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Research Article

Ethnomedicinal Study of Plants Used in Phytotherapeutics among Indigenous Communities of District Bhimber, Azad Kashmir and Migrants to United Kingdom

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Abstract: The key purpose of current study was to investigate impact of foreign culture of Britain on traditional herbal medicines on inhabitants and migrants of District Bhimber of Azad Jammu and Kashmir, Pakistan. The current ethnomedicinal (EMs) study was conducted by using questionnaire methodology using structured and semi-structured interview protocols involving 72 interviewees of both genders and age range of 30-100 years. The collected data was analyzed by Informant Consensus Factor (ICF), family index (Fi), fidelity level (FL), data matrix ranking (DMR), Use mode in %age and priority ranking (PR) analyses tools. In this research, total 50 medicinal plants (MPs) were documented as traditional ethnomedicines (TEMs). Euphorbiaceae had highest plant taxa (10) being used as EMs. Leaf was most commonly (21%) used part of plant in TEMs while decoction (32) ranked first in use form. Highest ICF was found for asthma (0.90) and highest FL was shown by *Otostegia limbata* (95 %). DMR showed *Acacia modesta* at 1st rank for its multiple usages. PR depicted "use of plants for construction" number first (1st) as key biotic threat for medicinal plants (MPs). The analysis depicted that the people purchase and fetch TEMs from their native hometown (Jatlan) or buy from British botanic markets. The study proves that immigrants now living in UK hitherto use TEMs for cure of ailments as complimentary alternative medicines (CAMs). There is less information of TEMs reported by migrants of Bhimber in Western (UK) pharmacological databases and this demand to do further detailed work on ethnopharmacological analysis for rationale use within safety limits and avoid any toxicity implications. Furthermore, young generations of migrants have least interest in CAMs and there is fear of loss of knowledge of MPs of Azad Jammu and Kashmir which demands dire need to document the TEMs data for conservation of cultural and biological diversity of the area

Keywords: Traditional Ethnomedicines, Bhimber, Complimentary alternative medicines, Informant consensus factor, Euphorbiaceae, Data matrix ranking, Azad Jammu and Kashmir, Pakistan.

1. INTRODUCTION

Plants have been known as basic component of ecosystem of earth, which provide main role of producers of food chain. Plants are of keystone worth because these provide oxygen for breathing. Plants provide four basic needs of life directly or indirectly such as food, shelter, oxygen and medicines. Plants have been used as traditional ethnomedicines (TEMs) by the old times civilization of human being and hitherto are being used around the globe. Plants have been used as staple food, food phytonyms and phytomedicines for coping various needs of life [1, 2]. Use of type of plant, its part used and recipe of use is dependent on culture and tradition of society which is inherited from parent generation to youth by oral communication [3]. Sometimes due to amalgam of two or more ethnic groups makes admixture of TEMs and brings novel medicines outcome. The people of any ethnic group or area move to other area due to intentional and planned rhythms or sudden movement/migration or because of catastrophes are compelled to migrate to another city, province or country [4]. Migration

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is natural phenomena occurring due to compulsory or intentional movement of people of one area to other for various reasons. The migration creates amalgam of culture, folklore therapeutics and rituals of migrants with natives. This brings changes in neo-society and people start of be influenced with each other's habits, cultures and copy/adopt traditions of each other creating a harmonized and diverse community origin. Trans-cultural folklore phytotherapeutic brings new issues and challenges for the government health concerned institutions to devise a stable and unisonic policy and agenda to cope with dynamic cultural influence on the native botanic drugs [5].

It is universal that plants on the earth are important for humanity; man uses these in various ways to cope with basic of life. Plants are key drivers of all ecosystems as they act as art of pioneer in ecosystem because they are producers and provide food by process of photosynthesis. All major basic needs of life: food, shelter and health cure medicines are mostly obtained from plants or its byproducts. According to an estimate, it is declared that world's 80% population depends on plants for health cure being promulgated in form different traditional medicine systems [6]. Pakistan's mainstream population is living in rural and mountains areas and they primarily use local plants for treatment of different diseases.

Ethnomedicines are folklore medicines being made from the plants and commonly used by the indigenous people of an area. The medicinal study is covered under subject of ethnobotany, which was coined by Harshberger in 1996 [7]. Ethnobotany focuses on documentation, description of co-relationships between cultures and plants of an area, telling that how plants are being used as food, as medicines, in divination, in cosmetics, in construction and in social life of different areas of various countries.

Ethnomedicinal research had begun long ago ca. AD 77, when Dioscorides published his work on MPs in form of book named as "De Materia Medica" with description of 600 plants of Mediterranean zone. It narrated the information about those ancient people that how they used plants for medicinal purposes for cure ailments [8]. The process of documentation of traditional ethnomedicinal knowledge of local people of an area is of key worth as it makes direction of future research for making novel drugs from known MPs of the day. Traditional ethnomedicines (TEMs) have been major source of cure for rural people of Africa like Ethiopia whose 80% population solely depends on plant based medicines to cure different diseases [9]. In world different medicine systems are being used by different cultural societies like traditional Chinese medicines (TCMs), Ayurveda of India, Unani medicines (AUMs), Homeopathy medicines (HMs) of Pakistan and Allopathic medicines (AMs) of western culture. It is declared in an estimate that ca. 2500-3000 plants are used as key resources for TEMs and many of these had been explored for drugs discovery and drug development. The ethnomedicinal study or its knowledge provides basis for pharmacological research and next on pharmaceutical analysis is used for drug making and hence, EMs study is driver of novel drug discovery and drug development [10].

Kashmir is called "paradise" on earth. Allah has bestowed it with many gifts and one of it is that its land has hub of various vegetation species. Azad Jammu and Kashmir is part of the state of Jammu and Kashmir. It was liberated from Dogra rulers of Indian abrogation in month of October, in year 1948. It has an area of 13,297 Km^2. It lies between 73ºC-75ºC longitude of 33ºC-36ºC latitude [11]. District Bhimber Jatlan and allied villages 459m altitude. The climate of the investigated area is of sub-tropical type. Other key survey points were Samahni and Barnala and few from Charhoee are of Kotli. The averages mean maximum and minimum temperature of the area is 28.7ºC and 15.5ºC, respectively. The average rainfall of the area was 99.4 mm. The average maximum and minimum relative humidity was 70% and 49%, respectively. Dominant casts are Gujjar, Jaat, Rajpoot, Jarral, Malik, Sayyed and Mughal residing in different areas of the area, particularly in District Bhimber of AJK. Research revealed that mostly Gojari, Punjabi, Hindko, Kashmiri, Saraikee and Pothohari are spoken in the area. Urdu and English are also spoken in the area but to some extent but later two languages are official and academic languages of the study area [7]. The key objectives of the research work were as: i) to document and prepare checklist of ethnomedicines being used in local communities of Jatlan area of Bhimber, AJK; ii) to document the ethno-medicines frequently used in

UK by the migrants of AJK from different villages of District Bhimber, iii) to compare the usage of medicinal plants in both societies and explore impacts of culture on these TEMs; and iv) to do analysis of erosion of TEMs in young generation of both sides (countries) and devise conservation measures for future research and reference.

2. MATERIALS AND METHODS

The research was conducted in Jatlan and allied villages of District Bhimber of AJK (some data was collected from various interviewees of different villages to keep heterogeneity and diversity of the research). The data has been collected through interview methods using semi-structured and structured protocols and interviewees comprise of both genders and age of diverse range. The data was collected from inhabitants who have been living in Bradford (UK) for last ten or more years and visit here for once a year. The interviewees were gracious to share their knowledge and experience about ethnomedicines being used in their hometowns (AJK) and new settlement place Bradford (UK). Their mode and trend of dependence on ethnomedicines has been calculated using different micro statistical tools [11]. The interviewees include both gender and age range of 30-80 years, with diverse professional and domestic jobs i.e. herbal drug sellers, shopkeepers, herbal doctors, house women. The preference was given to the people who can speak both English and local languages. The information collected was rationalized by tallying it with online literature available and verifying the data by cross checking by meeting to herbal healers (practitioners of area). The ethnomedicinal plants and other botanic drug specimens were collected from the concerned village sites and herbal drug stores of AJK and similar data was also collected from allied villages. All MPs were collected, identified, named and their herbaria prepared properly. These were placed in herbarium of Department of Botany (MUH), Mirpur University of Science and Technology (MUST) Bhimber Campus, AJK-Pakistan for future reference and study.

2.1 Data Analysis using Micro statistical Tools

The collected data was extracted for refined information, tabulated in matrix form and analyzed by using micro statistical tools as given below.

2.1.1 Experimental Procedure

The analysis describes the most preferred plant species used for cure of particular disease. FL % was determined by using equation as given by [12]. FL=(Np)/N ×100; where Np is the total number of informants describing the species for curing a particular disease and N denotes total number of informants stating uses of the species for the treatment of any disease. If FL value is high which describes that the given plant species has high use importance for the treatment of specific disease. For elaboration, FL of *Otostegia limbata* (Benth.) Boiss was found to be 95%, where it means that total number of informants telling about the species for its use to cure a particular disease (Np = 57) and total number of people telling the species for cure of any disease (N=60).

2.1.2 Determination of Informant Consensus Factor (ICF)

Information consensus factor (ICF) was calculated to measure agreement or consensus among the indigenous informants of an area about the uses of medicinal plants (MP) against given disease or group of diseases denoted as category as following the previous work of [13, 14].

ICF=(Nur-Nt)/(Nur-1); where "Nur" is the total number of use citations for each disease and "Nt" is the total number of species used for the treatment of that disease in the study area.

ICF describes the consensus or homogeneity of indigenous ethnomedicinal knowledge among the local informants and it is usually denoted between ranges of 0–1. Where if ICF is near to 1 (one), it indicates that most of the people have similar traditional therapeutic use information for any plant species for given disease [15].

2.1.3 Family Index (FI) Calculation

Family index (FI) was calculated and the highest number of the species of a particular family and the lowest number of taxa of other families were calculated from collected data and described in graphic mode.

2.1.4 Plant Parts Used (PPU)

In the research work, Percentage (% age) of PPU was found from collected data for each group and described in graphical form.

2.1.5 Mode of Use (MU)

Percentage (%age) of use mode of plant in form different recipes was also determined and presented in chart or graph form.

2.1.6 Calculation of Data Matrix Ranking (DMR) & Priority Ranking (PR)

DMR and PR methodologies were used to determine popularity the of plant species in the local communities, their multiple usage, biotic pressure and conservation level or status of various species in the area.

3. RESULTS

The plants are very significant and have pivotal role in life of man and particularly communities of rural areas are mostly dependent on plants for fulfilling of their life basic needs. The plants are good source of ethnomedicines (EMs) and are being used in rural communities as tonic to cure different ailments and chronic diseases since old times. The individual enumeration of each medicinal plant (MP) with its recipes is prescribed here below. The data generated through the interviews methodologies is tabulated and analyzed with relevant statistical tool Table 7.

3.1 Information of Indigenous People

In this study of comparative analysis, local people of District Bhimber, AJK and migrants of some families or members to UK was made on the basis of quantitative ethnobotanical analysis using provident research protocols. The information was collected from the local people residing in different villages of District Bhimber viz: Jatlan, Sokason, Bindi, Chowki, Samahni and other some rural areas of District Bhimber of Azad Jammu and Kashmir were also incorporated in the study. The purpose was to know the common popularity and use potential of different medicinal plants of the area. The second aspect was to note-down the traditional medicine uses of plants from the people who were migrants (migrated to Bradford, UK) but still they use herbal therapeutics as learnt from hometowns of AJK when they come back or even live there. The data were collected from migrants who came back to Bhimber (AJK) and living here for few months (with their parent families). A good total of 240 informants was used as model with high diversity containing both genders with various age groups were included (Table 1) to keep the heterogeneity in the study. The botanic drug healers (hakims) were also included in the survey to consolidate the data/ information [11]. It was found that older people had more knowledge of botanic drugs and they prefer to use traditional herbal tonic and recipes as learnt from their ancestors (Fig.1 & Fig. 2).

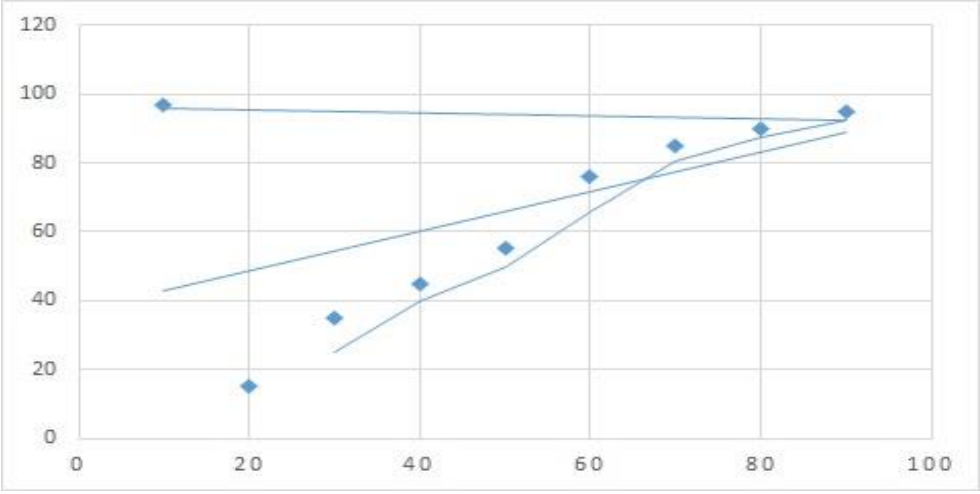

Fig. 1. A distribution of traditional ethnomedicinal knowledge by ages among Local Bhimber Communities and migrants to Bradford.

Table 1. Information of Interviewees about their age and gender during survey of Ethnomedicinal of District Bhimber of Azad Kashmir (Local and UK Migrants Inhabitants)

Interviewees	Age Categories (years)		Total number of informants
	20-40	>40-90	
Male	45	55	100
Female	20	65	85
Local herbal healers	10	45	55
Total			**240**

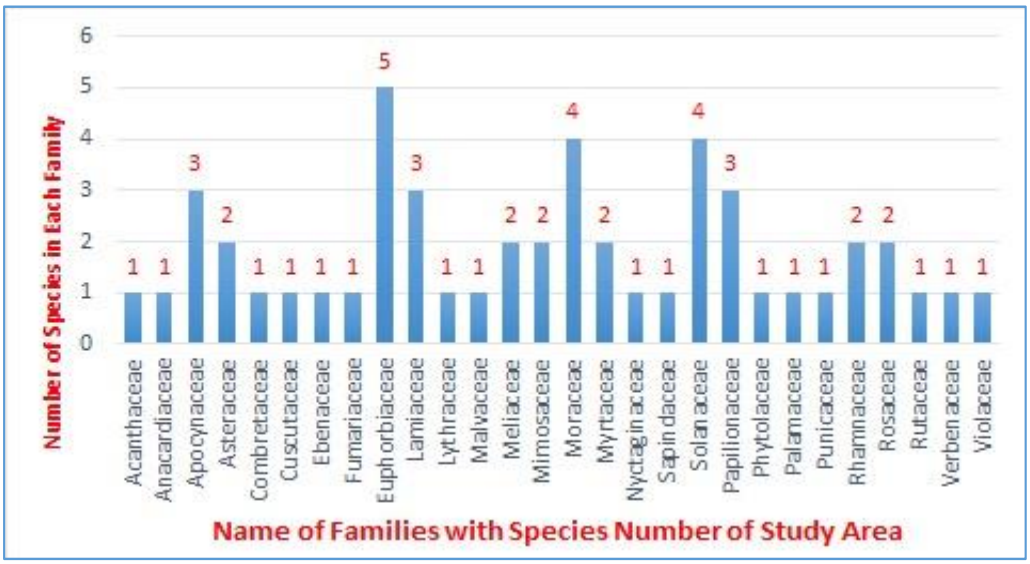

Fig. 2. Family Index of Study Area of District Bhimber of Azad Kashmir (Local and UK Migrants Inhabitants)

3.2 Data of Medicinal Plants and Their Family Index

In the study, 50 medicinal plants (MPs) of high value and prevalent use were included in the research work. These plants belonged to 28 families and family index was calculated which depicted that family Euphorbiaceae was ranked one (10 %), Moraceae and Solanaceae were at second (8%) each and Apocynaceae, Lamiaceae and Papilionaceae were at number three (6% each) as shown in Table 2 and Fig. 2. The common occurrence of Euphorbiaceae was due to its high population and low palatability by livestock and rodents. This family plants have latex which is also repellent of many pests and other insects. The second number families Moraceae and Solanaceae which had mostly trees (as reported in the study) as MPs and these can bear harsh climate and are perennial in nature having long life span [7].

3.3 Surveillance of Camel Browse Vegetations and their Preference by Camels at Thatta

Different parts of MPs have been used as traditional medicines by the local and the migrants people of Bhimber, AJK. Leaf, root, flower, and fruit are used commonly in this practice. It was found that leaves were mostly used in different herbal medicine recipes with percentage of 21%, followed by fruits (15%), root and flower (12%) each while 10% of seed and whole plant. Latex, was the part of the plant that was rarely used as (5%), due to the secretion of gum or of a few specific group of MPs only (Table 7; Fig. 3). The reason of using leaves in high percentage is due to the presence of high metabolic rate and phytochemicals [16, 11, 17]. One other reason for the frequent usage of leaf is the easy access and all time availability [18, 19]. The fruit was also popularly used as herbal tonic or form and it was due to easy accessible and easy to use or eat without any preliminary drug formation

Table 2. Family Index of Ethnomedicinal Study of District Bhimber of Azad Kashmir (Local and UK Migrants Inhabitants)

Family	Number of Plants	% age
Acanthaceae	1	2
Anacardiaceae	1	2
Apocynaceae	3	6
Asteraceae	2	4
Combretaceae	1	2
Cuscutaceae	1	2
Ebenaceae	1	2
Fumariaceae	1	2
Euphorbiaceae	5	10
Lamiaceae	3	6
Lythraceae	1	2
Malvaceae	1	2
Meliaceae	2	4
Mimosaceae	2	4
Moraceae	4	8
Myrtaceae	2	4
Nyctaginaceae	1	2
Sapindaceae	1	2
Solanaceae	4	8
Papilionaceae	3	6
Phytolaceae	1	2
Palamaceae	1	2
Punicaceae	1	2
Rhamnaceae	2	4
Rosaceae	2	4
Rutaceae	1	2
Verbenaceae	1	2
Violaceae	1	2
Total 28	**50**	

procedure [11].

Indigenous people use plant parts in different recipes and the mode of preparation is very sophisticated depending on cultural traditions of the area. The MPs are commonly used in the form of decoction, tea, extract, powder, gum, latex, infusion, poultice, fruit and paste. The mode of use or recipe type depends on the type of the plant parts being used. In fact, the culture of the ethnic groups also influences their usage. [20]. The highest form of use of MPs was in form of decoction (32) followed by powder (30), seeds (27) and tea (25) and it is also presented in figure form

(Figs. 3; 4). The decoction was shown the best and common way of MPs use in herbal cure which may be due to reason that during decoction formation (heating of plant parts in liquid) produce out more phytochemicals and people prefer it good mode of use with better relieve as shown in Table 7 [21]. The form of usage was powder which is easy to prepare and engulf with water or any liquid as prescribed by practitioners. The various people use tea or gum or poultice to cure different disease and it depends on the type of disease and mostly on traditional culture of the indigenous people of an area [19].

3.4 Informant consensus factor (ICF)

In the study all plants species used were categorized into 17 diseases which were commonly cured by using traditional methods from MPs of District Bhimber of AJK (Table 3). Highest ICF was found for asthma (0.90), followed by flatulence (0.88), diabetes (0.84), Hypertension (0.75), toothache (0.72). The least ICF was found for constipation (0.20). The high value of ICF proves that concerned diseases is effectively treated by local people using folklore therapeutics in Bhimber (AJK) and UK and these findings are corroborative with previous works of [22, 23]. High ICF value also indicates that there is good agreement among the local and migrant informants about the use of different herbal drugs obtained from MPs of local area of District Bhimber. While in contradictory form, when there is low ICF, it means that there is less consensus among the informants the use of particular treatment for cure of the disease or it may indicate that particular is very rare in the study area, which is coincides with past work of Teklehaymanot and Giday, (2007) [24]. In the analysis, mostly high ICF was found for many disease categories as described in Table 4, that might be due to high medicinal values for particular disease [25]. Generally, it is recognized by indigenous communities of the area that MP which has multiple uses is best one for curing different diseases [26, 27].

3.5 Fidelity Level (FL%)

The study revealed that highest value of fidelity value (FL%) was found for *Otostegia limbata* (95%), followed by *Azadirachta indica* (91.66%), *Acacia sena* (86.66%), *Boarhavia diffusa* (85%), *Lawsonia innermis* (83.33%), *Malva parviflora* (81.66%), *Morusnigra* (80.00%) and *Euphorbia hirta* (78.33%) as shown in Table 4. The high value of FL depicts the most preferred species of MP to cure a particular disease in study area [28]. This also tells that plants, which are more prevalently used by indigenous people, have higher value of FL. FL is also known as best tool to select a particular plant for future ethnopharmacological and pharmaceutical research based on ethnomedicinal preliminary research work indicating highest FL% to cure a certain disease [29]. It is recommended in the past research that plants with high FL% has good potential for further phytochemical analysis because these plants contain more potential phytoconstituents and it is also coincided with work of Hassan, et al., (2013) [30]. In table 5, some plants depict low FL such as *Acacia arabica* (25%), *Zizyphus nummularia* (23.33%), *Zizyphus jujuba* (36.66%) and this might be due less information of

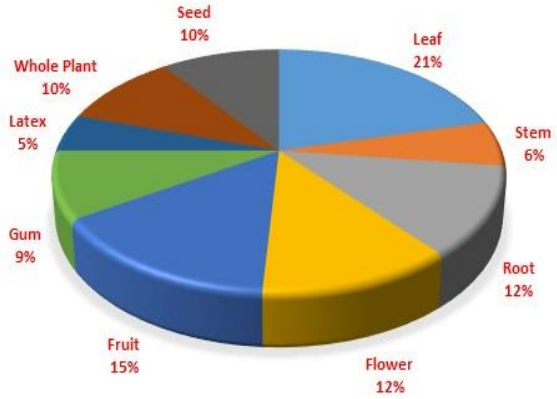

Fig. 3. **P**ercentage of Plant Parts Used by Local People of District Bhimber of Azad Kashmir (Local and UK Migrants Inhabitants)

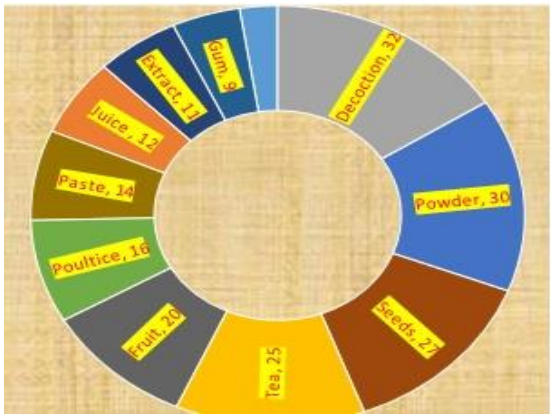

Fig. 4. Mode of Preparation and Use Reported by Local People of District Bhimber of Azad Kashmir (Local and UK Migrants Inhabitants)

these plants for cure of particular disease in the area [31, 32]. It might be due to reasons that these plants are not preferred for treatment of certain diseases in the research area communities or may be knowledge of these MPs to cure the ailment is eroded due to barrier in transfer of traditional knowledge from one generation to next or effect of new culture as on migrants' communities of Bhimber who went to UK and similar results were stated by [33].

3.6 Data Matrix Ranking (DMR) and Priority Ranking (PR)

In the study, DMR and PR statistical analyses were calculated to infer the current biodiversity conservation status of the MPs in the study area. DMR depicted that many MPs of the area albeit very commonly used in ethnomedicines but also people of the villages use these plants to cope their domestic needs i.e. construction of shelter/home, hedging, fencing, fodder, fodder and fruit (Table 5). Thus demarcates that there is severe biotic pressure on these MPs and many of these have been reduced to threatened level [11]. This study also describes that alternative uses of these MPs may be controlled to cope the needs of ethnomedicines of rural areas. If multiple usages in none-ethnomedicines (NEMs) remained incessant, it will lead loss of population and many taxa of important worth from the area. The analysis showed that Acacia modesta is under severe threat with 1st in DMR, followed by *Zizyphus jujuba* (2nd), *Zizyphus nummularia* (3rd) and *Terminalia belerica* (4th) in rank of multiple usages [7].

The priority ranking (PR) data showed that anthropogenic threats like construction is at number first (1st), fuel and fodder (2nd) and agriculture land expansion by cutting of trees and plants of wild land is at 3rd level (Table 6). The rural people use plants particularly trees for construction of their homes and their livestock sheds and cottages. The cutting of trees for household items leads towards to the loss these species from the study area causing

Table 3. Informant consensus factor for most prevailing diseases as told by interviewees of District Bhimber of Azad Kashmir (Local and UK Migrants Inhabitants)

Disease Name	Number of Use Report (Nur)	Number of Species (Nt)	ICF
Diabetes	20	4	0.84
Stomachache	13	6	0.58
Toothache	12	4	0.72
Hypertension	9	3	0.75
Jaundice & Hepatitis	10	6	0.44
Cough	10	5	0.55
Diarrhea	16	6	0.64
Leprosy	9	4	0.62
Asthma	11	2	0.90
Cancer and Tumor	6	3	0.60
Skin diseases	17	7	0.62
Eye Irritation	12	4	0.72
Constipation	11	9	0.20
Flatulence	28	4	0.88
Ulcer	16	5	0.73
Dysentery	16	6	0.65
Liver Problems	15	4	0.78

Table 4. Fidelity Level of Plants in study area used for Cure of Different Aliments as told by interviewees of District Bhimber of Azad Kashmir (Local and UK Migrants Inhabitants)-(Total Informants=60)

Diseases	Local Name	Botanical Name	Family	Np	F.L
Diabetes	Kikar	*Acacia arabica L.*	Mimosaceae	15	25.00
	Jand	*Zizyphus jujuba*	Rhamnaceae	22	36.66
	Bair	*Zizyphus nummularia*	Rhamnaceae	14	23.33
Stomachache	Podina	*Mentha arvensis*	Lamiaceae	16	26.66
	Gandeera	*Nerium oleander*	Apocynaceae	11	18.33
	Cheechra	*Butea monosperma*	Combretaceae	13	21.66
	Amlok	*Diospyros kaki*	Ebneceae	13	21.66
	Timmber	*Zanthoxylum alatum*	Rutaceae	44	73.33
Toothache	Phulai	*Acacia modesta*	Mimosaceae	33	55.00
	Dareek	*Azadirachta indica*	Meliaceae	55	91.66
	Sanatha	*Dodonea viscosa*	Sapindaceae	41	68.33
	Cheetibooti	*Otostegia limbata*	Lamiaceae	57	95.00
Jaundice	Kikar	*Acacia sena*	Papilionaceae		52
	Snati	*Boarhavia diffusa*	Nyctaginaceae	51	85.00
	Doodal	*Euphorbia hirta*	Euphorbiaceae	47	78.33
	Mehndi	*Lawsonia innermis*	Lythraceae	50	83.33
Cough	Kala toot	*Morus nigra*	Moraceae	48	80.00
	Sonchal	*Malva parviflora*	Malvaceae	49	81.66
	Banafsha	*Viola odorata*	Violaceae	42	70.00
	Dudhi	*Euphorbia hirta*	Euphorbiaceae	33	55.00
	Podina	*Mentha arvensis*	Lamiaceae	4	06.66

Table 5. Direct Matrix Ranking (DMR) of plant species of District Bhimber of Azad Kashmir (Local and UK Migrants Inhabitants) with other uses than medicinal value (total score is from 50 informants) in the study area

Sr.#	Plant spp./Uses	Construction	Hedge, Fencing	Fire wood	Cash income	Fodder	Fruit, Food	Total	Rank
1	*Acacia modesta*	Total		41	05	30	00	161	1st
2	*Nerium oleander*	Rank	40	15	00	05	00	80	10th
3	*Phyllanthus emblica*	05	00	00	45	10	44	89	9th
4	*Phoenix dactylifera*	00	15	11	35	00	40	101	6th
5	*Punicagranatum*	05	05	10	30	20	45	105	5th
6	*Ricinus communis*	00	05	00	00	15	00	20	14th
7	*Terminaliabellerica*	35	15	10	25	10	20	115	4th
8	*Viola odorata*	00	00	00	45	00	00	45	13th
9	*Zanthoxylumalatum*	10	05	05	20	10	10	60	12th
10	*Zizyphus jujuba*	10	35	30	20	25	20	140	3rd
11	*Zizyphusnummularia*	10	20	25	15	35	40	145	2nd
12	*Justicia adhatoda*	20	25	35	00	10	00	90	8th
13	*Acacia modesta*	15	20	25	00	10	00	70	11th
14	*Azadirachta indica*	25	15	15	00	25	00	80	10th
15	*Acacia arabica*	20	15	35	00	25	00	95	7th

Table 6. Priority Ranking (PR) of narrating different threats factor to medicinal plants (MPs) biodiversity based on multiple usages posing destructive pressure on MPs in the study area of District Bhimber of Azad Kashmir (Local and UK Migrants Inhabitants), Destructive Threat Order (DTO) is: 6<5<4<3<2<1; where 6 is the most destructive value and 5 is second highest value and subsequently others shown)

Threat Factors	Respondents (R1-R6)						Total	%age	Rank
	R1	R2	R3	R4	R5	R6			
Construction	10	8	4	7	6	5	40	19.80	1st
Fuel & Fodder	6	8	5	7	6	5	37	18.31	2nd
Urbanization	4	6	8	6	4	3	31	15.34	5th
Agriculture expansion	7	4	5	6	7	4	33	16.33	3rd
Timber mafia/export	8	6	4	3	4	7	32	15.84	4th
Fire	6	2	6	3	6	4	26	12.87	6th

Table 7. Ethnomedicinal Study of Plants Used in Phytotherapeutics Among Indigenous Communities of Districts Bhimber, Azad Kashmir and Migrants to United Kingdom

Sr	Species Name	Family	Local Name	Common Name	Specimen No	Locality	Plant Parts Used	Usage mode	Ethnomedicinal Uses
1	*Acacia arabica* L.	Mimosaceae	Kiker (Tree)	Babul	MUH-1652	(Peer Gali)	Branches bark and gum	Gum, extract and Powder	Gum: diarrhea, dysentery, diabetes & male-sterility Bark: astringent and demulcent & cure bleeding piles and cold. Branches: tooth cleaning. Gum is used for cure of.
2	*Acacia modesta* Wall	Mimosaceae	Phulai (tree)	Hook thorn	MUH-1658,	(Samahni /Poona),	Bark, root, gum, seed	Gum, decoction, tea	The gum of the plant is used as energizer, tonic and stimulant to keep body active. Small and soft branches or twigs of A. modesta are used to clean the teeth (miswak). Fresh branches are used as fodder. The gum is mixed with desi ghee (cow butter) and seeds of almond for cure of backbone pain. Bark is known as herbal tonic for diuretic in nature and its decoction is used for cure of bacterial infections, bleeding of gums, and wounds healing. The fruit is used for the cure of leprosy and burning with other herbs is used as ritual tonic for cure of venereal diseases
3	*Acacia sena* L	Papilionaceae	Kiker (Shrub)	Wattles	MUH-1627	(Jatlan)	Flowers and leaves	Fruit, Gum, Decoction	It is used for skin and tooth problems. It is also used as fuel and fodder for livestock. Its gum is used for antiseptic and wound healing. Its seed extract is used in form of decoction to cure sore throat and cough. It reduces the body fats and relieves pain.

4	*Azadirachta indica* (L.) A. Juss	Meliaceae	Neem (tree)	Indian lilac	MUH-1618	(Jatlan)	Leaves & fruit	Decoction, oil	Oil is used for skin care such as acne treatment and keeping skin elasticity. Leaves are used in wounds and reduced all inflammation. The fruit used in skin diseases, tumors and toothache.
5	*Boarhavia diffusa* L.	Nyctaginaceae	Santi (Herb)	Spreading hogweed	MUH-1688	(Bhimber/ Sokason)	Leaf, root & whole plant	Tea, powder, decoction	Roots extract is commonly used in anemia and jaundice. Leaves powder is used in oedema, inflammation and eye diseases problems. Its whole plant decoction is used in cure of urinary problems and encephalitis disease. The decoction of leaf and stem is useful in cure of leucorrhoea and joint pains.
6	*Butea monosperma* L.	Papilionaceae	Chichra (Tree)	Flame of Forest	MUH-1624	(Jandi Chontra)	Root and Leaves	Decoction, Powder	Leaf extract is externally is used for pimples. It is used for dysentery and for being young. It is used for joint pains or gout and its decoction is also used as diuretic. It is also used as powder form as anti-ulceric and stomachic.
7	*Calotropisprocera* (Aiton) Dryand.	Apocynaceae	Aak (Shrub)	Crown flower	MUH-1710	Bindi (Samahni)	Whole herb, Latex	Latex, powder	The milky latex is used in snake-bite cure. Its flower extract is used for curing ear pain. The lea poultice is used for treatment of skin infections.
8	*Carissa opaca* Stapf. ex. Haines	Apocynaceae	Granda (Shrub)	Currant Bush	MUH-1660	(Samahni /Bindi)	Leaf, Fruit and stem	Fruit, latex, decoction	The milky latex is used as antioxidant and antimicrobial tonic. Its root extract is known for anti-cancer, cytotoxic and anti-diabetic properties. Its leaf decoction is used as antipyretic, hepatoprotective and anti-inflammatory by local communities.
9	*Colebrookea oppositifolia* Sm.	Lamiaceae	Chiela (Shrub)	Indian Squirrel Tail	MUH-1729	Chahee (Samahni)	Leaf and Fruit	Extract, Paste	Leaf extract is used for curing wounds cure. Young leaves' and fruit paste is used as fish killer as bating/catching fish technique in villages. Its leaf extract is used as anthelminthic and antiseptic. It is used to cure dermatitis, nose bleedings and killing of ringworms.
10	*Cuscutare flexa* Roxb.	Cuscutaceae	Akasbel (Herb)	Devil's Hair	MUH-1705	(Sokason)	Whole herb	Whole plant	The decoction of whole plant is used get relief of sores pain. Its powder is known as purgative, constipation, fever and anthelmintic. It is a cold tea is used to cure liver and spleen disorders.

11	*Datura innoxia* Mill.	Solan-aceae	Datura (Tree)	Downy thorn	MUH-1673	(Jatlan)	Dried leaves, seeds and fruit	Decoction, powder, juice	The fruit powder is used as narcotic and sedative. To cure chest and breath issues leaf is burnt and smoked which is also good tonic for cure of asthma. Leaf infusion is dropped in earache. The fruit juice and leaves are good for curing dandruff and hair loss.
12	*Dodonea viscosa* (L.) Jacq.	Sapind-aceae	Sanatha (shrub	Soap-wood	MUH-1634	Gora Nakka	Leaves, fruit	Extract, powder	The leaves are chewed for toothache. Tanin /extracts are used externally to heal wounds and insect bites. Fruit can be used as a replacement for hops brewing beer. In hot, dry area, the shrub is used as windbreak to prevent soil erosion. It is also used as fuel. It is used for teeth cleaner.
13	*Diospyros kaki* Thunb.	Eben-aceae	Amlok (tree)	Persim-mon	MUH-1721	Garhoon (Samahni)	Leaf, Root & Whole Plant	Decoction, powder	Its root decoction is used in stomachic. The leaf extract is useful in soar throat cure. The fruit of plant is used as laxative and constipation. The juice of fruit is known as refrigerant and commonly thought as very useful for curing dyspepsia.
14	*Eugenia jambulana* L.	Myr-taceae	Jaman (tree)	Black plum	MUH-1699	(Jatlan)	Leaves and fruits	Fruit, deco-ction, tea	It fruit is used to cure diabetic problems. It is also used in diarrhea and in-digestion disorders with symptoms of flatulence. It is very effective in disease of bronchitis and asthma.
15	*Euphorbia hirta* L.	Euphorbi-aceae	Dudhi (herb)	Booti	MUH-1670	Bhimber	Entire plant	Tea, powder	Whole plant's decoction is used in diseases of children in worms, bowel complaints, cough and dysentery. Leaf tea of plant is used in bronchial affection and asthma.
16	*Euphorbia prostrata* Ait.	Euphorbi-aceae	Dudhi (herb)	Spurge	MUH-1672	Bhimber	Whole plant	Tea, powder	Internal use of sap is a drastic purgative. The substance is used to treat diarrhea and skin irritation. Its tea is useful for cure of bleeding hemorrhoids and other wounds.
17	*Ficus carica* L.	Moraceae	Anjeer (tree)	Fig	MUH-1620	Bhimber (Rajani)	Fruits, Latex, leaves	Latex, Fruit, Paste	Milky latex of leave is used for cure of nail pains. Fruit extract is for cure of constipation and urinary bladder disorders. It is considered as holly tree and its fruit is also eaten as cardio tonic. It is stated as folklore tale or myth that if someone sees flower of fig, he will become rich soon in future.

18	*Ficus palmata* L.	Moraceae	Phagw-arra (tree)	Fig	MUH-1666	(Samahni)	Fruit, bark and latex	Latex, powder	The fruit of fig if eaten regularly it makes digestive system laxative and removes pain of constipation. The milky juice of plant is used to treat insect bite and stings.
19	*Fumaria-indica (Hausskn.)* Pugsley	Fumari-aceae	Papra (herb)	Indian Fumitory	MUH-1704	(Jatlan)	Leaf and whole plants	Tea, Decoction	The decoction whole herb is applied to cure leprosy, jaundice, and dyspepsia. It is used in eczema and diuretic disorders. Its tea is used as diaphoretic and laxative for cure of chronic constipation.
20	*Indigofera heterantha* Wall. ex Brandis	Papilion-aceae	Jhand (shrub)	Indigo Bush	MUH-1734	Kadorah (Bhimber)	Fruit and stem bark	Decoction, Paste	Ethnomedicinal Uses: Its fruit is boiled and used pickle for eating food. Paste of stem bark is prepared in olive oil and used as plaster on scabies problems.
21	*Justicia adhatoda*	Acanth-aceae	Baiker (shrub)	Malabar nut	MUH-1646	(Jatalan)	Leaves, flowers and roots	Fruit, extract, decoction	Flower decoction is useful decoction for asthma. Flowers paste is used for cough treatment. Leaf paste is applied to relief pain. Juice of roots of this plant is given to relief from fever and scorpion bite. Root and leaf extract is used as expectorant to release phlegm. It is used to get relief of bronchitis and cold.
22	*Lawsonia innermis* L.	Lythra-ceae	Mehndis (shrub)	Migno-nette tree	MUH-1657	(Bindi/ Bhimber)	Leaf, seeds, bark and flowers	Fruit, Powder, decoction	Powdered seeds of plant give relieve in dysentery bowls. Bark extract is used to cure jaundice and yellowness of eyes. Henna flowers powdered very good to cure headache. The root decoction is taken in burning sensation and leprosy problems. Powdered leaves are useful in wounds healing, boils and burns of body. Its is leaf and bark powder is used dye hairs and its seed oil is very commonly used in perfume industry.
23	*Malva parriflora* L.	Malva-ceae	Sonchal (herb)	Mallow	MUH-1681	(Jatalan)	Lead and seeds	Tea, poultice, decoction	Its leaves are used as emollient. Seeds are used as decoction in cough. It is effective herbal medicine to treat bladder ulcers. Its leaves are warmed and cooked in oil and used as poultice to cure joint pains and swellings of knees.

24	*Mallotus philipp-ensis* (Lam.) Müll.	Euphorbi-aceae	Kameela (shrub)	Monkey-puzzle	MUH-1728	Kalch (Samahni)	Leaf, Flower and Inflores-cence	Decoction, extract, powder	Leaf twigs' extract is used for curing vermicide of livestock. Young leaves' paste and poultice is used in treating skin infectious diseases. Inflorescence and fruit powder is useful as pesticide to kill jackals, which damage crops, and its small quantity is used to kill intestinal worms of rodents.
25	*Mangifera indica* L.	Anacardi-aceae	Aam (tree)	Mango	MUH-1610	(Jatlan)	Leaves and Fruit	Pickle and decoction	Fruit is very delicious, tonic, vigour giving, carminative and appetizer. Its raw fruit is good for pickle making which is used as appetizer. Inflorescence used for killing calf worms.
26	*Melia azadarach* L.	Meli-aceae	Draik (tree)	Indian lilac	MUH-1677	(Bindi/ Samahni)	Leaf and seeds	Powder, Tea, extract	Leaf decoction is very commonly used as antiperiodic and anthelmintic and diuretic. Leaves extract is used in anemia, measles and jaundice treatment. Leaves paste is used in wounds and pimples curing.
27	*Mentha arvensis* L.	Lami-aceae	Podina (herb)	Mint	MUH-1631	(Jatlan)	Whole plant	Extract, sauce	The entire plant is antibacterial. It is used in cough, core throat, vomiting and diarrhea. It is also used for stomach problems and it is carminative. The sauce of leave and stem is used as sedative, emmenagogue and astringent.
28	*Morus alba* L.	Mor-aceae	Toot (tree)	White Mulberry	MUH-1643	Bindi (Bhimber)	Fruits, leaves, branches	Syrup, Decoction, Fruit	Fresh fruits of tree are eaten as wild fruit for villagers. Fruit eating is known as laxatives and purgative. Leaves are used for throat rashes, anthelmintic and astringent purposes. Leaves were once used in rearing silkworm.
29	*Morus nigra* L.	Mor-aceae	Kala Toot (tree)	Blackberry	MUH-1644	Jandala (Bhimber)	Leaves, fruits, branches, wood	Syrup, Decoction, Fruit	Fruits of the tree are eaten for cure of constipation and these are laxative. Syrup of fruit is prepared which is used to cure chronic whooping cough and sore throat.
30	*Myrtus communis* L.	Myrt-aceae	Myrtle (shrub)		MUH-1615	(Charohee	Leaves and Fruits	Decoction, Leaf paste	Myrtle leaf use as ingredient cough syrups to treat chest infection, congestion and disorders of the urinary tract. Oil and leaves are applied externally to treat wounds, acne and gum diseases.
31	*Nerium oleander* L.	Apocyn-aceae	Gandera (Shrub)	Oleander	MUH-1612	(Sokason)	Leaves	Decoction, Tea	Leaves tea traditionally used to treat functional disorder of the stomach and liver. Externally, used to treat skin rashes and scabies.

32	*Otostegia limbata* (Benth.) Boiss	Apocyn-aceae	Safeed Sumbali (Shrub)	Periwinkle	MUH-1731	Barnala (Bhimber)	Leaf and Root	Powder, decoction	Its leaf decoction is used as antiseptic, anti-renal disorder cure, toothache reliever. Its root powder is used to cure headache, diabetics, and anti-hyperlipidemia issues
33	*Phyllanthus emblica* L.	Euphorbi-aceae	Amla (tree)	Indian gooseberry	MUH-1611	(Toneen)/ Saamhni	Fruit, Flower and Seeds		: Its fruit is known as cooling, diuretic and asperative. Seeds are used in the asthma and bronchitis. Flowers are refrigerant. Its fruit is also cooked asdish, used to make marrabba amla, also used to make pickles of amla.
34	*Phytolaca oleracea* L.	Phytol-aceae	Khajoor (tree)	Kulfa	MUH-1645	Bhimber	Fruit, leaves	Decoction, Juice, powder	Fruit is used as thermogenic. The fruit juice is taken to control or lower down the blood pressure of patient. Its fruit extract is used for joint pains and rheumatism. Leaf powder is used as tonic of skin problems.
35	*Phoenix dactylifera* L	Palam-aceae	Anaar (Shrub)	ates	MUH-1687	(Tonin/ Samahni)	Fruit, root and gum	Fruit, root and gum	Fruit is very delicious and its fresh fruit juiced is coolant. The fruit is laxative and it has high content of calcium and energetic. Its gum is used for treating urinary infections, diarrhea and asthma. Its root powder is aphrodisiac, nutritive and good for cure of fever and cough. Its leaf decoction is used for cure of chest pains and gonorrhea.
36	*Punica granatum* L.	Punic-aceae	Gulab (shrub)	Pomegr-anate	MUH-1632	(Rayayal)	Fruit, bark, leaves	Decoction, powder	Leaves extract is used to skin diseases. Its fruit is known as astringent and blood purifier. Fruit pericarp is burnt and commonly used with raw sugar (gor) for treatment of whooping cough. Dried seeds are called as “anardana” as spices in making dishes. Bark of stem and root is boiled and its decoction is effective to cure stomach worms, mouth bad breathings and expectorant of phlegm.
37	*Rosa indica* Mill.	Ros-aceae	Gulab (shrub)	Rose	MUH-1635		Flowers, Leaf and Root	Paste, extract, Tea	Rose petals reduce high cholesterol. Rose water a valuable lotion of inflamed and sore eyes. It is also useful to improve sore throat and enlarged tonsils. It also used perfumes. It is used for face wash and feet cleanser.
38	*Ricinus communis* L.	Euphorbi-aceae	Akhrey (shrub)	Castor oil plant	MUH-1625	(Samahni)	Leaves, roots and seeds	Oil, Fruit, Extract	Seed oil is good tonic for joint pains and rheumatism. Its massage is used in paralysis treatment for early recovery. Fruit juice is used cooling agent for relieving body heat. Leaf poultice is prepared with ghee/oil and used on boils and swellings to get rid of it sooner.

39	*Rubus fruticosus* L.	Rosaceae	Akhrey (shrub)	Black berry	MUH-1733	Charhoee	Leaf, Fruit and Root	Extract, powder	Its fruit is used as cure of chronic constipation. Wild and rural communities of mountains also commonly eat it. Root decoction is used in curing of sore throat, mouth ulcers, gum bleedings and whooping cough. Its leaf powder is used for curing anemia and diarrhoea. Its root extract is also used in treatment of hemorrhoids and piles.
40	*Solanum nigurm* L.	Solanaceae	Mako (herb)	Black Nightshade	MUH-1637	(Sairla/ Bhimber)	Whole herb	Decoction, Powder	Plant decoction is known as diuretic and cardiac, tonic. Leavespowder is used to cure hey-fever and stomach ulcer. Juice of herb is useful in constipation, acne. The whole plant is crushed and juice or extract obtained which is effective in cure of flatulence.
41	*Sonchus arvensis* L.	Asteraceae	Kor (herb)	Swine thistle	MUH-1648	(Jatalan)	Root and leaves	Tea, extract, poultice	Root useful in jaundice leaves-cooling, sedative, diuretic, useful in cough, bronchitis, asthma. Leaf poultice is used to cure joints inflammation and pains. Leaf paste with seeds of Brassica rapa L. powder is used for cure of tough breast. Tea of roots is used for cure of bronchitis and other cold pains in chest.
42	*Solanum surrattense* L.	Solanaceae	Mokari (shrub)	Wild eggplant	MUH-1682	(Bindi/ Samahni)	Fruit, Whole plant	Tea, powder, poultice	Fruit is cooked which is used for joint's pain. Whole plant decoction is used in Chest infection bronchitis, soar throat and cough. Its root powder is used in constipation and dropsy disease. Dried fruit powder is used as anti-inflammatory and antispasmodic cure. Its root extract is used as anthelminthic to kill worms of belly in children.
43	*Taraxacum officinale* Weber ex. Wigg.	Asteraceae	Handh (herb)	Dandelion	MUH-1668	(Sairla/ Bhimber)	Leaf and root	Tea, powder	Its leaf powder sis used for stomach, liver and rheumatic complaints. Its leaf decoction is used for cure of gallbladder problems. Root powder is also useful in antitumor cure and killing of wound germs. Dandelion tea is very useful for diabetic patients. Its power is useful for body tonic because it has many minerals and vitamins in it.

44	*Terminalia bellerica* (Garten) Roxb	Combret-aceae	Baira (tree)	Belliric myro-balan	MUH-1654	(Bindi/ Samahni)	Bark, Fruit and Leaves	Powder, decoction, tea	Its root's bark decoction is used for skin diseases. It is also as used fuel. Its fruit is very useful to cure leprosy, cold, bronchitis and other respiratory diseases. Its fruit outer coat is used for carminative purpose and it is digestive and cure flatulence. Its fruit is powder with Phyllanthus emblica fruit and it is the best tonic and health harmonizer for strong body. Its seed kernels are used as antidiarrheal, antileprotic.
45	*Viola odorata* Sm.	Viol-aceae	Bana-fsha (shrub)	Sweet viole	MUH-1685	(Sarooli/ Bindi)	Whole herb and flowers	Tea, Decoction	Its flower's decoction is used as, diuretic, laxative and purgative to get rid of constipation. Roots extract is used for kidney diseases. Flowers and leaf boiled and their tea is flu, cold, cough and lung troubles.
46	*Vitex negundo* L.	Verben-aceae	Banaa (small tree)	Indigo Bush	MUH-1735	Kadorah (Bhimber)	Fruit and Leaves	Extract, Paste, Tea	Its leaves are used as analgesic and anti-inflammatory. Leaf decoction is used for cure of eye infections and pain. Leaf paste is applied on scorpion and snake sting. Fruit and leaf boiled extract is used for curing chest pains.
47	*Withania somnifera* (L.) Dunal	Solan-aceae	Panee-rdodi (shrub)	Winter cherry	MUH-1689	(Jatlan)	Fruit, root and leaf.	Poultice, tea, extract	Leaf poultices are used to treat cuts, wounds, inflammation and rheumatism. Its fruit decoction is used in anxiety and neurodegenerative disorders. It is used for vital body vigour. Its leaf is cooked and used in joint pains as poultice. Its root extract is used in cure of liver disorders. Fruit is used as aphrodisiac and astringent.
48	*Zantho-xylum alatum* Roxb.	Rut-aceae	Timber (shrub)	Prickly Ash	MUH-1661	Bhimber (Samahni/ Bindi)	Fruit, Leaf, bark	Powder, Sauce, Extract	It is bitter, hot, irritating and is appetizer, used in asthma also useful in eye and ear troubles. Fruit's sauce is used as carminative and cure of flatulence in stomach. Its powder is also used for cure of fever, indigestion and dyspepsia.
49	*Zizyphus jujuba* Lam.	Rhamn-aceae		Jand (tree)	MUH-1633	(Chowki)	Root, bark leaves, fruits and seeds	Extract, Powder	It is used in insomnia and hysteria. Fruits and leaves are useful to treat diabetes. The fruit is blood purifier and brings cooling sensations in the body. It tenders the blood, clear by removing waste matters from blood in all age groups.

50	*Zizyphus numm-ularia* (Burm.f.) Wight & Arn.	Rhamn-aceae	Bair (tree)	Wild Jujube	MUH-1633 MUH-1622	(Jatalan)	Fruit and Leaves	Fruit, extract, Decoc-tion	Its fruit is used in insomnia and hysteria. Fruits and leaves are useful to treat diabetes. The fruit is blood purifier and brings cooling sensations in the body. It tenders the blood, clear by removing waste matters from blood in all age groups. It is also to cure cuts and wounds. It is aphrodisiac and cough reliever.

4. CONCLUSIONS

Plants are important for the survival of human beings, animals and other living organisms. The human beings depend upon plants for fuel, medicines, forage, food, material for making agricultural tools and wood for construction. This research's findings depict that there is strong correlation between culture, area of habitance and herbal medicines use. It was found that albeit migrants of Bradford live in advanced country-UK, still use botanic and folklore medicines brought from their Pakistan-hometown. It was also found that older people have more knowledge of MPs and use them in their daily life to cure different diseases. There is trend of folklore or traditional knowledge erosion with passage of time and it is directly proportional to aboriginal culture and age. There is need to conduct further research to have rationale use of MPs or botanic drugs without or least side effects by doing drug dose optimization. This TEMs can be used to explore pharmaceutical potential for drug discovery and drug development through optimization process. There is trend of loss MPs biodiversity that is due to several causes such as:

i. extension of farm/agriculture by clearing of forests
ii. deliberate cuttings of the trees for fuel needs
iii. other factors are deforestation such as mass infrastructure construction
iv. soil erosion
v. grazing
vi. fire.

5. GENERAL PERSPECTIVES AND FUTURE RECOMMENDATIONS

Plants play vital role in air purification, precipitation and moderate the temperature. But now a day, major parts of the area looks barren. There is huge gap between plantation and demand of tree for few land construction survey of the area showed that there is no proper system of plantation and protection of plants. Some recommendations for concerned departments and local communities are as:

- to protect forest from fires that is generally caused due to human negligence and its own action which destroys cultivated and wild forest plants and wild life,
- to reduce or control incessant grazing by domestic animals which reduces forest productivity and land cover leading toward soil erosion,
- to control cutting of trees or plants for fuel purpose and for this alternative LPGs may introduced at low or subsidized prices,
- to provide proper guidance and training to Hakims and local people in collection of medicinal plants, if not then whole plant or its seeds will be lost, with no future plant outcome on the land,
- to set up natural conservation nursery and protected areas for MPs and other commercial plants of the area,
- to involve public-private joint-venture to protect the wild forest of the area, with provision of some remuneration or other botanic barter trade for their easy participation,
- to do afforestation and reforestation planned activities in the area by free plants provision to the local people and forest department may introduce the threatened plants in the area at public level for their sustainable availability in the area and
- to do compile ethnomedicinal and traditional cultural data of local and migrants people of Bhimber to UK for their comparison and historic perspectives and induce the mechanism to mitigate the erosion of biocultural and phytotherapeutic knowledge in coming generations.

6. REFERENCES

1. Vitalini, S., M., Iriti, C., Puricelli, D., Ciuchi, A., Segale, & G. Fico, Traditional knowledge on medicinal and food plants used in Val San Giacomo (Sondrio, Italy) an alpine ethnobotanical study. Journal of *Ethnopharmacology*, 145: 517-529 (2012).
2. Ahmad, I., M., Hussain, M.S.Ahmad & A., Hameed, M. Spatio-temporal effects on association of plant species in some valley of Pakistan. *Pakistan Journal of Botany.*, 40: 1865-1867 (2008).
3. Ajaib, M., S.K., Haider, A., Zikrea, & M. F. Siddiqui, Ethnobotanical Studies of Herbs of Agra Valley Parachinar, Upper Kurram Agency, Pakistan. *International Journal of Biology and Biotechnology,* 11: 71-83 (2014).
4. Pieroni A., & I., Vandebroek editors. Travelling plants. The ethnobiology and ethnopharmacy of migration. Oxford: Berghahn, in press (2012).
5. Pieroni, A. Traditional uses of wild food plants, medicinal plants, and domes-tic remedies in Albanian, Aromanian and Macedonian villages in South-Eastern Albania. *Journal of Herbal Medicine*, 9, 81–90 (2017).
6. Singh, V. & A. P. Jain, Ethnobotany and medicinal plants of India. 5-A, New Pali Road Jodhpur-342001.7-78 (2003).
7. Ishtiaq M., W. Hanif, M.A. Khan, M. Ashraf & A.M. Butt. An Ethnomedicinal survey and Documentation of important medicinal folklore food phytonims of Flora of Samahni valley, (Azad Kashmir) Pakistan. P*akistan Journal of Biological Sciences*, 10 (13):2241-2256 (2007).
8. Asfaw, D., D. Abebe K. & T. Urga. Traditional medicine Ethopia, Journal of *Ethiopian Medicine Practices*: 14-17 (1999).
9. Abebe, D. & E., Hagos. Plants as a primary source of drugs in the traditional Health practices of Ethopia in:, J.G. wored, M., editor, Plants Genetic resources of Ethopia. Cambrige University Press, Cambridge 1991: 101-113 (1991).
10. Baquar, S.R. Medicinal and Poisonous Plants of Pakistan, Printas. Karachi, Pakistan, (1989).
11. Ishtiaq M., M. Maqbool, T. Hussain & A. Shah. Role of indigenous knowledge in biodiversity conservation of an area: a case study on tree ethnobotany of Soona valley, district Bhimber Azad Kashmir, Pakistan, *Pakistan Journal of Botany*,45(SI): 389-399 (2013).
12. Friedman, J., Z., Yaniv, A., Dafni, & D. Palewitch, A preliminary classification of the healing potential of medicinal plants, based on the rational analysis of an ethnopharmacological field survey among Bedouins in Negev Desert, Israel. *Journal of Ethnopharmacology*, 16, 275–287 (1986).
13. Trotter, R.T., & M.H. Logan., Informant consensus: a new approach for identifying potentially effective medicinal plants. In: Etkin, N.L. (Ed.), Plants in Indigenous Medicine and Diet, Behavioural Approaches. Redgrave Publishing Company, Bedford Hills, New York, pp. 91–112 (1986).
14. Heinrich, M., S., Edwards, D.E., Moerman, & M. Leonti, Ethnopharmacological field studies: a critical assessment of their conceptual basis and methods. *Journal of Ethnopharmacology*, 124, 1–17 (2009).
15. Giday, M., Z., Asfaw, & Z. Woldu, Medicinal plants of the Meinit ethnic group of Ethiopia: an ethnobotanical study. *Journal of Ethnopharmacology*, 124, 513–521 (2009).
16. Ahmed, E., M. Arshad, A., Saboor, R. Qureshi, G. Mustafa, S. Sadiq, & S.K. Chaudhari, Ethnobotanical appraisal and medicinal use of plants in Patriata, New Murree, evidence from Pakistan (2013).
17. Kayani, S., M. Ahmad, M. Zafar, S. Sultana, M.P. Khan, M. Ashraf, A. Hussin, & J. Yaseen, Ethnobotanical uses of medicinal plants for respiratory disorders among the inhabitants of Gallies Abbottabad, Northern Pakistan. Journal of *Ethnopharmacology*, 156, (28) 47-60 (2014).
18. Qureshi, R.A., M.A. Ghufran, S.A. Gilani, Z., Yousaf, G. Abbas, G., & A. Batool, Indige-nous medicinal plants used by local women in Southern Himalayan Region of Pakistan. *Pakistan Journal of Botany*, 41, 19–25 (2009).
19. Meragia, M., Z. Asfaw, & M. Argaw, The status of ethnobotanical knowledge of medicinal plants and the impacts of resettlement in Delanta, Northwest-ernWello, Northern Ethiopia. *Journal of Evidence Based Complementary Alternative Medicines*, 1(1): 1-25 (2016).
20. Jamila, F., & E. Mostafa, Ethnobotanical survey of medicinal plants used by peo-ple in Oriental Morocco to manage various ailments. *Journal of Ethnopharmacology*, 154,76–87 (2016).
21. Hunde, D., Z. Asfaw, & E. Kelbessa, Use of traditional medicinal plants by people of 'Boosat' Sub District, Central Eastern Ethiopia. *Ethiopian Journal of Health Sciences*, 2, 141–155 (2006).
22. Rashid, S., M. Ahmed, M. Zafar, S. Sultana, M. Ayub, M.A. Khan, & G, Yaseen, Ethnobotanical

survey of medicinally important Shrubs and Trees of Himalayan region of Azad Jammu and Kashmir, Pakistan. *Journal of Ethnopharmacology*, 166, 340–351 (2015).

23. Shah, A., K.A. Bharati, J., Ahmad, & M.P. Sharma, M.P. New ethnomedicinal claims from Gujjar and Bakerwals tribes of Rajouri and Poonch districts of Jammu and Kashmir, India *Journal of Ethnopharmacology*, 166, 119–128 (2015).
24. Teklehaymanot, T., & M. Giday, Ethnobotanical study of medicinal plants used by people in Zegie Peninsula, Northwestern Ethiopia. *Journal of Ethnobiology and Ethnomedicines.* 3, 12 (2007).
25. Madikizela, B., A.R. Ndhlala, J.F. Finnie, & V.J. Staden, Ethnopharmacological study of plants from Pondol and used against diarrhea. Journal of *Ethnopharmacology* 141, 61–71 (2012).
26. Bennett, B.C., & G.T. Prance, Introduced plants in the Indigenous pharmacopoeia of Northern South America: introduced plants in the indigenous pharmacopoeia of northern South America. *Journal of Economic Botany*. 54, 90–102 (2000).
27. Albuquerque, U.P., Introduc¸ ão à Etnobotânica. Bagac¸ o, Recife, pp. 87 (2002).
28. Shil, S., M.D. Choudhury, & S. Das, Indigenous knowledge of medicinal plants used by the Reang tribe of Tripura state of India. Journal of *Ethnopharmacology* 152,135–141 (2014).
29. Khan, I., N.M. Abdelsalam, H. Fouad, A. Tariq, R. Ullah, & M. Adnan, Application of ethnobotanical indices on the use of traditional medicinesagainst common diseases. *Evidence Based Complementary and Alternative Medicines*, 1-21 (2014).
30. Hassan-Abdallah, A., A. Merito, S. Hassan, D. Aboubaker, M. Djama, Z. Asfaw, & E. Kelbessa, Medicinal plants and their uses by the people in the region of Randa, Djibouti. *Journal of Ethnopharmacology*, 148, 8701–8713 (2013).
31. Shinwari, Z.K. How to sustainably use medicinal plants: looking ahead. In: Proceeding of International Workshop Held in Islamabad, pp. 47–56 (2004).
32. Ong, H.G.,& Y.D. Kim, Quantitative ethnobotanical study of the medicinal plants used by the AtiNegrito indigenous group in Guimaras Island, Philippines. *Journal of Ethnopharmacology*, 157, 228–242 (2014).
33. Rehman, M.N., M. Ahmad, S. Sultana, M. Zafar, & S. Edward, Relative popular-ity level of medicinal plants in Talagang, Punjab Province, Pakistan. *Revista Brasilia Farmacognosia*, 27, 751–775 (2017).
34. Ullah, S., M. R. Khan, N.A. Shah, S.A. Shah, M. Majid, & M.A. Farooq, Ethnomedicinal plant use value in the Lakki Marwat district of Pakistan. *Journal of Ethnopharmacology*, 17(2): 144-156 (2014).
35. Sofidiya, M. O., O. A. Odukoya, A. J. Afolayan & O. B. Familoni. Survey of anti-inflammatory plants sold on herb markets in Lagos Nigeria. *International Journal of Botany*. 3 (3): 302-306 (2007).