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Survey of Ethnobotanical Medicinal Plants Used by Gaddi Tribal Community in Village Bandi District Kangra, Himachal Pradesh (India)

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Abstract: ***Introduction: In India, the majority of the people of tribal and rural areas near the Himalayan ranges depend on their traditional knowledge to combat various diseases and infections by using local medicinal plants, herbs and shrubs. The plants are used in different forms and parts. Each plant part has a unique effect on ailments and diseases. On the other hand, due to changing lifestyles, traditional healers' keeping of traditional knowledge secret, and the casualness of young people, folk medicine knowledge is declining globally. The Himalayan ranges occupy most of the area of Himachal Pradesh in the Dhauladhar range of the middle Himalaya, which is mostly inhabited by tribal communities. Himachal Pradesh's major medicinal plants are found in the subtropical zone's sub-mountain and low hills below 700 m above mean sea level. Material and Methods: The present study, from April to August of 2021, was regarding the documentation of ethano-medicinal plants in village 'Bandi' which lies between the co-ordinates 32°10'56" N latitude and 76°16'28" E longitude, and is located in the district of Kangra. An ethnobotanical survey has been initiated by conducting interviews and conferences/meetings with people of the Gaddi community to find out the medicinal properties of the collected medicinal plant specimens on the basis of a semi-structured questionnaire. Results: In the present investigation, 20 medicinal plants were reported and all of these plant species were angiosperms, belonging to seventeen different families. It was recorded that among these reported 20 medicinal plants, 9 (45%) were trees, 6 medicinal plants (30%) were shrubs, 4 medicinal plants (20%) were herbs and 1 medicinal plant (5%) was a climber. Conclusion: The present study has shown how inhabitants of the study area survived when they were not introduced to modern world medical practises to treat different ailments and maintain a healthy lifestyle. The present study has helped to explore more about the medicinal properties of available plants in the village and familiarise them with traditional knowledge among the people of the study area.***

Keywords: Medicinal plants, ethnobotanical survey, traditional knowledge, tribal community

1.Introduction

Ethnobotany is the study of regional plants and their practical uses through the traditional knowledge of local people. A person who studies ethnobotany is known as an ethnobotanist. Ethnobotany, a relatively new science, is concerned with the various principles that govern such a relationship between man and the vegetation that grows on the earth. The term "ethnobotany" was coined by J.W. Hershberger in 1895. The book *"Dictionary of Economic Products of India"*, written between 1889 and 1904 by George Watts, greatly facilitated the Indian medicinal plant. This text discussed earlier work (1813–1893) on medicinal plants, including plant habitat, use of appropriate plant parts, cultivation, economic importance, drug yield, and clinical trial results when available. The roots of ethnobotanical science have also emerged from India, and the sources of this science lie in old Indian scripture (for example, *Rig-Veda, Atharvaveda)* (Mishra *et al.*, 2001). It has been seen that these ancient sources contain guidelines for information regarding ethnobotanical medicinal plants. Utilization of medicinal plants has been documented long back in the ancient literature (Chattopadhyay *et al*., 2007). In the Charak Samhita, which appears to be the most important work (Jain *et al.*, 2018), around one hundred forty-eight medicinal plants are included, and in the Charka Samhita, four hundred to five hundred medicinal plants are included. The disease classification in the Charak Samhita includes more than two hundred diseases and one hundred fifty pathological conditions (Mishra *et al.*, 2001). The book "*Indian Medicinal Plants"*, written by Kirtikar and Basu in 1935, noted one thousand seven hundered seventy five plants, and the *"Glossary of Indian Medicinal Plants"* by Kumar *et al.* in 1956, included more than three thousand five hundred medicinal plants. The origin of all the sciences of India lies in the Vedas. India has always been the habitation of various seasons, climates, rain and mountains like the Himalayas. Therefore, India was considered the inhabitation of herbal medicine, but with the passage of time, the status of Ayurveda has degraded into a dark, ignorant period. There are many versions of books on the significance of the ethnobotanical study of medicinal plants. The scope of ethnobotany can be established with the problems of nutrition, life support species, rural health, drug use, social customs, cottage industries, conservation of ecosystems, and energy. Ethnobotany has attracted attention during the last three decades. Ethnobotanical studies have shown their relevance in the search for new herbal drugs, useful germplasm for food and fodder, in economic development, and in the conservation of natural resources and heritage.

In the last three decades, ethnobotanical work has been uplifted in a good sense. They worked out the number of workers in their published papers or articles in various journals and books. The ethnobotanical work was carried out at Shantikunj Haridwar, a Drug Research Institute in Lucknow, India. There are a number of institutions where the work has been done, either in a team or individually. About 80% of the world population relies on traditional medicine, which is based on plant material based on the data provided by WHO in 1993 (Bagachi *et al.*, 2012). A number of scientific studies on medicinal plants have indicated that essential phytochemicals can be developed for many health problems (Mishra *et al.*, 2001). Plants

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produce different bioactive molecules, making them a rich source of different types of medicines that have helped to cure viral infections or pandemics like COVID-19 (Murugesan *et al.*, 2021). In India, the majority of the people of tribal and rural areas near the Himalayan ranges depend on their traditional knowledge to combat various diseases and infections by using local medicinal plants, herbs, or shrubs. The plants are used in different forms and parts. Each plant part has a unique effect on ailments and diseases. On the other hand, due to changing lifestyles, traditional healers' keeping of traditional knowledge secret, and the casualness of young people, folk medicine knowledge is declining globally. These two Himalayan ranges occupy most of the area of Himachal Pradesh in the Dhauladhar range of the middle Himalaya, which is mostly inhabited by tribal communities. Himachal Pradesh's major medicinal plants are found in the subtropical zone's sub-mountain and low hills below 700 m above mean sea level. The mentioned districts have one hundred fifty-eight medicinal plants, mainly in Una, Hamirpur, Kangra, Solan, Mandi, and parts of Sirmour district of Himachal Pradesh (Himachal Pradesh Biodiversity Board). The present study is regarding the documentation of ethano-medicinal plants of village "Bandi", which lies between the co- ordinates 32°10'56" N latitude and 76°16'28" E longitude, and is located in the district of Kangra. The village is linked with the Mandi-Pathankot Highway. Therefore, the main aim of this present study is to investigate the medicinal uses of the local plant species to treat the ailments of the people of the *Gaddi* community in the study area.

2.Material and Methods

1.Study Area

Himachal Pradesh is situated between latitudes 30°22'40" N to 33°12'40" N and 75°45'55" E to 79°04'20" E, which is the whole mountainous area with an altitude ranging from 350 to 6975 metres above mean sea level. Topographically, **t**he study area is "Bandi' village, found in the foothills of the Dhauladhar range of the lesser Himalayas in the Kangra district of Himachal Pradesh. The village was located at 32°10'56" N latitude and 76°16' 28" E longitude. It was under Naganpatt panchayat in ward no. 2 (Figure No. 1). The study area was thirteen kilometres away from the tehsil of Dharamshala. This study area was bordered by other villages like village Swala in East, village Gharthed in West, village Kuliara in North and village Bahl in South of the village. The total population of the village was one thousand two hundred seventy two according to the census 2011, out of which six hundred thirty (49.53%) were male and six hundred forty two (50.47%) were female (Table no. 3.1). The economy of the households of study area was mostly supported by agriculture and livestock as well.

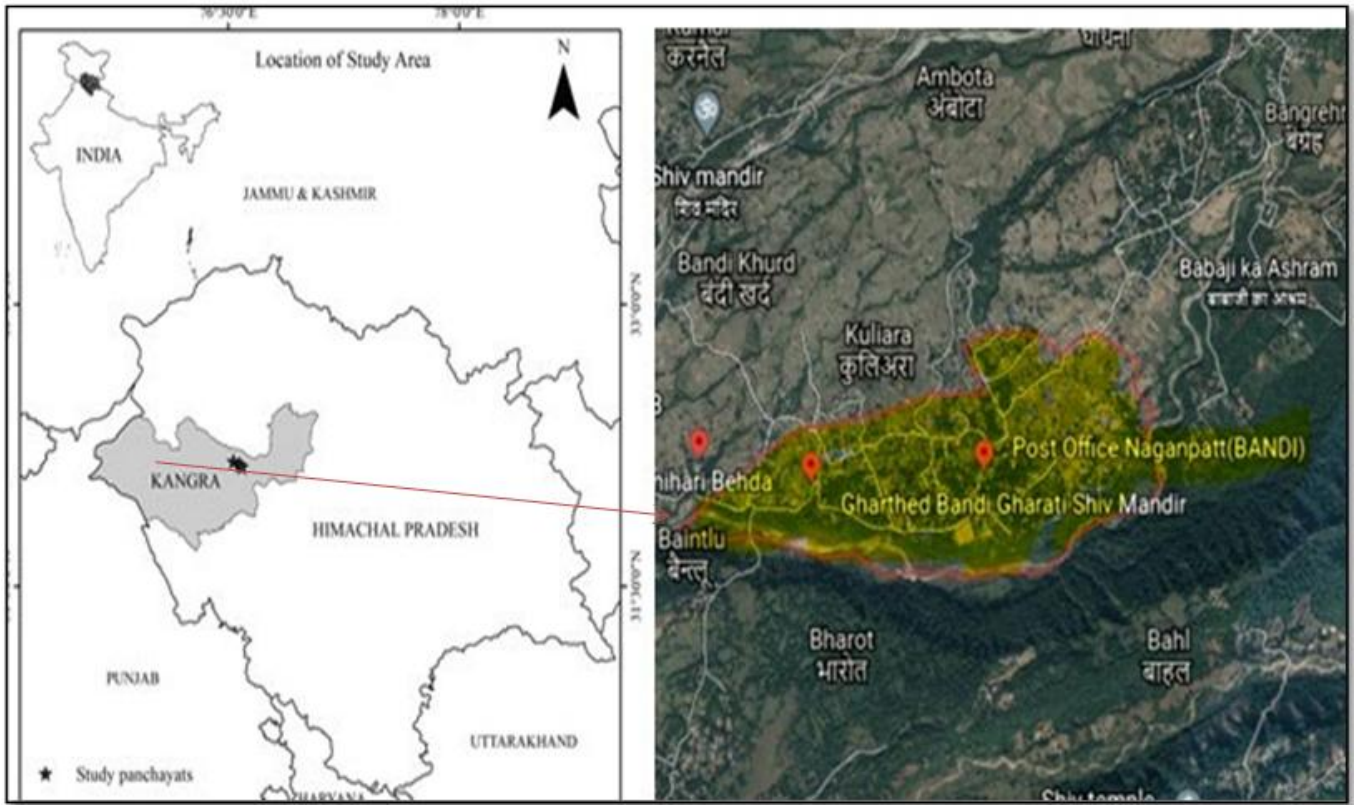

Figure 1: Map of Study area (Source: Google Earth)

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Table 1: Statistical data of study area

Area:	**18.1 ha**		
Coordinates	32°10'56"N latitude and 76°16'28"E longitude		
Total no. of Household:	**298**		
Population	**Persons**	**Males**	**Females**
Total	1,272	630	642
In age group 0-6 years	132	72	60
Schedule caste	77	36	41
Schedule tribe	129	61	68
Literates	969	514	455
Total worker	593	324	269
Cultivators	263	135	128
Non-workers	679	306	373

(Source: Ministry of Home Affairs, Government of India census 2011)

2.Collection of Data

To collect all medicinal plant specimens from the study area, knowledgeable people were asked to determine their correct identification (Figure No. 2). Therefore, a survey was conducted to find out the medicinal properties of the collected medicinal plant specimens with the help of local *vaidyas*, herbalists, and local medicine men. The survey was conducted by using the convenience sampling method. The survey was initiated by conducting interviews and conferences/meetings with people from the *Gaddi* community during a field visit on the basis of a semi-structured questionnaire (Table No. 2). The questionnaire was prepared in such a way to collect relevant information on the current study. During the survey, before proceeding to the interviews and group discussions, the selected thirty respondents were enlightened about the intention behind this interview and their verbal consent was taken. In the study area, all the local people, including shepherds, tribes, plant collectors and farmers, were investigated according to their age and gender. During the survey, the respondents were divided according to their age groups into age group I (above 60 years), age group II (35-60) and age group III (15-35). The respondents were interviewed in their local language to make them understand the question easily and to make them comfortable sharing accurate information about the medicinal species. During the investigation, respondents (herbalists, Ayurveda practitioners, local members of the tribal community) were first asked to enlist medicinal plant species which they had used as medicine in the present or in the past, for preparing specific forms (e.g., decoction, plaster, spray and powders) to utilise them. Furthermore, they investigated the collection period and seasonal availability of medicinal plant species. After the completion of the field survey, the collected information through questionnaires and group discussions with respondents was analysed, then compared with the collected literature and reconfirmed. In order to identify the medicinal plants, the books "Silviculture of Indian Trees" (Troup, 1985) and "Flora of Himachal Pradesh" (Chowdhery and Wadhwa, 1984) were also consulted. The reported plants were classified on the basis of their overall utility in the study area. The information on medicinal plants used for a variety of diseases originated from traditional beliefs, obtained during the survey of the village 'Bandi'. This gathered information was arranged indigenously according to its use and presented in a tabulated form. The list of medicinal plants included, habitat, botanical name, common name, local name, family, plant part used and their other medicinal uses mentioned in Table No. 3.

Figure 1: Photographs collected during field survey in study area

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Table 2: A questionnaire used for ethnobotanical study

Parameters	Questions/ Information
Respondent's details	Name: _____ Gender:_____ Age:_____ Occupation:_____ Education: _____ Location/residence: _____
Questions	For how long have you been a traditional healer? Which plants or plant products have you used as medicinal purposes, if any? Enlist the name of the disease cured/treated by these plants. What ailments do you use? Which part of the plant do you use? How is it used? (Dried or fresh) How do you prepare it for use? (Tea, infusion, topical application, etc.) Do you have livestock? (Yes/No) Do you treat your livestock with these plants as well (Yes/No) If Yes, Are they as effective as on human (Yes/No) Do you use these plants for commercial purpose? (Yes/No) Give details how do you make for each ailment How is the preparation managed? For how long do you have to take the preparation?

3.Results and Discussion

In the present investigation, 20 medicinal plants were collected from the study area. A detailed survey and group meetings/conferences with people from the study area were arranged. During the survey and group discussions, it was found that the information on medicinal plants and their uses was restricted to the elderly (above 45) only. It was observed that female respondents had a little bit extra knowledge on medicinal plant and their utilization as compared to the male respondents. Although the younger generation of the study area was aware of medicinal plant specimens, they were lacking in utilisation of local medicinal plants as most of them depended on market products. In the present study, the uses of medicinal plant species were enumerated in Table No. 3. The present investigation has introduced 20 species of medicinal plants. All medicinal plant species were angiosperms and belonged to seventeen different families. It was recorded that medicinal plants collected from the study area were from Rutaceae, Fabaceae, Tiliaceae, Asteraceae, Anacardiaceae, Menispermaceae, Myrtaceae, Amarydillaceae, Combretaceae, Convolvulaceae, Acanthaceae, Lamiaceae, Moraceae, Rosaceae, Verbenaceae, Zingiberaceae, Caricaceae and Brassicaceae. It was observed that among these above mentioned families of medicinal plants, Rutaceae was the highest repeating family, with three species named as *Murraya koenigii* *Aegle marmelos* and *Zanthoxylum aramatum* (Table no. 3). The enumeration of the medicinal plants and their uses was prepared for various aspects such as their scientific name, local name, common name, family, collection period, plant part used and medicinal uses of the plant collected in the study area. It was recorded that among these collected 20 medicinal plants, nine (45%) were trees, six medicinal plants (30%) were shrubs, four medicinal plants (20%) were herbs and one medicinal plant (5%) was a climber, which has been shown in Table No. 2.

Table 2: Distribution of medicinal plant habitat in study area

Sr. No.	Habitat	Medicinal plant	
		Number	Percentage
1	Tree	9	45
2	Shrub	6	30
3	Herb	4	20
4	Climber	1	5
	Total	**20**	**100**

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Table 4.3: Traditionally used medicinal plants by the people of study area for various ailments

Sr. No.	Botanical name	Common name	Local name	Family of the plant species	Phenology	Habitat	Part used	Medicinal Uses
1	*Bauhinia variegata*	Kachnar / Mountain Ebony	Kraal	Fabaceae	Flowering from March to May Fruiting from August to September	Tree	Flowers, bark, buds	Bark was used in form of decoction to treat Dysentery, haemorrhoids, for snake poisoning, wound healing, immunomodulatory. Buds and Flowers were consumed in form of vegetable.
2	*Grewia glabra*	Dhammani / Dhamman tree	Dhamman	Tiliaceae	Flowering in early winters fruiting from early spring to summer.	Tree	Leaves	Leaves have properties like Antibacterial, antioxidants, joint pain
3	*Murraya koenigii*	Meetha neem/ Curry leaves	Gandla	Rutaceae	Flowering occurred from April to May and peak fruiting from July to August	Shrub	Leaves, stem	Leaves were used in Blood purification, antifungal, vomiting and for kidney pain, hair growth, antidiarrheal activities joint pain. Stem was used to treat mouth infection and toothache.
4	*Zanthoxylum aramatum*	Pahadi neem/ Rattan pepper	Tirmira	Rutaceae	flowers in between the month of March to April	Shrub	Stem	Stem was used to treat Toothache, antibacterial, cardiovascular disorders.
5	*Tinpospora cordifolia*	Guduchi/ Heart-leaved moonseed	Gloy	Menispermaceae	Flowers in summer season	Climber	Whole	The medicinal plant was used as whole to treat Skin diseases, anaemia, inflammation, resists infections, digestive problems, enhances immune system
6	*Eucalyptus gigantean*	Neelgiri/ Eucalyptus	Safeda	Myrtaceae	flowering occured from rainy season to winters	Tree	Leaves, bark	Leaves were used to treat Bronchitis, as antiseptic and essential oil of the leaves was used as insect repellent, anti-inflammatory, and throat infection
7	*Magnifera indica*	Aaam/ Mango	Amb	Anacardiaceae	flowers in February to March, the fruit became matured in April to May	Tree	Fruit,	Fruit was used to treat diabetes, blood purification, antioxidant, kidney stone, tuberculosis, diarrhoea, sunstroke
8	*Allium sativum*	Lahasun/ Garlic	Lahasun	Amaryllidaceae	Fruiting from December to January	Herb	Bulb,	Bulbs were used to treat Hypertension, diabetes mellitus, gastrointestinal activities, strengthen immune system.
9	*Terminalia chebula*	Haritki/ Chebulic Myrobalan	Harad	Combretaceae	Flowers in summer season and fruiting in winters	Tree	Fruit	Fruit was consumed infusion with tea, decoction after drying in the sunlight Antiviral activities, cough, antibacterial (stomach cancer) gastrointestinal motility improved, chemo-preventive and radio protecting activity
10	*Ipomoea carnea*	Behaya/ Morning Glory	Basunth	Convolvulaceae	bloom time was in between May to September	Shrub	Leaves	Leaves were used to treat Antibacterial diseases, wound healing, anti-inflammatory
11	*Justicia adhatoda*	Adulasa/ Malabar Nut	Safed Basunth	Acanthaceae	bloomed in spring and late summer	Shrub	Leaves	Leaves were used to cure Cough, fever, asthma and dysentery
12	*Ageratum conyzoides*	Jangli Pudina/ Billy goat weed	Fulnu	Asteraceae	flowered in the rainy season and early winters	Herb	Leaves	Fresh Leaf paste was used as paste for Wound healing.
13	*Vitex negundo*	Nirgundi/ Five leaved chaste	Bana	Lamiaceae	flowering occurred in between April to August and fruit ripened in cold season	Shrub	Leaves, stem	Leaf were used as Antibiotic, insect repellent, fever, ulcer, boils, toothache, sprain and inflammation
14	*Morus alba*	Shehtoot/ Black Mulberry	Toot	Moraceae	Flowers in early monsoon and fruiting in winters	Tree	Fruit	Fruit (mulberry) used for Fever, sore throat, lower the blood pressure, eyesight improvement
15	*Aegle marmelos*	Shreefal/ Stone apple	Bael Patra	Rutaceae	Fruiting in summer	Tree	Fruit	Fruit has Antioxidant, antidiabetic (diabetes mellitus) properties, anticarcinogenic. Fruit pulp was used to treat dysentery and indigestion.
16	*Pyrus pashia*	Kainth/ Wild Himalayan pear	Kainth	Rosaceae	flowering began from March to April fruiting in monsoon	Tree	Fruit	Fruit was consumed raw when its ripped to treat mouth boils, Throat infection, Gastrointestinal, respiratory and cardiovascular ailments.

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17	*Lantana indica*	Latini/ Lantanas	Panchfulli	Verbenaceae	Flowers and fruits remains throughout the year	Shrub	Leaves, stem	Stem was used to clean mouth bacteria (Antibacterial) antitumoral. Leaves were used as insect repellent because of their different odour.
18	*Curcuma longa*	Haldi/ Turmeric	Haldar	Zingiberaceae	flowers in late summer with white flower spikes.	Herb	Rhizome	Rhizome was used to treat Respiratory and gastrointestinal disorders, also perform other tasks as antimicrobial, anti-inflammatory, anticarcinogenic, antidiabetic.
19	*Carica papaya*	Papita/ Papaya	Kharbuja	Caricaceae	flowers from March to April and fruiting from September to October	Tree	Fruit, latex	Ripe fruit was used to cure Bleeding piles, wounds of urinary tract. Seeds were used as a paste to treat ringworm. Leaves were consumed to treat asthma, abortion, leaf paste was used to dressing wounds, jaundice. Stem or bark used to cure sore teeth.
20	*Brassica nigra*	Sarson/ Mustard	Saron	Brassicaceae	flowering of the plant occurred in the spring season	Herb	Seeds, leaves, oil	Seed oil acts as germicide or Antibacterial, removes tanning of skin. Seeds were crushed and consumed to relieve throat infection and mustard plaster was applied for treatment of pulmonary congestion.

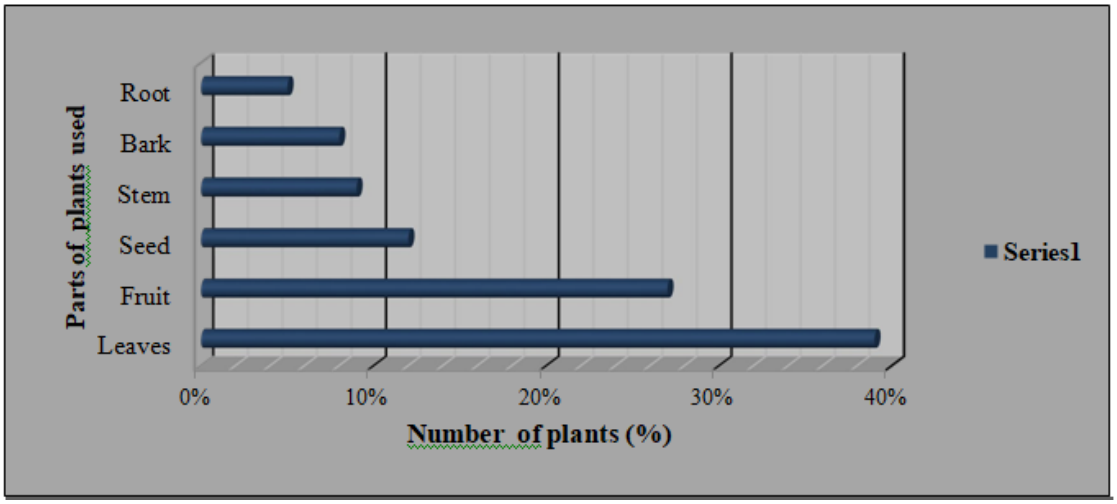

Figure 2: Diagrammatic representation showing the distribution of plant part used in study area

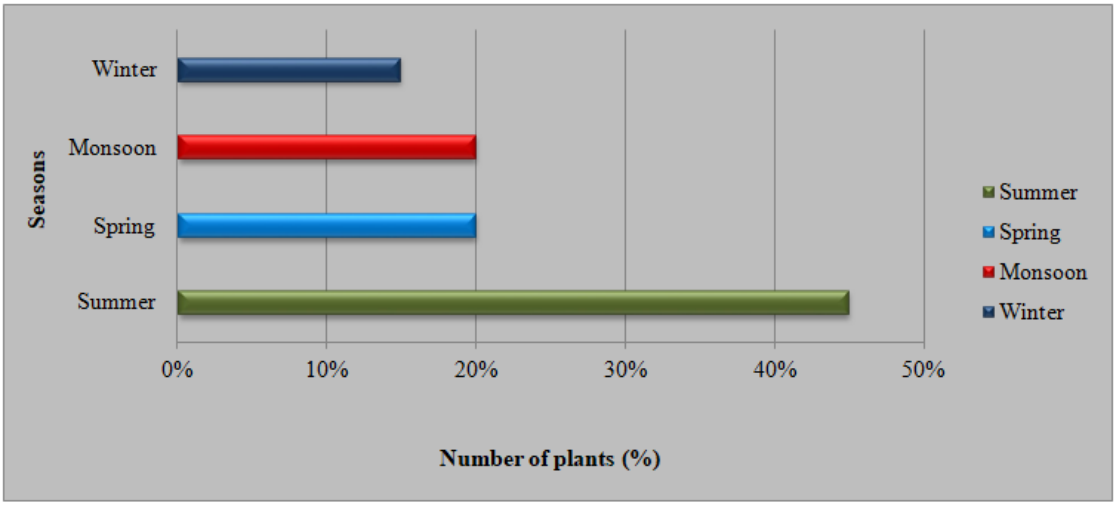

Figure 3: Diagrammatic representation showing seasonal availability of the medicinal plant in study area

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On the basis of plant parts used, these medicinal plants were differentiated into six categories, for instance, medicinal leaves, stems, bark, roots, bulbs, rhizomes, flowers, and whole plants. In most of the cases, eight medicinal plant species (39%) had applied leaves to cure the ailments; *Grewia glabra, Eucalyptus gigantean, Ipomoea carnea, Justicia adhatoda, Ageratum conyzoides, Vitex negundo, Lantana camara, Brassica nigra* from the family (Tiliaceae, Myrtaceae, Convolvulaceae, Acanthaceae, Asteraceae, Lamiaceae, Verbenaceae, Brassicaceae). The fruit parts of six (27%) medicinal species were utilized, named as *Carica papaya Aegle marmelos, Morus alba, Pyrus pashia, Terminalia chebula, Magnifera indica* from the family (Caricaceae, Rutaceae, Moraceae, Rosaceae, Combretaceae, Anacardiaceae). It was also observed that seeds of three (12%) medicinal plants named as Brassica nigra, Zanthoxylum aramatum, Grewia glabra and stem part of the plants of three (9%) plant species known as Lantana camara, Vitex negundo, Zanthoxylum aramatum and bark of two (8%); Eucalyptus gigantean, Bauhinia variegata from family (Fabaceae) and root, which was a climber of one medicinal plant known as Tinospora cordifolia from family Menispermaceae (5%) were the least used part of the medicinal plant specimens collected at the study area.

During the survey it was observed that nine medicinal plant species were available in summer which were named as *Magnifera indica, Aegle marmelos, Tinospora cordifolia, Curcuma longa, Justicia adhatoda, Murraya koenigii, Lantana camara, Vitex negundo, Ipomoea carnea* from families Anacardiaceae, Rutaceae, Menispermaceae, Zingiberaceae, Acanthaceae, Rutaceae, Verbenaceae, Lamiaceae and Convolvulaceae followed by four plant species, available in the spring season which were named as *Bauhinia ariegate, Grewia glabra, Brassica nigra* and *Zanthoxylum aramatum* from families Fabaceae, Tiliaceae, Brassicaceae, Rutaceae. Four plant species existing in monsoon were named as *Eucalyptus gigantean, Pyrus pashia, Morus alba* and *Ageratum conyzoides* from families Myrtaceae, Rosaceae, Moraceae, Asteraceae and only three plant species were available in winter season, named as *Allium sativum, Carica papaya* and *Terminalia chebula* from families Amarydillaceae, Caricaceae and Combretaceae.

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