Whole plant		0.08	0.12	Leaves are used for eliminating kidney stones	1A,2Δ,3Δ,4Δ,5Δ,6Δ,7Δ,8●,9Δ,10Δ,11Δ,12Δ,1- 3Δ,14Δ,15Δ,16Δ,17Δ,18Δ
	<i>Adiantum capillus- veneris</i> /Tas 53	Kakwai	Leaves	2.5	0.37	0.75	Leaves are used to treat hepatic problem , stomach acidity, and relieve fever	1A,2Δ,3Δ,4Δ,5Δ,6Δ,7●,8Δ,9Δ,10Δ,11Δ,12Δ,1- 13Δ,14Δ,15●,16Δ,17●,18Δ
Rosaceae	<i>Prunus armeniaca</i> L./Tas 54	Khobani	Fruits	22.5	0.15	0.15	Fruits are used against constipation	1A,2●,3Δ,4Δ,5Δ,6●,7Δ,8●,9Δ,10Δ,11Δ,12Δ,- 13Δ,14Δ,15●,16Δ,17●,18Δ
	<i>Rumex dentatus</i> L./ Tas 55	Hulla	Leaves		0.22	0.36	Leaves are used to relieve irritation and bleeding from wound	1A,2Δ,3Δ,4Δ,5Δ,6Δ,7●,8Δ,9Δ,10●,11Δ,12Δ,1- 3Δ,14Δ,15●,16Δ,17Δ,18Δ
	<i>Prunus domestica</i> L./Tas 56	Alocha	Fruits and		0.18	0.12	Fruit is taxative and helpful in curing constipation	1A,2●,3Δ,4Δ,5Δ,6●,7Δ,8●,9●,10Δ,11●,12Δ,- 13Δ,14Δ,15Δ,16Δ,17Δ,18Δ
	<i>Prunus persica</i> (L.) Batsch/Tas 57	Aaroon	Fruits and gums		0.22	0.47	Gum treats backbone and joint pain . Fruit is eaten by diabetic patients	1A,2●,3Δ,4Δ,5●,6●,7●,8Δ,9Δ,10Δ,11Δ,12Δ,1- 3Δ,14Δ,15●,16Δ,17Δ,18Δ

(Continued)

Table 1: Continued

Plant family	Plant species/ Voucher no.	Local name	Plant part used	FIV	RFC	UV	Medicinal uses	Previous reports
Rutaceae	<i>Rubus fruticosus</i> G.N.Jones/Tas 58	Akhray	Leaves		0.18	0.38	Leaves are used to control diarrhea	1A,2A,3C,4C,5A,6A,7C,8A,9C,10C,11A,12A,- 13A,14A,15A,16A,17A,18A
	<i>Pyrus pashia</i> L./ Tas 59	Batangi	Roots		0.17	0.31	Roots are used against bowls as well as dysentery , and whooping cough	1A,2C,3A,4A,5C,6C,7C,8C,9A,10A,11A,12A,- 13A,14A,15A,16A,17A,18A
	<i>Rosa brunonii</i> Lindl./Tas 60	Chall	Flowers		0.17	0.27	Fruits are laxative , blood purifier, and are used against diarrhea. Gulkand is very effective for heart and digestive problems	1C,2C,3A,4A,5A,6A,7C,8A,9A,10A,11A,12A,- 13A,14A,15A,16A,17A,18A
	<i>Fragaria nubicola</i> Lindl. ex Lacaita/ Tas 61	Budemewa	Whole plant		0.12	0.12	The fruit is laxative and purgative	1C,2C,3C,4A,5A,6A,7C,8C,9A,10A,11A,12A,1- 3A,14A,15A,16A,17A,18A
Rutaceae	<i>Pyrus communis</i> L./ Tas 62	Nashpaati	Fruits		0.08	0.13	Fruits are laxative and used for curing diarrhea	1A,2A,3A,4A,5A,6C,7A,8A,9A,10A,11A,12A,1- 3A,14A,15A,16A,17A,18A
	<i>Berberis lyceum</i> Royle./Tas 63	Sumbal	Bark, roots, fruits	2.5	0.85	1.17	Bark powder cures mouth boils . Fruits are laxative. Roots are used for joint pain and toothache	1C,2C,3C,4C,5A,6A,7A,8C,9A,10C,11A,12A,- 13A,14A,15A,16A,17A,18A
	<i>Bergenia ciliata</i> (Haw.) Stemb./ Tas 64	Zakhm-e-Hayat	Leaves and roots	2.5	0.72	1.13	Cures diabetes, fever, cough, joint pain , and inflammation in body	1C,2A,3A,4A,5A,6,7C,8C,9A,10A,11A,12A,1- 3A,14C,15C,16A,17A,18A
Simaroubaceae	<i>Ailanthus altissima</i> (Mill.) Swingle/ Tas 65	Drawia	Leaves	2.5	0.10	0.1	Young leaves act as blood purifier	1A,2C,3A,4A,5A,6C,7A,8A,9A,10A,11A,12A,1- 3A,14A,15A,16A,17A,18A
Solanaceae	<i>Solanum nigrum</i> L./ Tas 66	Kachmach	Whole plant	5	0.55	0.97	Plant extract is used for asthma, skin burn, malaria, and fever	1A,2C,3A,4A,5C,6A,7A,8C,9C,10C,11A,12C,- 13A,14C,15A,16C,17A,18A
	<i>Capsicum frutescens</i> L./Tas 67	Marchi	Fruits		0.07	0.07	Fruits are used in order to improve digestion	1A,2A,3A,4A,5A,6A,7A,8A,9A,10A,11A,12A,1- 3A,14A,15A,16A,17A,18A
Urticaceae	<i>Urtica dioica</i> L./ Tas 68	Kiayari	Whole plant	2.5	0.12	0.18	Roots are useful to enhance milk excretion	1C,2C,3C,4A,5A,6,7A,8C,9A,10A,11A,12A,1- 3A,14A,15A,16A,17A,18A
Violaceae	<i>Viola odorata</i> L./ Tas 69	Banafsha	Whole plant, flower, and roots	2.5	0.63	1.03	Whole plant is used to cure fever, cough , lung infection, constipation, and asthma	1C,2C,3C,4A,5A,6A,7A,8A,9C,10C,11C,1- 2A,13A,14A,15A,16A,17A,18A

RFC = relative frequency of citation; UV = use value; FIV = family importance Value; (C) = similar use to previous report; (●) = dissimilar use to previous reports; (Δ) = use not reported in previous report; bold text explains preferred use of plant species; 1 = [45] 2 = [34], 3 = [46], 4 = [47], 5 = [48], 6 = [10], 7 = [49], 8 = [50], 9 = [51], 10 = [29], 11 = [39], 12 = [52], 13 = [53], 14 = [54], 15 = [55], 16 = [56], 17 = [57], 18 = [43].

Table 2: FL of observed species from study area

Ailment category	FL of plant species (%)
Cough	<i>Persicaria amplexicaulis</i> (D Don) Ronse Deer. (50), <i>Anethum graveolens</i> L. (71.43)
Kidney problem	<i>Polygonum aviculare</i> L. (80)
Constipation	<i>Diospyros lotus</i> L. (66.67), <i>Ficus palmata</i> Forssk. (65), <i>Morus alba</i> L. (64.71), <i>Prunus armeniaca</i> L. (100), <i>Viburnum cotinifolium</i> D.Don (66.67), <i>Euphorbia hirta</i> L. (66.67), <i>Fragaria nubicola</i> Lindl. ex Lacaita (100), <i>Pyrus pashia</i> L. (70), <i>Cichorium intybus</i> L. (69.57), <i>Pyrus communis</i> (80), <i>Dryopteris ramose</i> (C.Hope) C. (66.67), <i>Morus nigra</i> (66.67), and <i>Prunus domestica</i> L. (72.73)
Tonic	<i>Brassica campestris</i> L. (76.92) and <i>Urtica dioica</i> L. (85.71)
Female reproductive disorder	<i>Stellaria media</i> L. (100)
Skin problem	<i>Achyranthus aspera</i> wall. (56), <i>Indigofera heterantha</i> Wall. ex Brandis (66.67), and <i>Cuscuta reflexa</i> Roxb. (61.11)
Stomach problem	<i>Zanthoxylum armatum</i> DC. Prodr (44.44), <i>Achillea millefolium</i> L. (60), and <i>Mentha longifolia</i> L. (45)
Mouth boils	<i>Otostegia limbata</i> (Benth.) Boiss. (75)
Joint pain	<i>Hedra nepalensis</i> K.Kosh. (83.33)
Toothache	<i>Juglans regia</i> L. (44.44), <i>Olea ferruginea</i> Royle (66.67), <i>Prunus persica</i> (L.) Batsch. (57.14), and <i>Acacia nilotica</i> Willd. (71.43)
Jaundice	<i>Cannabis sativa</i> L. (60.87) and <i>Melia azedarach</i> L. (65.63)
Fever	<i>Rubus fruticosus</i> Hook. (63.64), <i>Adiantum capillus-veneris</i> L. (63.64), and <i>Solanum nigrum</i> L. (54.55)
Anemia	<i>Punica granatum</i> L.(54.84)
Wound healing	<i>Berberis Lyceum</i> Royle. (35.29), <i>Pinus roxburghii</i> Sarg.(60), and <i>Rumex hestatus</i> D.Don.(100)
Thirst and burning sensation of body	<i>Viola odorata</i> L. (28.95)

FL can also be checked further for pharmacological purposes [44].

3.2.4 ICF

Our result showed that medicinal plants were used for treating 14 different ailment categories. ICF value ranged from 0.67 to 0.88%. Maximum ICF (0.88%) was obtained for gastrointestinal diseases. It was followed by respiratory disorders (0.87%), sexual disease (0.86%), and antidote (0.85%). Lowest ICF value was calculated for kidney disorders (0.67%) (Figure 6). ICF value tells us about the cultural consistency of plant uses against specific diseases. Our study reported that most of the plant species were used for gastrointestinal diseases. Most common plant species used for gastrointestinal diseases include *Diospyros lotus*, *Ficus palmata*, *Amarathus viridis*, *Morus alba*, *Viburnum cotinifolium*, *Cichorium intybus*, *Mentha longifolia*, *Cannabis sativa*, *Persicaria amplexicaulis*, and *Zanthoxylum armatum*. Our results for highest ICF value were also in agreement with the results of refs [45,46]. Gastrointestinal disorder was followed by respiratory disorder including *Viola odorata*, *Anethum graveolens*, *Diospyros lotus*, *Adiantum capillus-veneris*, *Viburnum cotinifolium*, *Cichorium intybus*, *Eucalyptus camaldulensis*, and

Persicaria amplexicaulis. High value for ICF shows high level of homogeneity among the informant consent regarding use of medicinal plants against specific disease [47]. Low ICF value shows that less number of people agreed for using specific plant against specific disease. Low ICF value may be due to the fact that people do not want to share their information with others, hence showing less consent regarding use of a plant against a disease [48].

Figure 6: ICF of disease categories.

Table 3: JI comparison of present study with previous reports

Previous study	Total documented species in previous study	No. of plant species with similar use	No. of plant species with dissimilar use	No. of plant species common in both area	No. of plant species found only in aligned area	Species only in study area	% Of plants with similar use	% Of dissimilar uses	JI
From district Bagh									
Moist temperate Himalayas of district Bagh	34	5	8	13	21	57	14.71	23.53	14.44
Harigal district Bagh, AJK	150	22	21	43	114	33	14.67	14.00	24.43
Sudhan Gali and Ganga Chotti hills, district Bagh.	33	11	3	14	23	59	33.33	9.09	15.91
From AJK									
District Kotli AJK	38	1	3	4	35	66	2.63	7.89	3.88
Tattapani valley, AJK	70	6	13	19	47	48	8.57	18.57	15.83
Himalayan region, AJK	73	11	10	21	52	48	15.07	13.70	17.36
Toli peer	121	15	11	26	—	—	12.40	9.09	15.85
Jhelum valley	113	8	15	23	—	—	7.08	13.27	14.47
Sudhonti	58	3	6	9	49	60	5.17	10.34	7.63
From other regions of Pakistan									
District Buner	80	14	14	28	52	41	17.50	17.50	23.14
Rawalpindi, Punjab	92	4	2	5	87	64	4.35	2.17	3.21
Kadhi areas of Khushab	48	4	9	12	36	57	8.33	18.75	11.43
KPK	10	2	1	3	7	66	20.00	10.00	3.95
Mastung of Balochistan	102	12	9	21	81	48	11.76	8.82	14
Northern Pakistan	106	1	16	17	89	52	0.94	15.09	10.76
China	121	1	3	4	56	65	0.83	2.48	2.15
Northeast India	145	0	4	4	80	65	0.00	2.76	1.90
Rangamati district, Bangladesh	117	0	1	1	49	68	0.00	0.85	0.54

Table 4: New medicinal uses of plant species not reported in previous compared studies

Plant species	New medicinal uses not reported in previous compared studies
<i>Amaranthus viridis</i> L.	Leaves are used for constipation and weight loss
<i>Achyranthus aspera</i> wall.	Herb Juice is used against diarrhea
<i>Anethum graveolens</i> L.	Fruits are used against fever, cough, ulcer, and for skin allergies
<i>Achillea millefolium</i> L.	Leaves are used for relief from toothache and bleeding gums
<i>Taraxacum officinale</i> Weber.	Roots are used against liver diseases, constipation, and stomach problems
<i>Gerbera gossypina</i> (Royle) Beauverd	Plant is considered as tonic
<i>Sonchus oleraceus</i> (L.) L.	Stems are sedative and tonic. Sap latex for warts treatment
<i>Cichorium intybus</i> L.	Roots decoction is used in curing fever. Leaves are effective against constipation
<i>Parthenium hysterophorus</i> L.	Used to treat diabetes
<i>Artemisia vulgaris</i> L.	Leaves regulate menstrual cycle, also valuable for sleeplessness and anxiety
<i>Silybum marianum</i> (L.)	Plant is useful for diabetes
<i>Brassica campestris</i> L.	Leaves are useful for stomach acidity. Seed oil is effective ear painkiller
<i>Sarcococca saligna</i> (Müll) Arg.	This plant defends children from wicked eye
<i>Cannabis sativa</i> L.	Flowers are valuable in regulating menstrual cycle
<i>Viburnum cotinifolium</i> D.Don	Fruits cure whooping cough
<i>Stellaria media</i> L.	Plant is very effective for menstrual distress
<i>Cuscuta reflexa</i> Roxb.	Plant is considered as anti-lice and anti-pyretic
<i>Dryopteris ramosa</i> (C.Hope) C.	Leaves are used to treat constipation and ulcer
<i>Diospyros lotus</i> L.	Fruits are used for curing fever and high blood pressure
<i>Zanthoxylum armatum</i> DC. Prodr	Young branches are used as miswak
<i>Euphorbia hirta</i> L.	Plant is used against constipation
<i>Medicago polymorpha</i> L.	Plant is useful against constipation
<i>Juglans regia</i> L.	Fruit reduces high blood pressure
<i>Mentha longifolia</i> (L.) L.	Whole plant is helpful for diarrhea and rheumatic pain
<i>Otostegia limbata</i> (Benth.) Boiss.	Boiled leaves extract is useful for mouth ulcers and fever
<i>Malvastrum coromandelianum</i> L.	Leaves are used to cure diabetes
<i>Melia azedarach</i> L.	Fresh leaves can be used to reduce mouth swelling
<i>Ficus palmata</i> Forssk.	Fruits are used as blood purification and for quick wound healing
<i>Conyza Canadensis</i> (L.) Cronq.	Plant is used against stomach disorders
<i>Morus alba</i> L.	Roots are effective for toothache
<i>Eucalyptus camaldulensis</i> Dehnh.	Young shoots and leaves give momentary relief in cough
<i>Olea ferruginea</i> Royle	Leaves and bark is helpful for gonorrhea
<i>Oxalis corniculata</i> L.	Plant is helpful in curing jaundice
<i>Melilotus indica</i> (L.)	Leaves are rubbed on skin to cure eczema. Seeds are effective against diarrhea
<i>Pinus roxburghii</i> Sarg.	Resin is usually used against tumors
<i>Pinus wallichiana</i> A. B. Jackson	Resin is used for cough. Leaves are useful for dysentery
<i>Plantago lanceolata</i> L.	Whole plant acts as a cooling agent for stomach. Leaves are useful for swollen surfaces
<i>Rumex hystatus</i> D.Don.	Leaves are used for treating bleeding wounds
<i>Persicaria amplexicaulis</i> (D. Don)	Dried rhizome is used to cure backache and joints pain. Herbal tea of leaves is useful for stomach ulcer, flu, and bleeding gums
Ronse Deer.	Leaves are used for eliminating kidney stones
<i>Polygonum aviculare</i> L.	Leaves are used to treat hepatic problem, stomach acidity, and relieve fever
<i>Adiantum capillus-veneris</i>	Fruit is laxative and helpful in curing constipation
<i>Prunus domestica</i> L.	Leaves are used to relieve irritation
<i>Rumex dentatus</i> L.	Gum treats backbone and joint pain. Fruit is eaten by diabetic patients
<i>Prunus persica</i> (L.) Batsch	Roots are used against bowels and whooping cough
<i>Pyrus pashia</i> L.	Fruits are used for blood purification. Gulkand is very effective for digestive problems
<i>Rosa brunonii</i> Lindl.	Fruits are laxative and are used for curing diarrhea
<i>Pyrus communis</i> L.	Fruits are laxative. Roots are used for joint pain
<i>Berberis lyceum</i> Royle.	Cures diabetes, fever, cough, and inflammation in body
<i>Bergenia ciliata</i> (Haw.) Sternb.	Plant extract is used for asthma, skin burn, and malaria
<i>Solanum nigrum</i> L.	Fruits are used in order to improve digestion
<i>Capsicum frutescens</i> L.	Roots are useful to enhance milk excretion
<i>Urtica dioica</i> L.	

3.2.5 JI

The results of our study were compared with 18 previous studies reported from neighboring areas of district Bagh as well as at regional and international level. By comparing results it is found that JI ranged from 0.54 to 24.43% (Table 3). Highest JI (24.43%) was found with the study reported from Harighal AJK [13]. Lowest JI (0.54%) was found for the study reported from district Rangamati, Bangladesh [49]. The range of similar and dissimilar uses with previous studies ranged from 0 to 33.33% and 0.85 to 23.53%. These similar and dissimilar uses are sorted out among the common plant species in the study area and previous reports. High level of similarity is due to same cultural, traditional values, vegetation, and geography among different areas [13,50]. While low similarity reflects that there is lesser exchange of information regarding use of medicinal plants with others. This may be due to large distance among two areas or limitations of cultural and traditional values.

By considering novelty, it was found that about 18 plant species are reported first time from district Bagh with their ethnomedicinal relevance. These species were not reported from district Bagh before. These plant species include *Coriandrum sativum*, *Anethum graveolens*, *Cichorium intybus*, *Parthenium hysterophorus*, *Brassica campestris*, *Stellaria media*, *Dryopteris ramosa*, *Diospyros lotus*, *Quercus incana*, *Juglans regia*, *Myrsine africana*, *Melilotus indica*, *Persicaria amplexicaulis*, *Polygonum aviculare*, *Adiantum capillus-veneris*, *Rumex dentatus*, *Pyrus communis*, and *Capsicum frutescens*. 21 plant species were found having different medicinal uses in the study reported in ref. [13] from Harighal district Bagh. These plant species with different medicinal uses include *Amaranthus viridis*, *Gerbera gossypina*, *Sonchus oleraceus*, *Artemisia vulgaris*, *Silybum marianum*, *Sarcococca saligna*, *Malvastrum coromandelianum*, *Melia azedarach*, *Acacia nilotica*, *Ficus palmata*, *Conyza Canadensis*, *Eucalyptus camaldulensis*, *Olea ferruginea*, *Oxalis corniculata*, *Rumex hystatus*, *Prunus domestica*, *Prunus persica*, *Pyrus pashia*, *Berberis lyceum*, *Solanum nigrum*, and *Urtica dioica*. Our results showed that 8 plant species were found with different medicinal uses in the study reported in ref. [12] from moist temperate Himalayas of district Bagh. These include *Urtica dioica*, *Bergenia ciliate*, *Berberis lyceum*, *Fragaria nubicola*, *Rosa brunonii*, *Pinus wallichiana*, *Indigofera heterantha*, and *Sarcococca saligna*. Similarly, 2 plant species *Urtica dioica* and *Sarcococca saligna* have different medicinal uses reported from the study area of Sudhan Gali and Ganga Chotti hills, district Bagh [14]. Plant species with new medicinal uses are shown in (Table 4) along with medicinal uses.

4 Conclusion

This study reported some useful medicinal plant species from district Bagh. From the results of study areas, it is concluded that people of study area still prefer native plants because of their low cost and accessibility. These areas are enriched with plant species having a lot of therapeutic uses and are important to cure a variety of human ailments. After comparative analysis, some plant species with novel medicinal uses are also found. These plants can be further investigated by pharmacological studies to confirm validity of medicinal uses. To conserve the plants of medicinal value of this study area, heavy grazing and medicinal plants devastation should be diminished or controlled in the area and the precious knowledge of medicinal plants should be transferred to new generation before it is lost forever.

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