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Floristic inventory and ethnomedicinal survey of important plants of Kalash Valley Chitral, Hindukhush range, Khyber Pakhtunkhawa, Pakistan

Zahid Fazal[1], Khan Sher[2], Lal Badshah[1], Ali Hazrat[3], Hafiz Ullah[1], Imran Ahmad[2], Subhan Ullah[1] and Sakina Bibi[4]

[1]Department of Botany University of Peshawar, **Pakistan**
[2]Shaheed Benazir Bhutto University, Sheringal, Dir Upper, **Pakistan**
[3]Department of Botany University of Malakand, **Pakistan**
[4]Govt Girl Degree College Gulshan Rehman Kohat Road Peshawar, **Pakistan**

***Correspondence:** mir.zahidfazal@gmail.com **Received 09-05-2020, Revised: 07-06-2020, Accepted: 09-06-2020 e-Published: 11-06-2020**

A field survey was conducted to explore the floristic diversity and medicinal properties of plants in Kalash valley Chitral, Khyber Pakhtunkhawa viz., Rumbor, Bumburet and Birir during the year 2014-16. The local inhabitants mostly consuming 75 plant species belonging to 33 families as a medicinal plants for the treatment of various ailments, among them herbs shows highest percentage of 58.7% followed by trees (24%), shrubs (12%), vegetables (4%) and climber (1.33%). Among families, Rosaceae was dominant represented by (9 species, 12.32%), followed by Asteraceae (6 species 8.21%), Papilionaceae (5 species 6.84%), Apiaceae, Lamiaceae, Brassicaceae and Poaceae (4 species, 5.47%) each, while Solanaceae, Moraceae, Polygonaceae and Pinaceae were represented by (3 species each, 5.47%) in addition to other families with two or one species. Plant parts used with highest percentage was fruits (28%) followed by leaves (24%), seeds (22.7%) and shoots (20%) in addition to other parts. Life form classes shows highest number of Therophytes (28) followed by Megaphanerophytes (19), Geophytes (12), Nanophanerophytes (8), Hemi-cryptophytes (05) and Chamaephytes (3). Last but not the least, leaf size data shows highest percentage of Mesophyll (25), followed by Nanophyll (19), Microphyll (15), Macrophyll (10), Leptophyll (05) and Aphyllous (01). The collected data obtained with the help of questionnaires, field visits and group interview suggests that the respondents used different plants parts for a variety of medicinal purposes and other miscellaneous uses. Different plant species were used to combat various kind of diseases such as, stomach problem, asthma, anemia, bronchitis, cholera, colic, diabetes, constipation, diarrhea, dysentery, dyspepsia, fever, hepatitis, coughs, jaundice etc.

Keywords: Kalash people; Floristic diversity; Ethno-medicine; Life form; Leaf sizes; Plant families.

INTRODUCTION

District Chitral is located to extreme North and North-west of Pakistan within 35^0 $15^/$ to 36^0 $55^/$ north latitude and 71^0 11 to 73^0 $51^/$ East longitude (Anonymous, 1998). Chitral has altitude ranges from 1494m to 7685m. Administratively, Chitral is part of Malakand Division, comprising 14800 square Km that is largest district in term of area in Khyber Pakhtunkhawa. Chitral is the land of great diversity having over a dozen of different cultures and languages spoken by the inhabitants from at least 4,000 years. Kalash valley, one of the most beautiful picnic and tourist spot of international, national and local fame, consists of three sub-

valley viz., Bumburet, Rumbor and Birir. Among them, Bumburet is the most beautiful and largest (Fazal *et al.,,* 2019). The valley of Kalash is blessed with a diverse and rich flora. This ethnobotanical study in the said area provides the indigenous information for the traditionally used native medicinal flora that is less expensive and locally reachable to the inhabitants of the locality. The Kalash people have an indigenous and unique culture and are considered to be the descendants of Alexander the Great (Hadi and Ibrar, 2014). The research area is a narrow strip and inhibited by wild flora and fauna and degradation is high due to large scale grazing and the inhabitants over uses these for their daily routine. Majority of the local people are backward and they do not have access to modern resources, therefore they mainly depends on plants products for survival. Kalash people main occupation is agriculture and rearing of livestock, as a result abundantly consumes wild plants as a source of medicines, food and forages. The inhabitants also use wild flora for timber wood and thatching. Agricultural tools are also prepared from various plant parts as mostly the inhabitants are farmers.

The present research work was performed to known the floristic and medicinal plants of Kalash valley Chitral. Many workers had explained floristic diversity and medicinal plants on other parts of Chitral and Khyber Pakhtunkhawa. Floristic diversity explains physiognomic appearance and ecological interaction in various localities (Catarino et al., 2002). The diversity and ecological characteristic of flora of Mastuj valley Chitral (Hussain et al., 2015) floristic diversity and weed communities of Kalash valley (Fazal et al., 2019) had also investigated. Similarly various researcher documented flora of Khyber Pakhtunkhawa (Khan et al., 2011; Naveed et al., 2012; Shaheen et al., 2016; Khan et al., 2017; Ali et al., 2019).

Ethnobotany is the relationship of plants and the people (McClatchey et al., 2009) and study of plants used in local people for food materials, therapeutically active plants, timber wood plants, dwelling-hold instruments, musical tools, construction materials, fuel, and many other usage (Ugulu 2011; Sargin et al., 2013). In backward and hilly regions of the world, medicinal plants besides being main component of cultural and historical heritage also consumed as herbal cure for the treatment of large numbers of human diseases (Jamal et al., 2012; Iyamah and Idu, 2015). Local people traditionally uses the medicinal plants for different ailments and remedies (Waheed et al., 2013). Similarly, the local community of the target area has the valuables information about the uses of therapeutically active plants. (Ali 2008) demonstrated that Pakistan has about 5521 plant species belonging to 1572 genera, which is mostly present to the hilly areas. The ethno-medicinal values with special reference to therapeutically active plants in Chitral district were presented by many Botanists such as Ali and Qaiser (2009) in medicinal plants of Chitral, Ahmed et al., (2006) plants of Booni, Hussain et al., (2012) of Mastuj valley and acknowledged the local usage of 111 plants. Khan et al., (2010) also explored the traditional uses of some plants from various parts of Chitral. Recently, Hadi et al., (2013) explored 29 medicinal plants belonging to 16 families on the ethno botany of Rech valley. Khan et al., 2011 studied medicinal plants at the Chitral Goal National Park. Kalash people mainly prioritized the use of medicinal flora because of the accessibility and cheapness. The main purpose of the research is to collect and compile the local information of therapeutically active plants of Khyber Pakhtunkhawa, Pakistan before the knowledge gets vanished with the death of the old people, as the new generation has no interest in the new technological era.

MATERIALS AND METHODS

Complete survey of the floristic diversity was documented through collection of plant species. Plant specimens were hard pressed and identified through (Nasir and Ali 1970-1989; Ali and Nasir 1989-1991; Ali and Qaisar 1993-2018). The collected plants materials were submitted as a reference for future records in the Herbarium, Botany Department University of Peshawar.

Ethno-medicinal survey was collected through questionnaires and interviewing respondents among the communities. They were asked to register the plants of medicinal values, known to the community. The information obtained was further processed as outlined by Badshsah et al., (1996, 2011) and Hussain et al., (2015).

RESULTS

The collected information obtained with the help of questionnaires, field visits and group interview explained that the local inhabitants mostly consuming 75 plant species belonging to 33 families as medicinal plants. Data of medicinal plants are available at table 1 and that of floristic composition is in table 1 and 2

Table1: Family wise medicinal plants with local names, habits, life form, leaf size, parts usage and medicinal uses for various ailments in Kalash valley district Chitral.

S.N	Family	B. Names	Local Names	Habit	L.F	L.S	Parts Used	Medicinal properties of plants
1	Alliaceae	*Allium cepa* L.	Thashtu	Herb	Geo	Mes	Bulb	Diuretic, Piles, Abdominal,throat and gas problems.
		Allium sativum L.	Wrasnu	Herb	Geo	Mes	Bulb	Hypertension, fever and cough
2	Astaraceae	*Artemisia scoparia* Waldst & Kit.	Drone	Herb	He	Nan	Shoot Seeds	Respiratory stimulant,jaundice, Intestinal worms,hepatitis.
		Cichorum intybus Linn.	Khasti	Herb	Th	Mes	Root	Abdominal pain, Typhoid,Hepatitis, Urination problems, Malarial fever.
		Matricaria chamomilla L.	Shirisht	Herb	Th	Nan	Flower Head	Abdominal pain,fever, typhoid, digestion &stomach problems.
		Taraxacum officinale Webber	Troqphowo	Herb	Geo	Mes	Leaves	Reduce blood pressureand cholesterol, anti-inflammatory,enhance liver health and help in weight losses.
		Xanthium strumarium L.	Chamchir	Herb	Th	Mes	Roots	Laxative, diarrhea,tonic, diuretic, emollient, sedative and anthelmintic.
		Artemisia parviflora Roxb. ex. D. Don	Kharkhalig	Herb	Th	Mic	Flower	Common intestinal worms, abdominal problemsand aromatics
3	Berberidaceae	*Berberis lyceum* Royle.	Choange	Shrub	Np	Nan	Shoot Roots	Tonic, gum diseases, Stomachic, Diuretic, Headache and Hepatitis.
4	Brassicaceae	*Brassica napus* Linn.	Tepor	Vegetable	Th	Mes	Leaves Root	Vegetable, Ulcer, Stomach and Diuretic.
		Nasturtium officinale R. Br.	Toqho-krdachi	Herb	Th	Mic	Leaves stem	Chest problems, Diuretic and Jaundice.
		Capsella bursa-pastoris L.	Jalajali	Herb	Th	Mes	Leavesflower	Stimulant and diuretic.
		Sisymbrium irio L.	Khalikhali	Herb	Geo	Mic	Seeds	Stabbing pain,diarrhea, bloody stool, bronchitis and skin problems.
5	Canabaceae	*Cannabis sativa* L.	Boung	Herb	Th	Nan	Leaves Flower	Sedative, Narcotic, Scabies and Stimulant
6	Chenopodaceae	*Chenopodium album* L.	Pililio-mragh	Herb	Th	Nan	Shoot	Anti-spasmodic, Aromatic, Purgativeand Carminative.
		Chenopodium botrys L.	Kunakh	Herb	Th	Lep	Shoots	Jaundice, Blood purifier, Hepatitis and Cough.
7	Cupressaceae	*Juniperus excelsa* M. Bieb	Sarooz	Tree	Mp	Lep	Berry	Skin diseases, Stimulant,and Carminative.
8	Ebenaceae	*Diospyrus lotus* Linn.	Jangaliamlook	Tree	Mp	Mes	Fruit, Leaves.	Edible, Carminative and Dysentery.
		Diospyrus	Amlook	Tree	Mp	Mes	Fruit	Edible, Carminative and

		kaki Linn.						Dysentery.
9	Elaegnaceae	*Elaeagnus angustifolium* L.	Shinjur	Tree	Mp	Mes	Fruit	Kidney stone removal,astringent, jaundice, Bronchial stimulant, asthma, arthritis, Coughs, anti-inflammatoryand pain relief agent.
10	Juglandaceae	*Juglans regia* Linn.	Birmogh	Tree	Mp	Mac	Nuts, Bark	Teat cleaning, Tonic,Intestinal worms, Blood pressureand Brain stimulant.
11	Fagaceae	*Quercus dilatata* Lindle ex Royal.	Shabanjh	Tree	Mp	Mic	Fruit Leaves	Livestock Urinary Tract Infection and dysentery.
		Quercus incana (Husskn)	Eshparu-Banjh	Tree	Mp	Mic	Fruit Leaves	Diuretic, Diarrhea and Asthma.
12	Lamiaceae	*Mentha longifolia* (L.) Huds.	Jangali Bane	Herb	Geo	Mes	Leaves Branch Flower	Fever, cough, Stomach problems,Carminative, improve digestionand immunity.
		Nepeta cataria Linn.	Mutrigh	Herb	Ch	Mes	Leaves Flower	Fever, internaland external injury,lumbago andtoothache.
		Ocimum basilicum Linn	Danu	Herb	Ch	Nan	Leaves Flower	Aromatic, digestive,stomach ache, colon problems,condiments, constipation and fever.
		Mentha arvensis L.	Pudina	Herb	Geo	Mic	Leaves Flower Stem	Improve digestive system, Control of vomiting, diarrhea, toothache andconstipation.
13	Fumariaceae	*Fumaria indica* (Haussk) Pugsly.	Shahtara	Herb	Th	Lep	Shoot	Aches, fever, constipation,dyspepsia, blood purification, diuretics,vomiting and pain.
14	Moraceae	*Ficus carica* Forsk.	Koyet	Tree	Mp	Mac	Fruit, Latex Leaves	Constipation, Piles,Removal of spines from body parts and Useful in cancer.
		Morus alba Linn.	Mragh	Tree	Mp	Mac	Fruit	Jaundice, urinarytract infection, stimulant and astringent.
		Morus nigra Linn.	Shayiky	Tree	Mp	Mac	Fruit	Jaundice, Laxative and dyspepsia.
15	Fabaceae	*Medicago denticulata* Linn.	Mushich	Herb	Th	Nan	Shoot	Useful for diabetic patients and inflammatory responses.
		Lathyrus aphaca L.	Jungallimatar	Herb	Th	Mic	Seeds	Tonics, Aphrodisiac and bowel movement.
		Trifolium resupinatum L.	Shaftal	Herb	Geo	Nan	Shoot	An infusion has been used for coughs,colds, fever and leucorrhoea anddiuretic for cattle.
		Vigna radiata (L.) R. Wilczek	Khanis	Herb	Th	Mic	Seeds	Detoxification properties, used to refresh mentality and alleviate heat stroke.
		Glycyrrhiza glabra L.	Moyu	Shrub	Geo	Mes	Root	Intestinal worms, cough in animals and Abdominal pain.
		Pisum sativum Linn.	Matar	Herb	Th	Mic	Leaves Seeds	Vegetable,Bowel movement, contraceptive,fungistatic andspermicidal.
16	Papavaraceae	*Papaver somniferum* Linn.	Afyon	Herb	Th	Mac	Latex, Seed	Narcotic, Opium, Diarrhea and Coughs.

17	Pinaceae	*Pinus roxburghii* Sarg.	Rogh	Tree	Mp	Nan	Resin, Oil	Oil is useful against cancer, pathogens and liver health.
		Pinus wallichiana A.B. Jackson.	JangaliRogh	Tree	Mp	Nan	Resin,Oil	Wound healing,oil is useful against cancer ,germs and hepatitis.
		Pinus geradiana Wall.ex. Lamb	Chalghuza	Tree	Mp	Nan	seed and oil	Aphrodisiac, tonics,oil is useful against cancer, germs and hepatitis.
18	Plantaginaceae	*Plantago lanceolata* L.	Boikoligini	Herb	Th	Mic	Leaves, Seeds	Fever, diarrhea, acidity of stomach, Dysentery and mouth diseases.
19	Poaceae	*Triticum aestivum* Linn.	Gom	Herb	Th	Mes	Immature Seed	Backache, Anti-cracking agent, colon diseases, hypertension, constipation,diabetes and obesity.
		Avena sativa Linn.	Gracgh	Herb	Th	Nan	Seeds	Constipation, anxiety,lower cholesterol, prevent heart diseases,Skin disorder.
		Digitaria sanguanilis L.	Gass	Herb	Geo	Nan	Shoots	A folk remedy forcataracts and debility, in treatment ofgonorrhea and emetic.
		Zea mays Linn.	Juwari	Herb	Th	Mac	Seeds	Tonic and stomach related Problems.
20	Polygonaceae	*Rumex hastatus* D.Don	Shutshakhu	Herb	He	Mes	Young Shoot	Carminative, wound healing,vomiting and diuretic.
		Polygonum aviculare L.	Nazuk-joshu	Herb	Th	Lep	Shoots	Useful in inflammatory response, astringent and curing of ulcer.
		Rheum webbianum Royle	Ishpar	Herb	Th	Mac	Shoots	Constipation, Fever and diarrhea,
21	Rosaceae	*Cotonester microphylla* Wall.ex. Lind	Miken	Shrub	Np	Lep	Fruits	Fruit edible, astringent, blood purifiers and carminative.
		Prunus domestica Linn.	Alocha	Tree	Mp	Mes	Fruits	Flavoring agent in rice and meat,edible, honey bee species
		Pyrus communis L.	Tong	Tree	Mp	Mes	Fruits	Astringent, sedative,diarrhea, colic, constipation,nausea, fever and mild digestion problems.
		Prunus armeniaca Marsh.	Zuli	Tree	Mp	Mes	Fruit, Seed	Useful againstcancer, Gases problems and fruits are edible.
		Crataegus songarica C.Koch	Gooni	Tree	Mp	Mes	Fruits	Blood purifier andcardiac diseases.
		Prunus persica Linn.	Grgalog	Tree	Mp	Mes	Fruit,	Edible, blood purifiers, constipation andbowel movement.
		Rosa webbiana Wall. ex. Royle	GangaliGulab	Shrub	Np	Nan	Flowers	Ornamental, mental health, Death of centipedes,Infection of skin.
		Rubus fruticousus L.	Achu	Shrub	Np	Mes	Fruit	General body tonic,blood purifiers,
		Fragaria vesica L.	Achu	Shrub	Np	Mes	Fruit	Carminative,blood purifiersand laxative.
22	Capparidaceae	*Capparis spinosa* Linn.	Kaveer	Herb	He	Mes	Fruits	useful in hepatitis and rheumatism, aphrodisiac, astringent and tonic.

23	Scrophulariaceae	*Verbascum thapsus* Linn.	Gordogh-Kharo	Herb	Geo	Mac	Flower seeds.	Diarrhea and dysentery of cattle,healing wounds.
24	Solenaceae	*Solanum tuburosum* Linn.	Aloo	Vegetable	Geo	Mes	Tubers.	Source of starch and Proteins also causes gas trouble.
		Lycopersicum esculentum Linn.	Patingal	Vegetable	Th	Mic	Fruit	Aphrodisiacs, causes mouth rash andkidney problems.
		Solanum nigrum L.	Pirmilik	Herb	Th	Mes	Fruit, Leaves	Fever, extraction for sore eyes, Stomach ulcer and face beautification and pimples
25	Convulvulaceae	*Convulvulous arvensis* L.	Mesh	Herb	Th	Mes	Shoots	Stomach related issues in animals.
26	Punicaceae	*Punica granatum* Linn	Dalum	Shrub	Np	Mes	Fruit	Constipation, blood purifiers, reduces cholesterol and Tonic.
27	Violaceae	*Viola odorata* Linn.	Mulkhon	Herb	He	Mic	Whole Plant	Diaphoretic, Epilepsy, Antipyretic, Curing acnes And Common colds.
28	Vitaceae	*Vitis verifera L.*	Drogh	Climber	Np	Mac	Fruit, Juice	Gas problem, Laxative,Brain stimulant and vine productionfor tourists.
29	Ephedraceae	*Ephedra gerardiana* Wall.ex. Stapf.	Somani	Shrub	Ch	Aph	Whole Plant	Asthma, Bronchitis and Toothache.
30	Malvaceae	*Althea rosea* Linn.	Lane	Shrub	Np	Mes	Flower	Tonsils, Bowel Movements and Bronco-stimulant.
31	Pteredaceae	*Adiantum capillus-veneris* L.	Sumbal	Herb	Geo	Nan	Shoots	Heart problems, hair growth and Baldness.
32	Apiaceae	*Carum carvi* L.	Hojosh	Herb	Th	Nan	Seeds	Dyspepsia, Abdominal pain andCondiments
		Coriandrum sativum L.	Danu	Herb	Th	Nan	Shoots	Appetizer, Carminative, Urine problemsand anthelmintic.
		Foeniculum vulgare Miller.	Bodyong	Herb	Th	Nan	Leaves Seeds	Cough, Lumbago, Bronchitis, Gastricand Abdominal pain.
		Carum copticum L.	Shnjmok	Herb	Geo	Mic	Seeds	Gastric, Fever and Dysentery.
33	zygophyllaceae	*Paganum harmala* Linn.	Ispandur	Herb	He	Nan	Seeds	Useful against germs, evil eyes and devils.

Table2: Ecological attributes of floral diversity and Percentage of Family, Life forms, Leaf sizes, part used and Habits of medicinal plants in Kalash valley district Chitral.

S.No	Classes	No	% age	S. No	Family	No	% age	S.No	Part used	No	% age
Life form				**1**	Rosaceae	09	12	**1**	Fruits	21	28
1	Therophytes	28	37.3	**2**	Asteraceae	06	8	**2**	Leaves	18	24
2	Megaphanerophytes	19	25.3	**3**	Papilionaceae	05	6.66	**3**	Seeds	17	22.7
3	Geophytes	12	16	**4**	Poaceae	04	5.33	**4**	Shoots	15	20.
4	Nanophanerophytes	08	10.7	**5**	Apiaceae	04	5.33	**5**	Flower	11	14.7
5	Hemicryptophytes	05	6.7	**6**	Brassicaceae	04	5.33	**6**	Roots	05	6.66
6	Chersiyophytes	03	4	**7**	Lamiaceae	04	5.33	**7**	Resin	03	4
Leaf sizes				**8**	Pinaceae	03	4	**8**	Oil	03	4
1	Mesophylls	25	33.3	**9**	Solanaceae	03	4	**9**	Whole Plant	02	2.66
2	Nanophylls	19	25.3	**10**	Moraceae	03	4	**10**	Stem	02	2.66
3	Microphylls	15	20	**11**	Polygonaceae	03	4	**11**	Bulb	02	2.66
4	Macrophylls	10	13.3	**12**	Chenopodaceae	02	2.66	**12**	Latex	02	2.66
5	Leptophylls	05	6.7	**13**	Ebenaceae	02	2.66	**13**	Tuber	01	1.33
6	Aphyphylls	01	1.33	**14**	Alliaceae	02	2.66	**14**	Berry	01	1.33
Habits				**15**	Fagaceae	02	2.66	**15**	Nuts	01	1.33
1	Herbs	44	58.7	**16**	Remaining Families	01	1.33				
2	Trees	18	24								
3	Shrubs	09	12								
4	Vegetable	03	4								
5	Climber	01	1.33								

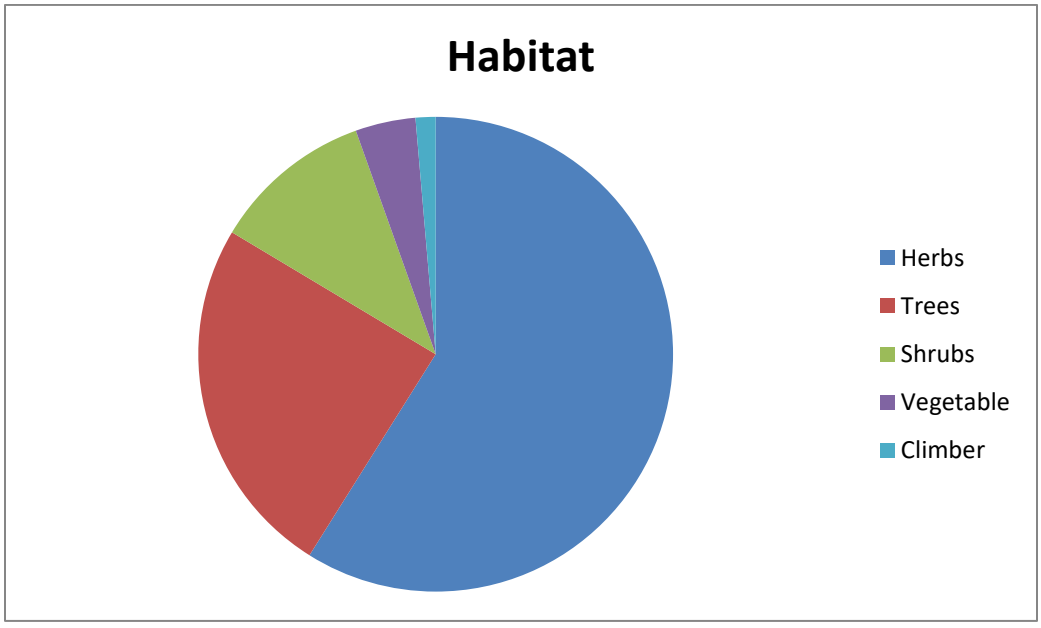

Figure1: Habitat of medicinal plants in Kalash valley district Chitral

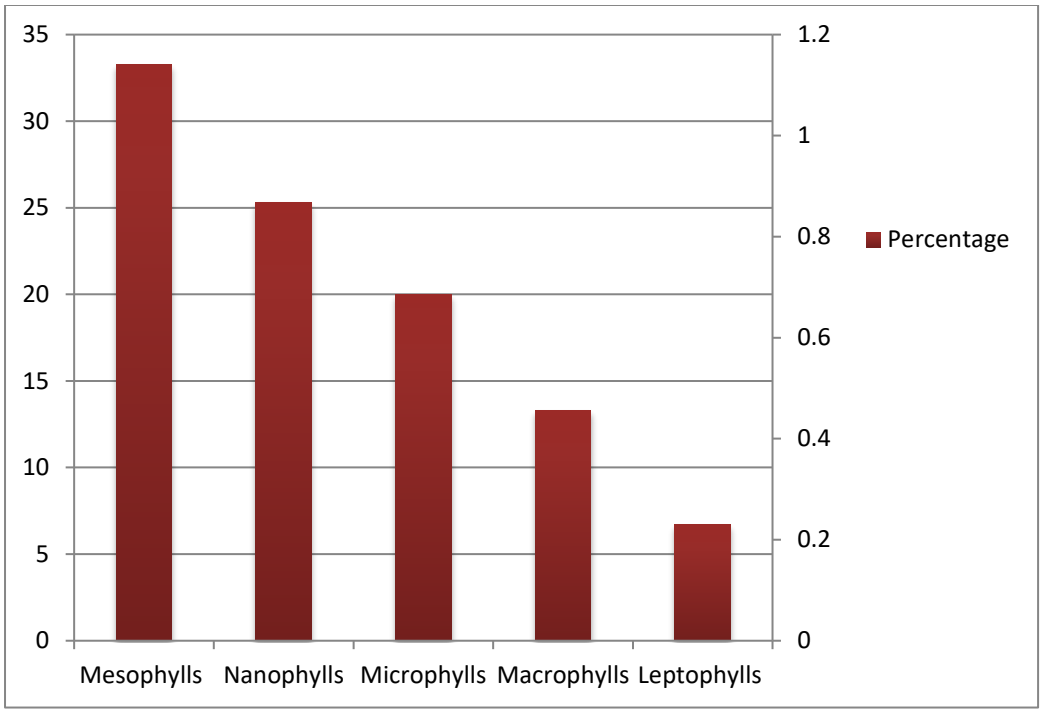

Figure 2: Percentage of leaf sizes of medicinal plants in Kalash valley district Chitral.

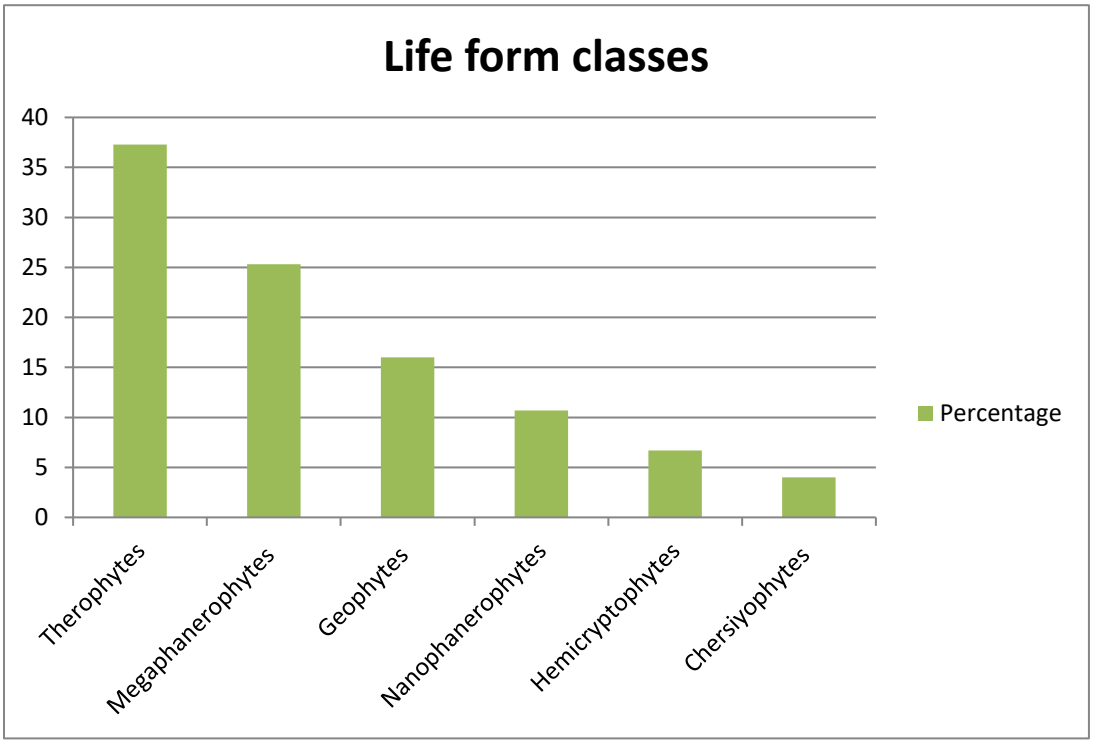

Figure 3: Percentage of life forms of medicinal plants in Kalash valley district Chitral

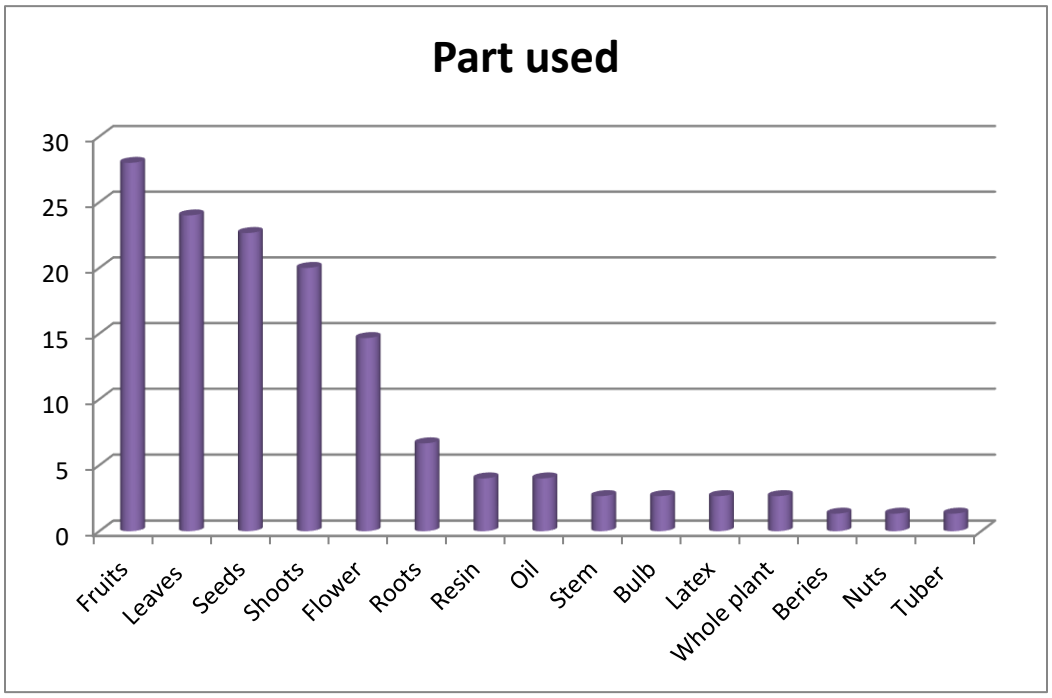

Figure 4: Percentage of part used of medicinal plants in Kalash valley district Chitral

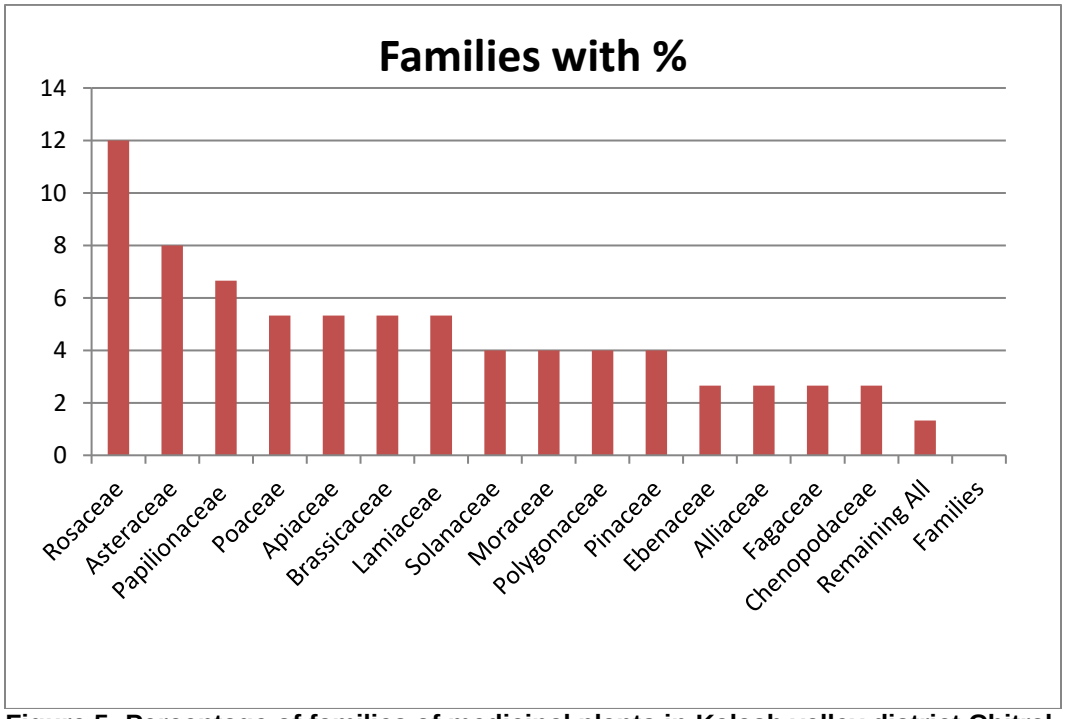

Figure 5: Percentage of families of medicinal plants in Kalash valley district Chitral.

and explained in figures 1, 2, 3, 4 and 5. Among the families one was Pteridophyte, (3) Gymnosperm and remaining all Angiosperm. Among families, leading family was Rosaceae represented by (9 species), followed by in addition to other families with two or one species. In habitat classes, Herbs shows highest of 58.7% followed by trees (24%), shrubs (12%), vegetables (4%) and climber (1.33%). Plant parts used with highest percentage were fruits (28%) followed by leaves (24%), seeds (22.7%) and shoots (20%) in addition to other parts. Life form classes shows highest number of Therophytes (28) followed by Megaphanerophytes (19), Geophytes (12), Nanophanerophytes (8), Hemi-cryptophytes (05) and Chamaephytes (3). Last but not the least, leaf size data shows highest percentage of Mesophyll (25), followed by Nanophyll (19), Microphyll (15), Macrophyll (10), Leptophyll (05), and Aphyllous (01).

DISCUSSION

This was the first attempt to investigate medicinal and floristic compositions at a time in Kalash valley Chitral viz., Rumbor, Bumburet and Birir during the year 2014-16. Collected data has been summarized in table.1 and table. 2 while elaborated in figures 1 to 5, suggested that the local inhabitants mostly consumed different plants parts for a variety of medicinal purposes and other miscellaneous uses and the area is rich with important flora. According by Raunkiaer (1934), the plant is ordered into five groups which are Chamaephyte, Therophytes, Phanerophytes, Hemi-cryptophyes, Cryptophytes (Costa et al., 2007). Similarly, the Leaf size spectrum gives an idea of the floristic adjustment that investigates plants association in connection to the predominant climatic variables. It is useful in studying vegetation at a local level (Rashid et al., 2014).

In addition, ethnobotanical studies with special reference to medicinal plants in other part of Chitral valley was investigated by Ali and Qaiser (2009), Khan et al., (2010) also explored the traditional uses of some plants from various parts of Chitral. Hadi et al., (2014) explored 29 medicinal plants belonging to 16 families on the ethnobotany of Rech valley. The ethnobotanical studies of plants in Chitral Valley, such as Chitral Gol National Park (Khan et al., 2011), Mastuj Valley district Chitral by Shah and Hussain (2012), flora of Mastuj by (Hussain et al., 2007), Booni valley Chitral (Ahmad et al., 2006) had been Asteraceae (6 species), Papilionaceae (5 species), Apiaceae, Lamiaceae, Brassicaceae and Poaceae (4 species) each while Solanaceae, Moraceae, Polygonaceae and Pinaceae were represented by (3 species), performed already. Recently, Zaman and Badshah (2019) explored medicinal plants of Terich valley Chitral. The diversity and ecological characteristic of flora of Mastuj valley Chitral (Hussain et al., 2015) floristic diversity and weed communities of Kalash valley (Fazal et al., 2019) have also investigated. Similarly various researcher documented floristic diversity of Khyber Pakhtunkhawa (Khan et al., 2011; Naveed et al., 2012; Shaheen et al., 2016; Khan et al., 2017; Ali et al., 2019).

Likewise, other researchers demonstrated floristic diversity and therapeutically active plants of Pakistan such as diversity and ecological characteristics of flora of Mastuj (Hussain *et al.,* 2015), floristic description of flora and ethnobotany of Samanhi valley A. Kashmir (Hussain and Ishtiaq 2009), medicinal plants of Shawar valley Swat (Islam et al., 2006), Dir Kohistan by (Ali et al., 2011), Hindu Kush mountain region of District Swat (Hamayun 2006), Malam-Jabba valley, District Swat, (Sher and Hussain 2009), Karak Khyber Pakhtunkhawa, (Siddique et al., 2016), Ikrampur (Baizokharki) of district Mardan, (Uddin et al., 2016), Dir Lower (Shuaib et al., 2014), Dir Upper, (Sharifullah et al., 2016), Usherai Valley (Hazrat et al., 2010), Mahal Kohistan, Khirthar National Park, Panhwar and Abro (2007), Ranyal Hills District Shangla (Ibrar et al., 2007), District Tank, Badshah and Hussain (2011), Dir Kohistan Valley, (Jani et al., 2011), Morgah Biodiversity Park, Rawalpindi (Hussain et al., 2008), Haramosh and Bugrote valleys Gilgit, Khan and Khatoon (2008), Khyber Agency, (Ali et al., 2016), Tehsil Birmal of South Waziristan Agency, (Farooq et al., 2012), Ato-Khel Tehsil Halimzai district Mohmand Agency, (Ali et al., 2016), Malam-Jabba valley, District Swat, Khyber Pakhtunkhawa, Iqbal & Humayun (2003), Shinwari& Khan (1999) has also been reported. Azad Jamu and Kashmir, Muzaffarabad (Dastagir 2001), Potohar Region (Badshah et al., 2001), Shogran valley of Khyber Pakhtunkhawa (Matin et al., 2002), Nushki district Chagai, Balochistan (Durrani et al., 2003), has also been reported.

Similarly, many other researchers explored ethno-medicinal importance of plants in different part of the world some of them are Bhattacharjee (2004), Das et al., (2009), Cunningham (2001), Brown (2002). The local usage of therapeutically

active plants for curing of different types of ailments and diseases is essential need of the hour. Sharma (2003), Kumaragiri mountains of Salem district of Tamilnadu, India (Alagesaboopathi 2009), Seshachalam mountanious ranges in Cuddapah area of Andhra Pradesh, India (Reddy et al., 2009), Villu-Puram district, Tamil-Nadu, Dhanam and Elayaraj (2014), Saxena (2000), Trivedi and Nargas (2000), and Dhiman (2003), elaborated the local information regarding the therapeutically active plants utilized to the treatment of various kinds of health issues such as hydrophobic ailments, rabies, dysentery, ear problems, epilepsy, vision ailments and liver problems, pyrexia, hair damages, snake bite, toothache and different other diseases in various regions of Hindustan.

CONCLUSION

From this research work it is cleared that Kalash valley is rich with medicinal plants and local people mostly depends on these plants for ailments of various diseases. They used different plant parts such as leaves, fruit, seed, stem, shoots, underground parts, berries or whole plant at a time. The local inhabitants mostly consuming 75 plant species belonging to 33 families as a medicinal plants, among them herbs shows highest percentage followed by trees, shrubs, vegetables and climber. Among families, Rosaceae were represented by (9 species12.32%), followed by Asteraceae (6 spp. 8.21%), Papilionaceae (5 spp. 6.84%), in addition to other families with four, three, two or one species. Plant parts used with highest percentage were fruits followed by leaves, seeds and shoots, in addition to other parts. Life form classes show highest number of Therophytes followed by Megaphanerophytes and Geophytes. Leaf size classes show highest percentage of Mesophyll (25), followed by Nanophyll (19) and Microphyll (15).

CONFLICT OF INTEREST

The authors declared that present study was performed in absence of any conflict of interest.

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AUTHOR CONTRIBUTIONS

ZF conducted the research work under the supervision of KS. LB Helped in data analysis, Review the manuscript and tabulation of data. AH, facilitated during plants identification, Paper writing and research work. While, that of HU, SU and IM facilitated in plants collection and field work. SB helped in data analysis and paper setting. All authors read and approved the final version.

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