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-amyrin, 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
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 Harigal, 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 Malhial 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{\text{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:

\[ \text{RFC} = \frac{\text{FC}}{N} \quad (0 < \text{RFC} < 1), \]

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].

\[ \text{UV} = \frac{\sum U_i}{N}, \]

where “\(\sum U_i\)” 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.

\[ \text{FL} = \frac{N_p}{N} \times 100, \]

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].

\[ \text{ICF} = \frac{\text{Nur} - \text{Nt}}{\text{Nur} - 1}, \]

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:

\[ \text{JI} = c \times 100/a + b - c. \]

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
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 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.
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), *Amaranthus 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 europaea* (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 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), *Amaranthus viridis* (0.43), and *Achyranthes aspera* (0.42) (Table 1). Our results

Figure 5: Mode of utilization of medicinal plants.

because it is richer with medicinal constituents as compared to single part [36].
| Plant family | Plant species/ Voucher no. | Local name | Plant part used | FIV  | RFC  | UV  | Medicinal uses                                                                                                                                                                                                 | Previous reports                                                                 |
|--------------|---------------------------|------------|----------------|------|------|-----|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------|
| Amaranthaceae | *Amaranthus viridis* 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. Herb juice is used against diarrhea and skin diseases. Leaves are used against insect bite. | 1Δ, 2Δ, 3Δ, 4Δ, 5Δ, 6Δ, 7Δ, 8Δ, 9Δ, 10Δ, 11Δ, 12Δ, 13Δ, 14Δ, 15Δ, 16Δ, 17Δ, 18Δ |
| Apiaceae     | *Achyrante aspera* wall./ Tas 02 | Puthkanda   | Whole plant    | 0.42 | 0.8  |      | Plant has carminative property and is used in chattiness. Leaves are cooked as vegetable. Fruits are used against fever, cough, ulcer, asthma and for skin allergies. | 1Δ, 2Δ, 3Δ, 4Δ, 5Δ, 6Δ, 7Δ, 8Δ, 9Δ, 10Δ, 11Δ, 12Δ, 13Δ, 14Δ, 15Δ, 16Δ, 17Δ, 18Δ |
|              | *Coriandrum sativum* L./ Tas 04 | Dhania      | Leaves and seeds | 0.20 | 0.33 |      | Leaves are used for fever, asthma and nervous ailments. Seeds are sedative and tonic. Sap latex is used for warts treatment. | 1©, 2©, 3©, 4©, 5©, 6©, 7©, 8©, 9©, 10©, 11©, 12©, 13©, 14©, 15©, 16©, 17©, 18© |
|              | *Anethum graveolens* L./ Tas 03 | Soya        | Whole plant    | 0.12 | 0.25 |      | Leaves are cooked as vegetable. Fruits are useful for joint pain. Plant has jaundice. Roots are used against stomach problem, and bleeding gums. | 1Δ, 2Δ, 3Δ, 4Δ, 5Δ, 6Δ, 7Δ, 8Δ, 9Δ, 10Δ, 11Δ, 12Δ, 13Δ, 14Δ, 15Δ, 16Δ, 17Δ, 18Δ |
| Araceae      | *Arisaema jacoquemontii* Blume/Tas 06 | Hathpees   | Fruits and rhizome | 2.5  | 0.10 | 0.1  | Dried rhizome is used in numerous mental and nervous ailments. | 1©, 2©, 3©, 4©, 5©, 6©, 7©, 8©, 9©, 10©, 11©, 12©, 13©, 14©, 15©, 16©, 17©, 18© |
| Araliaceae   | *Hedera nepalensis* 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. Leaves provide relief from toothache, stomach problem, and bleeding gums. | 1Δ, 2Δ, 3©, 4©, 5©, 6©, 7©, 8©, 9©, 10©, 11©, 12©, 13©, 14©, 15©, 16©, 17©, 18© |
| Asteraceae   | *Achillea millefolium* L./ Tas 07 | Kansi       | Leaves and roots | 2.5  | 0.25 | 0.5  | Roots are used for fever. Roots are used against kidney, liver diseases, constipation, and stomach problems. Leaves cure jaundice. | 1Δ, 2Δ, 3©, 4©, 5©, 6©, 7©, 8©, 9©, 10©, 11©, 12©, 13©, 14©, 15©, 16©, 17©, 18© |
|              | *Taraxacum officinale* Weber./ Tas 12 | Hand        | Leaves and roots | 0.58 | 0.98 |      | Plant is considered as tonic. Stems are sedative and tonic. Sap latex is used for warts treatment. | 1©, 2©, 3©, 4©, 5©, 6©, 7©, 8©, 9©, 10©, 11©, 12©, 13©, 14©, 15©, 16©, 17©, 18© |
|              | *Gerbera gossypina* (Royle) Beauverd/ Tas 08 | Paproola   | Whole plant    | 0.08 | 0.08 |      | Roots decocation is used in curing fever. Leaves are effective against constipation. Used to treat diabetes. | 1Δ, 2Δ, 3©, 4©, 5©, 6©, 7©, 8©, 9©, 10©, 11©, 12©, 13©, 14©, 15©, 16©, 17©, 18© |
|              | *Sonchus oleraceus* (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. | 1©, 2©, 3©, 4©, 5©, 6©, 7©, 8©, 9©, 10©, 11©, 12©, 13©, 14©, 15©, 16©, 17©, 18© |
|              | *Cichorium intybus* L./ Tas 10 | Kasni       | Whole plant    | 0.38 | 0.52 |      | Stems are used for treatment of boils and abscesses. | 1©, 2©, 3©, 4©, 5©, 6©, 7©, 8©, 9©, 10©, 11©, 12©, 13©, 14©, 15©, 16©, 17©, 18© |
|              | *Artemisia vulgaris* L./ Tas 14 | Chouo       | Leaves         | 0.05 | 0.05 |      | Leaves are used for treatment of boils and abscesses. | 1©, 2©, 3©, 4©, 5©, 6©, 7©, 8©, 9©, 10©, 11©, 12©, 13©, 14©, 15©, 16©, 17©, 18© |

(Continued)
| Plant family | Plant species/ Voucher no. | Local name | Plant part used | FIV  | RFC | UV | Medicinal uses | Previous reports |
|-------------|----------------------------|------------|----------------|------|-----|----|----------------|-----------------|
| **Buxaceae** | *Sarcococca saligna* Müll.Arg./Tas 16 | Nazroon | Branches | 2.5  | 0.05 | 0.05 | Leaves are useful for stomach acidity. Seed oil is effective ear painkiller | 1,2,3,6,7,8,9,10,11,12,13,14,15,16,17,18Δ |
| **Cannabinaceae** | *Cannabis sativa* 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 | 1,2,3©,4,5,6,7©,8©,9©,10,11,12,13,14,15,16,17,18Δ |
| **Caprifoliaceae** | *Viburnum tinus* D.Don/ Tash 19 | Gush | Fruits and Leaves | 2.5  | 0.35 | 0.85 | Fruits cure constipation and whooping cough. Leaves treat menorrhagia | 1,2,3©,4,5,6,7©,8©,9©,10,11,12,13,14,15,16,17,18Δ |
| **Caryophyllaceae** | *Stellaria media* L./Tas 18 | Ladroo | Whole plant | 2.5  | 0.08 | 0.08 | Plant is very effective for menstrual distress | 1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18Δ |
| **Convolvulaceae** | *Cuscuta reflexa* Roxb./Tas 20 | Neela tari | Whole plant | 5    | 0.30 | 0.78 | Plant is also considered as anti-lice, anti-anemic, and anti-pyretic | 1,2,3©,4,5,6,7©,8©,9©,10,11,12,13,14,15,16,17,18Δ |
| **Dryopteridaceae** | *Dryopteris ramosa* (C.Hope) C./Tas 22 | Langeri | Leaves | 2.5  | 0.10 | 0.13 | Leaves are used to treat constipation and ulcer | 1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18Δ |
| **Ebenaceae** | *Diospyros lotus* L./Tas 23 | Amlook | Fruits | 5    | 0.50 | 0.98 | Fruits are used for curing fever, high blood pressure, and constipation | 1,2,3©,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18Δ |
| **Euphorbiaceae** | *Euphorbia hirta* L./Tas 25 | Dodhal | Whole plant | 2.5  | 0.23 | 0.33 | Plant is used against diarrhea and constipation | 1,2,3©,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18Δ |
| **Fabaceae** | *Medicago polymorpha* L./Tas 27 | Maina | Whole plant | 2.5  | 0.03 | 0.05 | Plant is useful against constipation and other digestive complications | 1,2,3©,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18Δ |
| **Fagaceae** | *Indigofera heterantha* 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 | 1,2,3©,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18Δ |
### Table 1: Continued

| Plant family       | Plant species/ Voucher no. | Local name       | Plant part used | FIV | RFC  | UV | Medicinal uses                                                                 | Previous reports                                      |
|--------------------|----------------------------|------------------|-----------------|-----|------|---|--------------------------------------------------------------------------------|--------------------------------------------------------|
| **Juglandaceae**   | Quercus incana Roxb./Tas 28 | Rein             | Bark            | 0.05| 0.05 |   | Bark is very helpful for treating joint pain. It also has a cooling effect      | 1Δ, 2Δ, 3Δ, 4Δ, 5Δ, 6Δ, 7Δ, 8Δ, 9Δ, 10©, 11Δ, 12Δ, 1-3Δ, 14Δ, 15Δ, 16Δ, 17Δ, 18Δ |
|                    | Juglans regia 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             | 1Δ, 2Δ, 3Δ, 4Δ, 5Δ, 6Δ, 7Δ, 8Δ, 9Δ, 10Δ, 11Δ, 12Δ, 1-3Δ, 14Δ, 15Δ, 16Δ, 17Δ, 18Δ |
| **Lamiaceae**      | Mentha longifolia (L.) L./Tas 30 | Poodina         | Whole plant     | 7.5 | 0.80 | 1.17 | Helpful for diarrhea, stomach problem, rheumatic pain, dysentery, and vomiting| 1Δ, 2©, 3©, 4©, 5©, 6©, 7©, 8©, 9©, 10©, 11Δ, 12Δ, 13©, 14©, 15Δ, 16Δ, 17Δ, 18Δ |
|                    | Otostegia limbata (Benth.) Boiss./Tas 32 | Chita jand     | Leaves          | 0.07| 0.15 |   | Boiled leaves extract is useful for mouth ulcers, fever, and skin infections  | 1Δ, 2©, 3©, 4©, 5©, 6©, 7©, 8©, 9©, 10©, 11Δ, 12Δ, 13Δ, 14Δ, 15Δ, 16Δ, 17Δ, 18Δ |
|                    | Mentha longifolia (L.) Huds./Tas 31 | Bareena         | Whole plant     | 0.67| 1.12 |   | Leaves are used for vomiting, diarrhea, and blood purification                | 1Δ, 2©, 3©, 4©, 5©, 6©, 7©, 8©, 9©, 10©, 11Δ, 12Δ, 13©, 14©, 15Δ, 16Δ, 17Δ, 18Δ |
|                    | Punica granatum 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 | 1Δ, 2©, 3©, 4©, 5©, 6©, 7©, 8©, 9©, 10©, 11Δ, 1-2©, 13©, 14©, 15©, 16Δ, 17Δ, 18Δ |
| **Lathyraceae**    | Malvastrum coromandelianum L./Tas 34 | Lafa            | Leaves          | 2.5 | 0.10 | 0.13 | Leaves are used to cure diabetes                                              | 1Δ, 2©, 3©, 4©, 5©, 6©, 7©, 8©, 9©, 10©, 11Δ, 12Δ, 1-3©, 14Δ, 15Δ, 16Δ, 17Δ, 18Δ |
| **Malvaceae**      | Malvastrum coromandelianum L./Tas 34 | Lafa            | Leaves          | 2.5 | 0.10 | 0.13 | Leaves are used to cure diabetes                                              | 1Δ, 2©, 3©, 4©, 5©, 6©, 7©, 8©, 9©, 10©, 11Δ, 12Δ, 1-3©, 14Δ, 15Δ, 16Δ, 17Δ, 18Δ |
|                    | Melia azedarach 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  | 1Δ, 2©, 3©, 4©, 5©, 6©, 7©, 8©, 9©, 10©, 11Δ, 12©, 13©, 14©, 15©, 16Δ, 17©, 18© |
| **Meliaceae**      | Morus nigra L./Tas 36       | Kala toot        | Fruits          | 7.5 | 0.15 | 0.32 | Fruit is used against anemia and also for sore throat                          | 1Δ, 2©, 3©, 4©, 5©, 6©, 7©, 8©, 9©, 10©, 11©, 12©,-13©, 14©, 15Δ, 16Δ, 17Δ, 18Δ |
|                    | Acacia nilotica Wild./Tas 37 | Kiker            | Leaves and bark | 0.12| 0.2  |   | Bark is used for painful throat and also against toothache                    | 1Δ, 2©, 3©, 4©, 5©, 6©, 7©, 8©, 9©, 10©, 11©, 12©,-13©, 14©, 15Δ, 16Δ, 17Δ, 18Δ |
| **Mimosaceae**     | Ficus palmata 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           | 1Δ, 2©, 3©, 4©, 5©, 6©, 7©, 8©, 9©, 10©, 11Δ, 12Δ,-13©, 14Δ, 15Δ, 16Δ, 17Δ, 18Δ |
|                    | Conyza Canadensis (L.) Cronq./Tas 39 | Chhi booti      | Whole plant     | 0.05| 0.05 |   | Plant is used against flatulence and other stomach disorders                | 1Δ, 2©, 3©, 4©, 5©, 6©, 7©, 8©, 9©, 10©, 11Δ, 12©,-13©, 14©, 15Δ, 16Δ, 17Δ, 18Δ |
|                    | Morus alba L./Tas 40        | Safed toot       | Roots           | 0.28| 0.65 |   | Roots are effective for toothache and cough                                  | 1Δ, 2©, 3©, 4©, 5©, 6©, 7©, 8©, 9©, 10©, 11©, 12©,-13©, 14©, 15Δ, 16©, 17©, 18Δ |
| **Myrsinaceae**    | Myrsine africana L./Tas 41  | Gogal            | Leaves          | 2.5 | 0.08 | 0.12 | Leaves help in the treatment of liver diseases like jaundice                | 1Δ, 2©, 3©, 4©, 5©, 6©, 7©, 8©, 9©, 10©, 11Δ, 12Δ,-13©, 14©, 15Δ, 16Δ, 17Δ, 18Δ |
| **Myrtaceae**      | Eucalyptus camaldulensis Dehnh./Tas 42 | Safaida         | Leaf and bark   | 2.5 | 0.12 | 0.2  | Young shoots and leaves give momentary relief in cough                      | 1Δ, 2©, 3©, 4©, 5©, 6©, 7©, 8©, 9©, 10©, 11Δ, 12©,-13©, 14©, 15Δ, 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 |
|--------------|----------------------------|------------|-----------------|-----|-----|----|----------------|-----------------|
| Oleaceae     | *Olea ferruginea* Royle/Tas 43 | Kao        | Leaves and bark | 2.5 | 0.25 | 0.3 | Helpful for gonorrhea and toothache | 1Δ,2Δ,4Δ,5Δ,6©,7Δ,8Δ,9©,10©,11Δ,12Δ,13Δ,14Δ,15Δ,16Δ,17Δ,18Δ |
| Oxalidaceae  | *Oxalis corniculata* L./Tas 44 | Khattahulla | Whole plant     | 2.5 | 0.15 | 0.22 | Plant is helpful in curing jaundice and stomach acidity | 1Δ,2Δ,4Δ,5Δ,6Δ,7Δ,8©,9,10,11Δ,12Δ,13Δ,14Δ,15Δ,16Δ,17Δ,18Δ |
| Papilionaceae | *Mellotis indica* (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 | 1Δ,2Δ,3Δ,4Δ,5Δ,6Δ,7Δ,8Δ,9Δ,10Δ,11Δ,12Δ,13Δ,14Δ,15Δ,16Δ,17Δ,18Δ |
| Pinaceae     | *Pinus roxburghii* 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 | 1Δ,2Δ,3Δ,4Δ,5Δ,6Δ,7Δ,8©,9,10©,11Δ,12Δ,13Δ,14Δ,15Δ,16Δ,17Δ,18Δ |
| Plantaginaceae | *Plantago lanceolata* 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 | 1Δ,2©,3©,4Δ,5Δ,6Δ,7Δ,8©,9,10Δ,11Δ,12Δ,13Δ,14©,15©,16Δ,17Δ,18Δ |
| Poaceae      | *Cynodon dactylon* (L.) Pers./Tas 49 | Khabal grass | Whole plant     | 2.5 | 0.10 | 0.17 | Fresh plant paste is useful for healing of fracture and against dysentery | 1©,2©,3©,4Δ,5Δ,6©,7Δ,8Δ,9©,10,11Δ,12©,13Δ,14©,15©,16Δ,17Δ,18Δ |
| Polygonaceae | *Rumex hestatus* D.Don./Tas 50 | Chukheery  | Leaves          | 7.5 | 0.47 | 1.02 | Leaves are used for treating jaundice and bleeding wounds | 1©,2©,3©,4Δ,5©,6Δ,7©,8©,9,10©,11Δ,12©,13©,14©,15©,16Δ,17Δ,18Δ |
|             | *Persicaria amplexicaulis* (D Don) Ronse Dec./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 ulcers, flu, and bleeding gums | 1©,2©,3©,4Δ,5©,6Δ,7©,8©,9©,10,11Δ,12©,13©,14©,15©,16Δ,17Δ,18Δ |
|             | *Polygonum aviculare* L./Tas 52 | Darubra    | Whole plant     | 0.08 | 0.12 | Leaves are used for eliminating kidney stones | 1©,2©,3©,4Δ,5©,6©,7©,8©,9©,10,11Δ,12©,13©,14©,15©,16Δ,17Δ,18Δ |
| Pteridaceae  | *Adiantum capillus-veneris* Tas 53 | Kakwai     | Leaves          | 2.5 | 0.37 | 0.75 | Leaves are used to treat hepatic problem, stomach acidity, and relieve fever | 1©,2©,3©,4Δ,5©,6©,7©,8©,9©,10,11Δ,12©,13©,14©,15©,16Δ,17Δ,18Δ |
| Rosaceae     | *Prunus armeniaca* L./Tas 54 | Khobani    | Fruits          | 22.5 | 0.15 | 0.15 | Fruits are used against constipation | 1©,2©,3©,4Δ,5©,6©,7©,8©,9©,10,11Δ,12©,13©,14©,15©,16©,17©,18© |
|             | *Prunus domestica* L./Tas 55 | Aroha     | Fruits and gums | 0.18 | 0.12 | Fruits and gums | 1©,2©,3©,4Δ,5©,6©,7©,8©,9©,10,11©,12©,13©,14©,15©,16Δ,17Δ,18Δ |
|             | *Prunus persica* (L.) Batsch/Tas 57 | Aaroon    | Fruits          | 0.22 | 0.47 | Fruit is eaten by diabetic patients | 1©,2©,3©,4Δ,5©,6©,7©,8©,9©,10,11©,12©,13©,14©,15©,16Δ,17Δ,18Δ |

(Continued)
| Plant family | Plant species/ Voucher no. | Local name | Plant part used | FIV | RFC | UV | Medicinal uses | Previous reports |
|--------------|---------------------------|------------|-----------------|-----|-----|-----|----------------|-----------------|
| **Rutaceae** | *Pyrus communis* L./ Tas 62 | Nashpaati | Fruits | 2.5 | 0.85 | 1.17 | Fruits are laxative and used for curing diarrhea | 1\(\Delta\), 2\(\Delta\), 3\(\Delta\), 4\(\Delta\), 5\(\Delta\), 6\(\Delta\), 7\(\Delta\), 8\(\Delta\), 9\(\Delta\), 10\(\Delta\), 11\(\Delta\), 12\(\Delta\), 13\(\Delta\), 14\(\Delta\), 15\(\Delta\), 16\(\Delta\), 17\(\Delta\), 18\(\Delta\) |
|              | *Berberis lyceum* 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 | 1\(\Delta\), 2\(\Delta\), 3\(\Delta\), 4\(\Delta\), 5\(\Delta\), 6\(\Delta\), 7\(\Delta\), 8\(\Delta\), 9\(\Delta\), 10\(\Delta\), 11\(\Delta\), 12\(\Delta\), 13\(\Delta\), 14\(\Delta\), 15\(\Delta\), 16\(\Delta\), 17\(\Delta\), 18\(\Delta\) |
| **Saxifragaceae** | *Bergenia ciliata* (Haw.) Sternb./ Tas 64 | Zakhm-e-Hayat | Leaves and roots | 2.5 | 0.72 | 1.13 | Cures diabetes, fever, cough, joint pain, and inflammation in body | 1\(\Delta\), 2\(\Delta\), 3\(\Delta\), 4\(\Delta\), 5\(\Delta\), 6\(\Delta\), 7\(\Delta\), 8\(\Delta\), 9\(\Delta\), 10\(\Delta\), 11\(\Delta\), 12\(\Delta\), 13\(\Delta\), 14\(\Delta\), 15\(\Delta\), 16\(\Delta\), 17\(\Delta\), 18\(\Delta\) |
| **Simaroubaceae** | *Ailanthus altissima* (Mill.) Swingle./ Tas 65 | Drawia | Leaves | 2.5 | 0.10 | 0.1 | Young leaves act as blood purifier | 1\(\Delta\), 2\(\Delta\), 3\(\Delta\), 4\(\Delta\), 5\(\Delta\), 6\(\Delta\), 7\(\Delta\), 8\(\Delta\), 9\(\Delta\), 10\(\Delta\), 11\(\Delta\), 12\(\Delta\), 13\(\Delta\), 14\(\Delta\), 15\(\Delta\), 16\(\Delta\), 17\(\Delta\), 18\(\Delta\) |
| **Solanaceae** | *Solanum nigrum* L./ Tas 66 | Kachmach | Whole plant | 5 | 0.55 | 0.97 | Plant extract is used for asthma, skin burn, malaria, and fever | 1\(\Delta\), 2\(\Delta\), 3\(\Delta\), 4\(\Delta\), 5\(\Delta\), 6\(\Delta\), 7\(\Delta\), 8\(\Delta\), 9\(\Delta\), 10\(\Delta\), 11\(\Delta\), 12\(\Delta\), 13\(\Delta\), 14\(\Delta\), 15\(\Delta\), 16\(\Delta\), 17\(\Delta\), 18\(\Delta\) |
|              | *Capsicum frutescens* L./ Tas 67 | Marchi | Fruits | 0.07 | 0.07 | | Fruits are used in order to improve digestion | 1\(\Delta\), 2\(\Delta\), 3\(\Delta\), 4\(\Delta\), 5\(\Delta\), 6\(\Delta\), 7\(\Delta\), 8\(\Delta\), 9\(\Delta\), 10\(\Delta\), 11\(\Delta\), 12\(\Delta\), 13\(\Delta\), 14\(\Delta\), 15\(\Delta\), 16\(\Delta\), 17\(\Delta\), 18\(\Delta\) |
| **Urticaceae** | *Urtica dioica* L./ Tas 68 | Kiayari | Whole plant | 2.5 | 0.12 | 0.18 | Roots are useful to enhance milk excretion | 1\(\Delta\), 2\(\Delta\), 3\(\Delta\), 4\(\Delta\), 5\(\Delta\), 6\(\Delta\), 7\(\Delta\), 8\(\Delta\), 9\(\Delta\), 10\(\Delta\), 11\(\Delta\), 12\(\Delta\), 13\(\Delta\), 14\(\Delta\), 15\(\Delta\), 16\(\Delta\), 17\(\Delta\), 18\(\Delta\) |
| **Violaceae** | *Viola odorata* 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 | 1\(\Delta\), 2\(\Delta\), 3\(\Delta\), 4\(\Delta\), 5\(\Delta\), 6\(\Delta\), 7\(\Delta\), 8\(\Delta\), 9\(\Delta\), 10\(\Delta\), 11\(\Delta\), 12\(\Delta\), 13\(\Delta\), 14\(\Delta\), 15\(\Delta\), 16\(\Delta\), 17\(\Delta\), 18\(\Delta\) |

RFC = relative frequency of citation; UV = use value; FIV = family importance Value; (⊙) = 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].
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 antiodote (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 palma, Amaranthus viridis, Morus alba, Viburnum opilfolium, 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 opilfolium, 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.](image-url)
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 |
| Harighal 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   |
| Plant species | New medicinal uses not reported in previous compared studies |
|---------------|-------------------------------------------------------------|
| *Amarathus viridis* L. | Leaves are used for constipation and weight loss |
| *Achyranthus aspera* wall. | Herb juice is used against diarrhea |
| *Anethum graveolens* L. | Fruits are used against fever, cough, ulcer, and for skin allergies |
| *Achillea millefolium* L. | Leaves are used for relief from toothache and bleeding gums |
| *Taraxacum officinale* Weber. | Roots are used against liver diseases, constipation, and stomach problems |
| *Gerbera gossypina* (Royle) Beauverd | Plant is considered as tonic |
| *Sonchus oleraceus* (L.) L. | Stems are sedative and tonic. Sap latex for warts treatment |
| *Cichorium intybus* L. | Roots decoction is used in curing fever. Leaves are effective against constipation |
| *Parthenium hysterophorus* L. | Used to treat diabetes |
| *Achillea millefolium* L. | Leaves are used for relief from toothache and bleeding gums |
| *Sonchus oleraceus* (L.) L. | Stems are sedative and tonic. Sap latex for warts treatment |
| *Cichorium intybus* L. | Roots decoction is used in curing fever. Leaves are effective against constipation |
| *Parthenium hysterophorus* L. | Used to treat diabetes |
| *Artemisia vulgaris* L. | Leaves regulate menstrual cycle, also valuable for sleeplessness and anxiety |
| *Silybum marianum* (L.) | Plant is useful for diabetes |
| *Brassica campestris* L. | Leaves are sedative and tonic. Sap latex for warts treatment |
| *Sarcococca saligna* (Müll) Arg. | This plant defends children from wicked eye |
| *Cannabis sativa* L. | Flowers are valuable in regulating menstrual cycle |
| *Silibum marianum* (L.) | Plant is useful for diabetes |
| *Diospyros lotus* L. | Fruits are used for curing fever and high blood pressure |
| *Zanthoxylum armatum* DC. Prodr | Young branches are used as miswak |
| *Euphorbia hirta* L. | Plant is used against constipation |
| *Medicago polymorpha* L. | Plant is useful against constipation |
| *Juglans regia* L. | Fruit reduces high blood pressure |
| *Mentha longifolia* (L) L. | Whole plant is helpful for diarrhea and rheumatic pain |
| *Oxalis corniculata* L. | Plant is used against stomach disorders |
| *Malvastrum coromandelianum* L | Leaves are rubbed on skin to cure eczema. Seeds are effective against diarrhea |
| *Pinus roxburghii* Sarg. | Resin is usually used against tumors |
| *Pinus wallichiana* A. B. Jackson | Resin is used for cough. Leaves are useful for dysentery |
| *Plantago lanceolata* L. | Whole plant acts as a cooling agent for stomach. Leaves are useful for swollen surfaces |
| *Punica granatum* L. | Leaves are used for treating bleeding wounds |
| *Pimpinella anisum* L. | Leaves are used for eliminating kidney stones |
| *Ziziphus mauritiana* L. | Leaves are used to treat hepatic problem, stomach acidity, and relieve fever |
| *Prunus domestica* L. | Fruit is laxative and helpful in curing constipation |
| *Rhus verniciflua* Thunb. | Resin is used for treating bleeding wounds |
| *Prunus persica* (L.) Batsch | Gum treats backbone and joint pain. Fruit is eaten by diabetic patients |
| *Pisum sativum* L. | Roots are used against boils and whooping cough |
| *Rosa brunonii* Lindl. | Fruits are used for blood purification. Gulkand is very effective for digestive problems |
| *Pyrus communis* L. | Fruits are laxative and are used for curing diarrhea |
| *Berberis lyceum* Royle. | Fruits are laxative. Roots are used for joint pain |
| *Bergenia ciliate* (Haw.) Sternb. | Cures diabetes, fever, cough, and inflammation in body |
| *Solanum nigrum* L. | Plant extract is used for asthma, skin burn, and malaria |
| *Capsicum frutescens* L. | Fruits are used in order to improve digestion |
| *Urtica dioica* L. | Roots are useful to enhance milk excretion |
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 (26.43%) 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 palnata, Conyza Canadensis, Eucalyptus camaldulensis, Olea ferruginea, Oxalis corniculata, Rumex hestatus, 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 ciliata, Berberis lyceum, Fragaria nubicola, Rosa brunoni, Pirus 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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