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Floristic diversity of ethno medicinal plants in Khajjiar region of Himachal Pradesh

ARUN KUMAR* AND HEM CHANDER

Division Botany, Department of Bio Sciences, Career Point University, Hamirpur, Himachal Pradesh, India

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ABSTRACT

Over the last century, ethno botany has evolved into a scientific discipline that focuses on the people and plant relationship in a multidisciplinary manner, incorporating not only collection and documentation of indigenously used species, but also ecology, economy, pharmacology, public health and other disciplines. The Chamba district of Himachal Pradesh is considered as one of the richest areas of traditional and potential medicinal wealth. On interacting and interviewing the local people of different ages of Khajjiar and its adjoining villages reveals 33 species of flowering plants used traditionally for medicinal purposes to treat various diseases asthma, fever, wounds, vomiting, urinary tract infections, aphrodisiac, body inflammation and many other diseases. Most of the tribal people of this area use different parts of the plants to treat different diseases. Study of this area reveals that people of this area use plants for traditional medicines and have no side effects. The information collected from the area will help in documentation of floristic diversity used by the local people of Khajjiar region of western Himalaya and will act as an important source of information for developing conservation strategies as well as developing potential medicines in future.

Keywords: Conservation, Ethnomedicine, Floristic diversity, Indigenous.

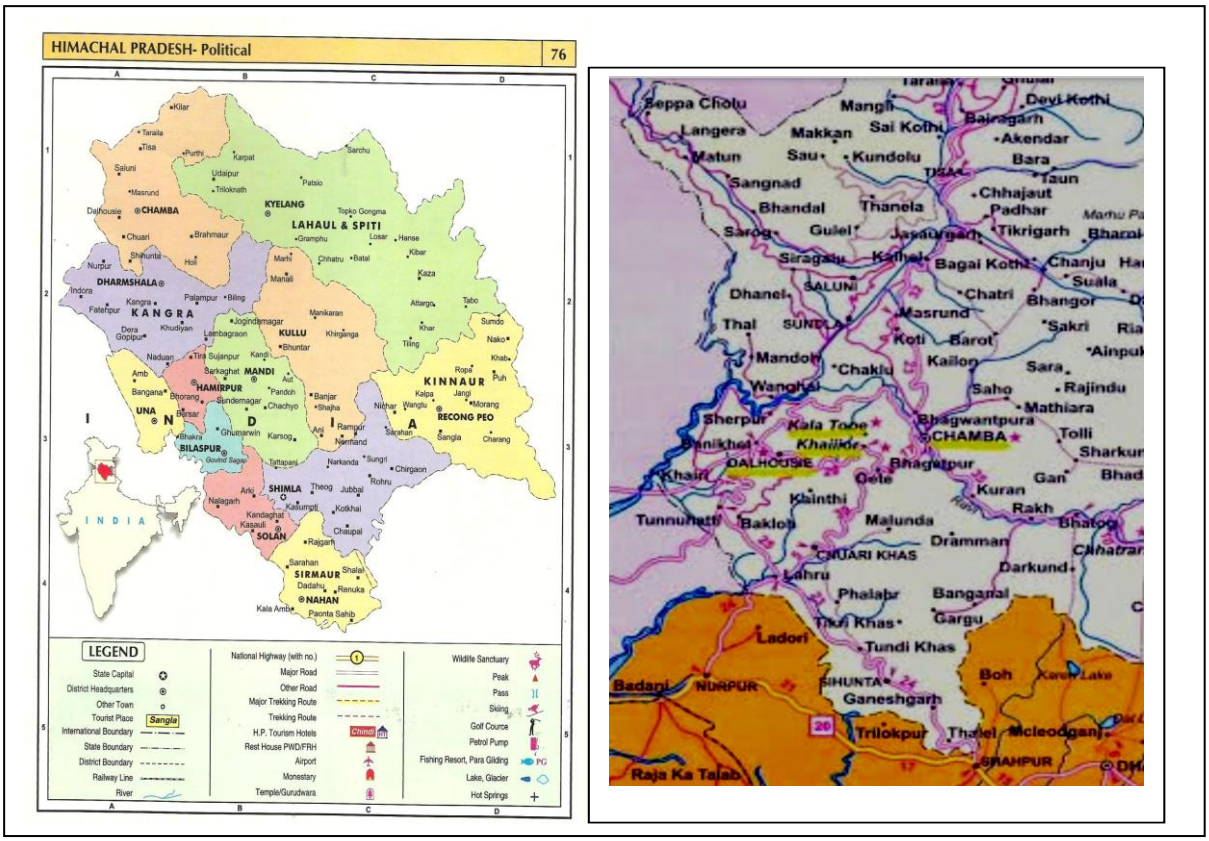
INTRODUCTION

The use of plants for different purposes dates back to the early civilization. Over the last century, ethno botany has evolved into a scientific discipline that focuses on the people and plant relationship in a multidisciplinary manner, incorporating not only collection and documentation of indigenously used species but also ecology, economy, pharmacology, public health, and other disciplines. Today, ethnobotany has become increasingly valuable in the development of health care and conservation programs in different parts of the world. The dependence on herbal resources to cure different types of diseases is well known. According to WHO about 80% of population from developing countries make use of herbal medicines (Malik *et al.,*2010; Amjad *et al.,*2015).Herbal therapy is not only cost-effective but also provides means for the treatment of many diseases, which are considered to be incurable in another system of medicines (Singh *et al.,* 2024) . The rural and tribal people of India still depend largely on the local herbal resources for curing different types of diseases. Systematic and scientific investigations of traditional medicinal plants have also provided many valuable drugs in western medicine. The high species richness and diverse community structure make Himachal Pradesh as one of the most fascinating reservoirs of floral diversity in the Himalaya (Aswal and Mehrotra,1994; Sharma *et al.,*2014). It causes a diversified and rich flora ranging from tropical scrub in the low elevation to Himalayan meadows, birch and rhododendron in the higher altitudes. Nearly 66.45% of its area is covered with forests and natural vegetation (Bodh *et al.,* 2018). Owing to its characteristic climate, geology and floristic (manifested through different phytoclimatic and topographic regimes), Himachal Pradesh becomes a distinct Himalayan territory (Badola and Pal, 2003).

The Chamba district of Himachal Pradesh is considered as one of the richest areas of traditional and potential medicinal wealth. The vegetation of the Chamba district varies considerably, chiefly owing to elevation and rainfall variations. The Chamba district is very rich in plant biodiversity and there is need to explore more and more areas to find out traditional uses of plants by the peoples of this district. Singh and Sharma work on the floristic diversity of Chamba (Singh and Sharma, 2006). Gupta found total of 225 species, belonging to 165 genera and 76 families were collected from the different locations of the Bharmour (Gupta, 2011). Gaddi tribe of Bharmour area and Pangi valley in Himachal Pradesh use plants for

*Email: arun.jatropha@gmail.com

treatment of various diseases (Dutt *et al.,* 2011, 2014). Thakur *et al* found that In Bharmour of distt. Chamba have total of 49 edible plants belonging to 24 families were recorded (Thakur *et al.,* 2020). This diversity suggests the presence of bioactive compounds distributed across different plant organs, each with unique medicinal properties (Chuskit *et al.,* 2024). Lots of ethno botanical work has been done on Khajjiar wild life sanctuary, but there are large number villages around this wild life sanctuary and ethnobotanical point of view these areas are still unexplored. Keeping these factors in view, the present study was carried out to find out the various uses of the flora by the inhabitants in Khajjiar region and its adjoining villages in Himachal Pradesh, India.



MATERIALS AND METHODS

Study area: Present study was carried out in Khajjiar and its adjoining villages of District Chamba, Himachal Pradesh during 2022-2023. The study area is located in Western part of Chamba District, it lies in the catchments of Ravi River. It is one of the oldest preserved forests of the State (notified on 01.07.1949), which lies between 32° 26´ North Latitude; 76° 32´ East Longitude and the altitude varies from 1850-2750 m (Fig. 1). Study area is dominated by forest containing *Cedrus deodara*, *Picea smithiana*, *Quercus macrophylla* and *Pinus roxburghii* as dominant species.

Field survey: The frequent field survey was carried out in the different months of year in Khajjiar and its adjoining areas. The plants used by the folk peoples for treatment of various diseases were documented by using structured questionnaire, interviews and discussions among the folk people (Jain, 1996). A group of 40 local people of different age groups and educational qualification was taken to the field and specimen of ethno botanically important plants were collected along with photographs in their natural habitats. Each informant was asked to consent verbally to take part in the study so as to follow the ISE (International Society of Ethno biology) code of ethics. The collected specimens had been dried and pressed in plant presser for 12 to 14 hours. Individual specimen with in blotters was kept between corrugated sheets. The collected plant species were dried and preserved by making herbarium (Jain and Rao,

Table 1: Enlisted Ethnomedicinal plant species

Botanical Name	Family	Local Name	Habit	Part(s) used	Disease/Ailment Treated (no of informents)	UV
Achyranthes aspara L.	Amaranthaceae	Puthknda	Herb	Whole Plant	Abdominal pain (7), Kidney stone (4) and Skin problems (13).	0.60
Ajuga bracteosa Wall. ex. Benth	Labiateae	Neelkanthi	Herb	Leaves, Roots	Headache (16), Bites of insects (10)	0.65
Asparagus adscendence Roxb.	Asparagaceae	Sanserpali	Shrub	Roots	Nausea (4), Vomiting (8), Headache (10) and Aphrodisiac (4).	0.65
Bauhinia variegata L.	Ceaslpiniaceae	Karyale	Tree	Flower	Stomach problem like indigestion (5)	0.12
Berberis aristata DC.	Berberidaceae	Kemru	Shrub	Roots	Eye infection (9).	0.22
Cannabis sativa L.	Cannabaceae	Bhang	Shrub	Leaves	Insect stings (27).	0.67
Cotoneaster microphyllus Lindl	Rosaceae	Kadhor	Shrub	Fruits	Skin against irritation (7).	0.17
Ficus carica L.	Moraceae	Anjir	Tree	Leaves	Tuberculosis (2).	0.05
Fragaria vesca L.	Rosaceae	Bubal	Herb	Fruits, Roots	Dysentery (5).	0.12
Fumaria indica L.	Fumariaceae	Pithpapra	Herb	Leaves	Fever (8), Vomiting (3), Jaundice (6).	0.42
Juglans regia Linn	Juglandaceae	Akhrot	Tree	Leaves , Bark	Teeth cleaning and Gum problems (31).	0.78
Jurinea macrocephala DC.	Asteraceae	Guggal	Herb	Leaves, Roots	Fever (11).	0.27
Litsea monopetala Roxb.ex Baker	Lauraceae	Gwa	Tree	Leaves	Arthritis (6).	0.15
Mallotus philippensis Muell.	Euphorbiaceae	Kamala	Tree	Fruits , Bark	Aphrodisiac (4), Bile (2) and Ulcer related problems (3).	0.22
Mentha longifolia L.	Lamiaceae	Pudina	Herb	Roots, Leaves	Piles (6), Vomiting (3), Dysentery (4), Stomachache (2) Headache (1)	0.40
Murraya koenigii L.	Rutaceae	Gandhelu	Shrub	Leaves	Obesity (6).	0.15
Ocimum sanctum L.	Lamiaceae	Tulsi	Herb	Leaves	Cold (11) and Cough (17).	0.70
Oxalis articulata L.	Oxalidaceae	Amlodi	Herb	Leaves	Fever (4), Boils (2), Dysentery (8) and increase appetite (1).	0.37
Persicaria capitata L.	Polygonaceae	Ratnyaule	Herb	Leaves	Urinary tract infections (8).	0.20
Phyllanthus emblica L.	Euphorbiaceae	Ambla	Tree	Fruits	Hairs fall and Dandruff (28).	0.70
Ranunculus muricatus DC.	Ranunculaceae	Gudi	Shrub	Leaves	Cuts (5), Wounds (4).	0.23
Rhododendron arboreum Sm.	Ericaceae	Buransh	Tree	Leaves, Flowers	Diabetes (2), Piles (16).	0.45
Rosa macrophylla Lindl.	Rosaceae	Gulabri	Shrub	Flowers	Cold (10), Cough (12).	0.55
Rumex dentatus Wall.	Polygonaceae	Jangli Palak	Herb	Roots	Against any type of poison (5).	0.12
Rumex hastatus Link	Polygonaceae	Khatimithi	Herb	Leaves	Stomachaches due to gas (9).	0.22
Solanum nigrum L.	Solanaceae	Makoi	Herb	Leaves	Dysentery (4)	0.10
Taraxacum officinalis Wig.	Asteraceae	Dudhi	Herb	Leaves	Bandage on cuts (13), Fever (5), Headache (7).	0.63
Tinospora cordifolia Miers	Menispermaceae	Gloe	Shrub	Stem	Jaundice (11), Constipation (2).	0.33
Verbascum thapsus L.	Scrophulariaceae	Gaddi tamakhu	Herb	Leaves, Flowers	Asthma (6).	0.15
Viburnum bodnantense L.	Caprifoliaceae	Laklu	Shrub	Leaves	Blood purifier (4).	0.10
Viola canescens Wall.ex Roxb	Violaceae	Vanksha	Herb	Flowers	Cough (19), Asthma (3), Fever (6).	0.70
Vitex negundo L.	Lamiaceae	Bana	Shrub	Leaves	Cold (5), Cough (3), Fever (3), Body swelling (12)	0.58
Zanthoxylum aromaticum DC	Rutaceae	Tirmira	Shrub	Stem	Clean the teeth (17), Gum problems (9)	0.64

1967). The ethnobotanical statistics were evaluated with the help of **Use value (UV):** The relative significance of each plants species known locally to be used as herbal remedy is shown as the use value (UV) and it was calculated by using the following formula (Phillips *et al.,* 1994).

$$UV = \Sigma U / n$$

Where UV is the use value of a species, U is the number of use information mentioned by each informant for a given plant species and n is the total number of informants questioned for a given plant. The UV is helpful in finding the plants with the maximum use (most frequently indicated) in the treatment of a disease. UVs are high when there are numerous use reports for a plant and low when there are a few reports associated to its use.

Informant Consensus Factor (F_{ic}): The informant consensus factor (F_{ic}) was calculated towards checking, there is an agreement in the use of plants in the illness categories among the plant users in the study area. The F_{ic} was be calculated by the following formula (Heinrich *et al.,* 1998).

$$F_{ic} = N_{ur} - N_t / (N_{ur} - 1)$$

Where N_{ur} denotes to the number of use-reports for a specific disease group and N_t refers to the quantity of plant species used for a particular disease group by all informants. The product of this factor ranges from 0 to 1.

RESULTS AND DISCUSSION

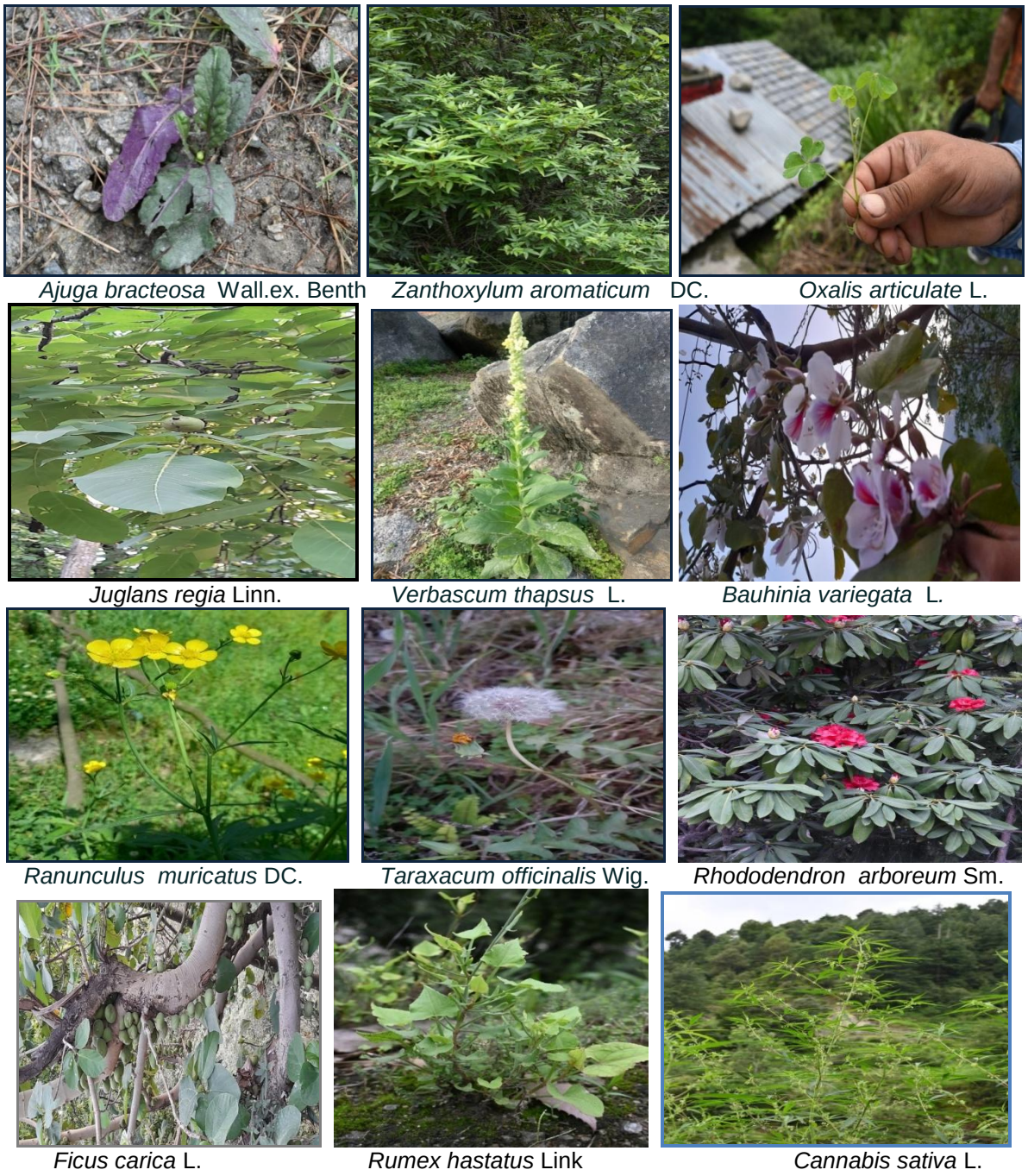
From the study area about 33 medicinal plant species belongs to 24 families were collected. The collected plants are documented in Table 1 with their family, local name and ethnomedicinal uses along with use value (Fig. 2). Most of the documented plants belong to families Polygonaceae (3 species), Rosaceae (3 species), Lamiaceae (3 species), Astraceae (2 species), Euphorbiaceae (2 species) and remaining families contributes single species**.** Out of documented plants 46% are herbs, 33% are shrubs and 21% are tree species (Fig.3). Most commonly plant part used is leaf (66%), followed by roots (21%), flower (18%), fruit (12%), stem (9%) and 6% bark (Fig. 4).

Use value showed that most commonly used plant species for the treatment of different diseases are *Juglans regia* (UV=0.78), *Ocimum sanctum* (UV=0.70), *Phyllanthus emblica* (UV= 0.70), *Cannabis sativa* (UV= 0.67), *Asparagus adscendence* (UV=0.65), *Ajuga bracteosa* (UV=0.65), *Zanthoxylum aromaticum* (UV=0.64) and least medicinally used plants *Ficus carica* (UV=0.05), *Viburnum bodnantense* (UV=0.10). It is found that those plant species having high use value are commonly grown in the wild and easily identified by the peoples of study area and use them for the treatment of various diseases. Plants having low use value are used by only local healers for making different types of local medicines.

Table 2: Informant Consensus Factor (ICF) for different category of diseases

Category of diseases	Use citations (Nur)	No. of species (Nt)	F_{ic} Value
Poisoning: wasp stings, ant biting, bee stings	43	2	0.97
Reproductive disorders: sexual abnormality, infertility	8	2	0.85
Urological disorders: Kidney stones, diuretic	8	2	0.85
Inflammation: Arthritis	6	2	0.80
Gastrointestinal problems: indigestion, gastritis, pile, constipation	109	9	0.93
Respiratory disorders: cold, cough, asthma, throat infections	94	5	0.96
Dermatological disorders: Dandruff, hair fall, wounds, cuts, boils	57	4	0.95
Fever and physical pain: fever, headache, weakness, body pain, boils	89	10	0.89
Oral Hygiene: Tooth cleaning, gum problems	57	2	0.98
Urinary tract infections: infection in urinary tract	8	2	0.85

Highest value of F_{ic} is 0.98 for oral hygiene followed by 0.97 for poisoning, 0.96 for respiratory disorders, 0.95 for dermatological problems, 0.93 for gastrointestinal disorders, 0.89 for fever and physical pain, 0.85 for reproductive disorders, 0.85 for urological disorders, 0.85 for urinary tract infections and least value is 0.80 for inflammation like arthritis (Table 2). Highest value of F_{ic} for oral hygiene, poisoning, respiratory disorders, dermatological problems, gastrointestinal disorders indicates that the knowledge of use of specific plant species for the treatment of specific illness is well spread among the informants and least value indicates that the knowledge of use of specific plant species which should be for the treatment is less transferred among the informants.



Ajuga bracteosa Wall.ex. Benth *Zanthoxylum aromaticum* DC. *Oxalis articulate* L.

Juglans regia Linn. *Verbascum thapsus* L. *Bauhinia variegata* L.

Ranunculus muricatus DC. *Taraxacum officinalis* Wig. *Rhododendron arboreum* Sm.

Ficus carica L. *Rumex hastatus* Link *Cannabis sativa* L.

Fig.2: Photographs of some medicinal plants collected from study area

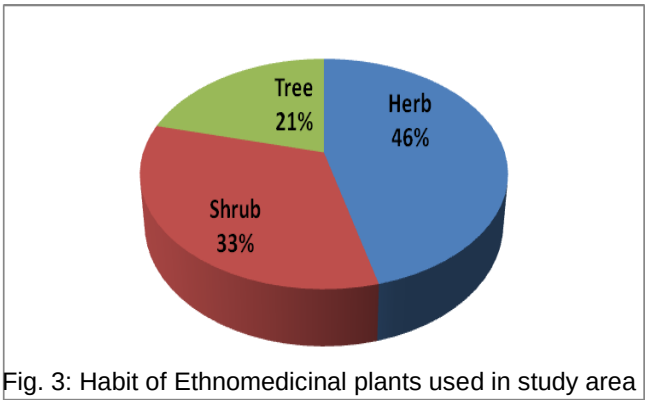


Fig. 3: Habit of Ethnomedicinal plants used in study area

CONCLUSION

The observation from the present study reveals that the tribal peoples of Khajjiar region of district Chamba, Himachal Pradesh has great treasure about the use of medicinal plants for the treatment of various diseases. This study reveals that some of the plants are easily identified by the local peoples and use them for treatments of various diseases. But most of the medicinal plants are known to only local healers and

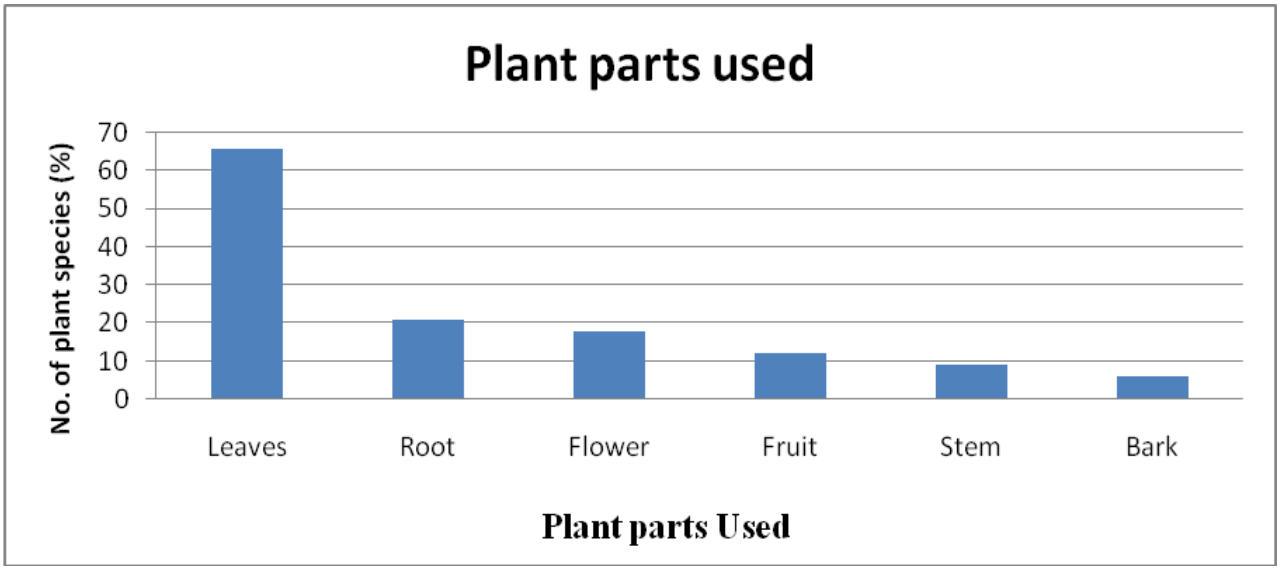


Fig.4: Plant parts used in folk medicines by the people of study area

elderly peoples. This knowledge is not properly documented nor transferred to next young generations. So information gathered from the study area will be useful in future for making potent drugs.

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