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Ethnobotanical inventory of medicinal plants used in northern
region of Panjab, Pakistan

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Author:

Muhammad Arslan Khan

Supervisor:

prof. Dr. Ing. Eloy Fernandez Cusimamani

Consultant:

Ing. Iva Viehmannová, Ph.D

Declaration of authorship

I, Muhammad Arslan Khan, hereby declare that this thesis entitled “Ethnomedicinal knowledge in the northern part of Pakistan” submitted in fulfillment of the requirements for the degree Master’s in Faculty of Tropical AgriSciences of the Czech University of Life Sciences Prague, and the work presented in it is entirely my own work. Information derived from the published or unpublished work has been acknowledged in the text and a list of references is given.

Prague, April, 2021

Muhammad Arslan Khan

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Abstract

These days, two thirds of the population in developing nations relies upon the utilization of customary plants as a first wellbeing resort. Despite Pakistan's vast biodiversity, there are numerous regions where traditional medicinal uses of plants have not yet been thoroughly studied. The goal of this study was to document, quantify, and preserve medicinal plant knowledge among local people in three different Pakistani cities Chakwal, Rawalpindi and Islamabad. The field work was done from June 2019 to January 2020. Altogether 126 informants from these cities were interviewed. Data were investigated utilizing standard quantitative ethnobotany characteristic features, for example, the Relative frequency of citation, Fidelity level, and Informant consensus factor. The outcomes demonstrate that the district with the most noteworthy biodiversity of medicinal plants was Islamabad with 55 medicinal plant species, 33 genera, 27 families, trailed by Rawalpindi with 35 medicinal plants species, 15 genera, 9 families and in Chakwal 29 medicinal plant species, 25 genera, 18 families. The Poaceae family was the most delegate natural family in the study. High number of informants assembled the plants from the wild 80%. The leaves are the main plant part for the preparation of herbs. This study can be utilized as a reason for creating the management strategies for protection, manageable use and medication advancement.

Keywords: Ethnobotany, medicinal plants, Punjab province, traditional knowledge

1. Introduction

Tradition medication is an old restorative practice which exists, in the world before the approach of current wellbeing sciences. Traditional medication depends on native hypotheses, convictions and encounters that are preserved from ages. Around 422,000 flowering plant species, have been reported from all across the world, with over 50,000 of them being used for medicinal purposes.

Because of the high cost of allopathic drugs, medicinal plants have gained a lot of attention. They provide a fantastic platform for healthcare approaches. Herbal medications have gained popularity in Europe since they have less adverse effects when administered appropriately compared to allopathic drugs (Jordan 2010). Australia's continent is regarded as one of the world's seventeen super diversified countries due to its extensive utilization of natural resources. In creating world, more than 4.5 billion peoples rely upon therapeutic plants as they are viewed as a piece of their essential medical services (Mussarat et al. 2014).

In Pakistan, there are 6,000 identified wild plant species, 600-2000 of which have been utilized in traditional medicine in various parts of the nation, and the majority of them are currently being investigated. Pakistani nation have understood the need and significance to create improved traditional prescriptions from local and endemic plants that are generally utilized at different place for different sicknesses. People around the Indus River use evidence-based complementary and alternative medicine. Herbal medication actually are the primary assets for a vast majority part. Ethnobotanical reviews give data about local communities and their customary use of traditional therapeutic plants (Farooq et al. 2009). Herbal medical consultancy including the utilization of the restorative plants has a much lower cost than modern consideration.

Consequently the current examination was started to explore the therapeutic plants and traditional information in Chakwal, Rawalpindi and Islamabad cities of Pakistan. It is one of the most distinctive and rich locations on the planet in terms of logical wealth. Traditional uses of the plants found in the area are known to the local community for generations. Almost half population of Panjub Pakistan relies on natural resources to support their daily requirements, either directly or indirectly. Local peoples all throughout the planet have special information on plant assets on which they depend for food, medication, and general utility including gigantic natural expertise (Martin et al. 1995).

Most of Pakistani peoples actually rely upon herbal medication. The issue of guaranteeing the evenhanded distribution of modern medical care has gotten more serious. There is an impressive worldwide interest in tapping the aggregated information on traditional medication, and in this way research are being done in numerous nations to expand the utilization of herbal medication to give best assistance of the humans. People who live in distant areas use medicinal treatments on a regular basis. The area's economic development is dependent on the management of a wide variety of crops, the maintenance of high pastures, the development of fodder trees in a diverse alpine environment, and the development of animal diversity and medicinal plants.

The study will provide information on the formation, abundance, variety, consistency, utilization, and harvesting techniques of medicinal plants in the cities of Pakistan Chakwal, Rawalpindi, and Islamabad. The research also adds to our understanding of how indigenous medicinal plants are used harvested, and conserved.

This study was designed on the premise that medicinal plants are a valuable biological resource that can be sustainably utilized or designed to improve the livelihood of the local community in the study area in measurable ways. In general, there is a link between the use of medicinal plants and their preservation.

2. Literature review

2.1. Ethnobotany

Ethnobotany is defined as the science that deals with relationships between plants and humans. It can be said that most of the time in context of ethnobotanical studies, the talk about indigenous uses of medicinal plants. The work of ethnobotany is not worked out by a single sort of proficient, but is a multidisciplinary work of botanists, anthropologists, drug specialists, chemists, historians, modelers, among others. Numerous individuals particularly in less fortunate nations trust and even could depend on wild developing plants and gathering them and the information of these individuals of utilization plants as a wellspring of various materials is enormous. The issue is that quite a bit of this information is getting to be to be lost (Martin 2010).

It is moreover characterized as local people's interaction with their normal environment how they classify, manage and utilize plants accessible around them (Martin et al. 1995). The connection between plants and human societies is not restricted to utilize of plants for nourishment, clothing and shelter but to include their utilization for religious ceremonies, ornamentation and healthcare (Schultes et al. 1992).

Cotton (1996) noted that the changing states of mind towards conventional people groups are among the key reasons for the developing intrigued in ethnobotany. Consequently, ethnobotany achieved potential applications since the early ethnobotanical ponders in native plant utilize. The scope of ethnobotany as of now has extended massively, enveloping the botanical angles of different technoscientific ponders counting ethnomedicine, ichnotaxonomy, ethnoecology, anthropological and botanical considers of fabric culture (Balick et al. 1996). The viable applications of ethnobotanical information in zones such as biodiversity prospecting and preservation science are seen inside the current scope of the subject.

Cotton (1996) summarized that ethnobotany presently constitutes an assorted field of consider which looks at all perspectives of corresponding connections between plants and conventional individuals through its multidisciplinary approach drawn from wide run of subjects, medicinal plants are botanical remedies derived from trees, bushes, or herbaceous plants that are valuable for essential healthcare framework and as a cure for infection and damage counting plants utilized customarily for nourishments and drinks that is too accepted great for wellbeing. Particularly, individuals living in towns have

been utilizing indigenous plants as medications since ages since this information moves from age to age and depends on deep rooted encounters. Although, the villages are far from urban communities and generally need legitimate wellbeing offices (Samuelsson et al. 2004).

2.1.1. Ethnobotany of Pakistan

Pakistan is a diverse country with different weathers, traditions and peoples. Ethnobotany is usually divided in two basic groups in Pakistan. First those peoples or tribes live in rural areas and the other those live in cities or urban areas. The population of Pakistan is around 216.8 million. There are around 74 different languages spoken in Pakistan. Urdu, Punjabi and English are common ones.

Moreover, utilization of plants in early social societies. The common utilize of plants may be a common hone, but ethnobotanical ponders are still on a recording level (Shinwari et al. 2010).

Natural assets and related organic diversity provide the premise of job for human populations. Consequently, people have an extraordinary effect on local vegetation (Gerique et al. 2006). In Pakistan roughly 6,000 types of higher plants are found around 12% of the vegetation species are utilized therapeutically, a few of which are sent out of country (Ali et al. 2006).

Of these species, the dynamic constituents of around 500 species are known. Variety in plants and connections between plants and peoples are additionally impacted by the determination of wild plants for food and other local social employments (Athar et al. 2004). One of the essential goals of ethnobotanical examinations is the documentation of native information related with these plant species, which is decreasing step by step all in all, and among peoples living in close to the woodlands (Afolayan et al. 2008). There has been enormous progress in the economies from resource to showcase situated in over last 25 year which truly affects by and large parts of customary clinical frameworks by influencing native prescriptions, asset information base and climate (Nasir et al. 1972).

Ethnobotany has become really captivating today, than at any within the history. In any case, it experiences numerous inadequacies, particularly the absence of study support,

instructive freedoms, and hypothetical premise just as problem of understanding the language of different tribes (Martin et al. 2004).

2.1.2. Local Knowledge

Local knowledge implies to the collection of information, rules, guidelines and mental sets, which are controlled by neighborhood individuals in a specific region (Quanash et al. 1998). Such complex knowledge, convictions and practices commonly known as native information creates and changes with existence. Consequently, such information incorporates reliable practice that created in the process of interaction of people with their environment (Alcorn et al. 1984).

Local knowledge is characterized as conventional environmental information. Analysts such as Hussain et al. (2010) emphasized the esteem of neighborhood environmental knowledge, presenting it as a result and procedure of human adjustment to the environment.

Local knowledge on herbal medicine in many countries over the world and in Pakistan had very deep secrets and history. To make this knowledge more valuable it passes through different tribes but during the transfer of this indigenous knowledge a lot of work also lost (Canagarajah 2002).

2.2. Traditional Medicines

Herbal plants are natural segments of conventional therapeutic frameworks in treating and also forestalling a variety of sicknesses. Herbal medication is wide terms that refer to "frameworks" like herbal Chinese Medication Indian Ayurveda medication or various types of native medication. In any case, in a few nations traditional medicines is named as "option "or "compulsory" medication (WHO 2002).

As of late there has been a move in all inclusive drift from manufactured to herbal medicine, which can be said return to nature. Therapeutic plants have been known for centuries and are profoundly regarded all over the world as a rich source of restorative operators for the anticipation of infections and ailments (Sharma et al. 2008). The quest for endless wellbeing and life span and for solutions for assuage agony and uneasiness drove early man to investigate his quick normal environmental factors and prompted the utilization of numerous plants, minerals and so forth and the improvement of an assortment of experienced specialists (Nair & Chanda 2007).

The historical background of herbal medication is pretty much as old as human development. Preferably records indicate that home grown medications have been utilized and reported in Roman, Greek, Egyptian, Chinese and Indian herbal frameworks for around 5,000 BC. Home grown herbal medication has likewise been used from old times in America and Japan. The records of herbal medication frameworks in the Indian subcontinent India, Pakistan, Bangladesh, Nepal, etc. consists of Ayurveda, Siddha and Yemeni. Herbal medication has a genetic base and its practice for a long time resounds with customized medication. Most of the herbal recipes were defined through traditional information exchanged from one generation to another generation. The safety, functionality and sociological acknowledgment are important variables within the popularity of herbal medication in developing countries (Turker et al. 2008).

In fact, tremendous advancement has been made in the formation of manufactured drugs for the treatment of a few dangerous illnesses; nonetheless, lavish and extra utilization of such medications may create harmful results that are considered as a nonstop risk in present day wellbeing health systems (Hussain et al. 2012).

Within the early advancement of present-day medication, organically dynamic compounds from higher plants have played an imperative part in giving solutions to battle agony and sicknesses. In this era the demand of herbal medicines is increasing very fast and the most reason for this drift is the flourish effects of herbal items as appearing low side effects, and improved compatibility with physiological flora, and being accessible at cheap costs in terms of modern chemical substances presented as therapeutic agents over the past several decades, the portion of plant-based medications has been closed to 2% (Tariq et al. 2020).

Ethnopharmacological overviews are led to record the act of home-grown medication among country and ethnic networks. Such reviews have acquired interest among scientists for featuring significant plant species ordinarily utilized in different frameworks of medical care (Leonti 2011; Pendry 2005).

According to my research in Pakistan, there are different herbal markets are found in Punjab state and other parts of Pakistan. But the main big market is in Islamabad and Rawalpindi cities. Furthermore, this market has a vital position among home grown markets where numerous therapeutic plant species having significance in home grown practices are exchanged at local, territorial and worldwide level. The documentation of

such exchanged home-grown drugs may open modern roads of inquire about for home grown businesses, analysts and strategy producers may be assistant within the conservation of the conventional information with respect to exchange of restorative plants.

2.2.1. Traditional Medicines of Pakistan

Pakistan has a range of 80,943 km² between 60° 55' to 75° 30'E longitude from 23° 45' to 36° 50'N scope. Pakistan has an elevation extending since 8,611 m, subsequently, encompasses an assortment of climatic zones and an interesting biodiversity. It has approximately 6,000 species of higher plants. It has been detailed those 600 to 700 species are utilized for medicinal purposes (Tufail et al. 2020).

Medicinal plants specialists know that regarding plants is regularly fundamental to the adequacy of solutions, which ought to not be 'miracle' cures based on chemical compounds, but due to healing vitality that draws its restorative qualities established on a relationship between the plants and the individuals. There is few instructive organizing where they are examining commonsense suggestions of restorative plants.

In Pakistan, this approach has not however been set up despite of the fact that structural changes are underway within the forest areas to allow a more prominent part for neighborhood communities within the administration of forests (Shinwari et al. 2000). The past few decades there has been an increase within the usages of medicinal plants and their society utilization in various parts of Pakistan.

Using of herbal plants in medication is also very effective but sometimes there will be side effects if there is any mistake during preparation of medicine. Twelve percent of Pakistani flora is utilized in answers and more than 300 medicinal plants are exchanged. Ten driving herbal producers of Pakistan every year expend more than 2 Million of 200 therapeutic plants in 1990s whereas its utilization expanded multifold within the final two decades. Almost 22 species of medicinal plants worth Rupees 14.733 million were exchanged in 1990 whereas in 2002, this esteem rose to more than Rupees 122 million, an eight and-a half times increment. Also, the herbal plants from the wild are in danger because of commercial benefits use. Such plants are used to treat almost every kind of sickness (Shinwari et al. 2010).

In 1990 to 1995 species were expended worth Rs. 36 million whereas in 2002, medicinal plants worth Rupees 218 million were expended a six-fold increment

(Shinwari et al. 1989). There are 45,000 conventional healers, from which around $\frac{3}{4}$ are working in provincial zones (Shaikh et al. 2005). All of them work in rural areas because these are the main source of health care system in Pakistan in these areas. In both rural and urban areas around 52,600 registered Hakeem's are practicing. It is also believed that the herbal medicines are more effective and useful than manufactured medicines (Abdullah et al. 2021).

The prevailing conventional system of medicine in Pakistan is Unani framework. In tribal zones peoples have no proper knowledge of modern medicines, so they are more likely use herbal medicines for most of diseases (Williams et al. 1999). In addition, poisonous occasions happen very often so with conventional medicines which are very difficult to treat but the herbal remedies are safer, and their side effects are easy to manage (Winslow et al. 1998).

In Pakistan, communities who live outside of city or in villages are using plants as medicines from long prior since this information is transferring to them through one generation to another. As the towns are distant away from cities, people are financially frail and expanding costs of conventional drugs results in acceptance of Unani/herbal drugs (Shinwari et al. 2000).

According to WHO 80% of peoples living in developing countries still using herbal medicines, while the rest ones use conventional medicines (Bodeker et al. 2002). Pakistan comes up on eight positions in exporting of herbal plants (Hussain et al. 2012).

In addition, need of responsibility within the medical profession, both current and correlative which result that unprofessional people practicing medication in various names, which result in destroying good and professional practitioners a bad name or tag. The Public wellbeing strategy of Pakistan simply specifies a plan to bring correction to the existing law on tuberculosis and recognize the post-graduate level instruction. In any case, the position on its advancement is still unclear (Gilani et al. 1992).

2.3. Medicinal plants

Wild assets of medicinal plants have been utilized by man for centuries in traditional frameworks. Local people have adjusted diverse modes of application and employments to exploit this normal resource. The utilization of wild plants as nourishment and pharmaceutical is prevalent in numerous country communities of the world since long times. The traditional use of plants is inescapable in giving society medicines for wellbeing care framework additionally as a source of nourishment for the low-income community and the country. Utilization of plants as medication ranges from 4% to 20% for different nations and around 2,500 species are exchanged universally. Despite of the fact that the natural interference of human has continuously gone and may subsequently have been dependable for the termination of several species of creatures and plants (Abdullah et al. 2021).

All inclusive, there's a rising drift to move assets from allopathic to traditional healthcare frameworks. The global market 2002 for medicinal and aromatic plants was US\$ 60 billion and gauges propose that will reach US\$ 4 trillion by 2050. For illustration in Japan, Society of Oriental Pharmaceutical Ponders was built up by 98 individuals fascinated by Kampo conventional Japanese medication. In Russia 52,000 tons of therapeutic plants are utilized yearly of which, 50% are developed. Alone in Pakistan medicinal plants worth Rs.90 million are developed yearly.

Twelve percent of Pakistani flora is used in medicines and more than 300 medicinal plants are traded. Pakistan is assuming a main part towards protection and practical administration of plant assets. There is a great deal of capability of getting advantage from development. One of the costliest therapeutic plants, *Crocus sativus* (Saffron) is utilized by the main home-grown industry in the nation. Saffron is an aromatic and flavoring agent in spices. The stamens of which are used as ink to write holy verses of the Holy Quran (Hussain et al. 2012).

Medicinal plants play multipurpose parts such as flavors and condiments environmental administrations, source of wood and wood items as well as soil preservation in expansion to their medicinal esteem. According to Langenheim et al. (1982) when we look up the garden history, we get to know that these are the main places where herbal plants are found.

3. Objectives

3.1. Main Objectives

The study's major goal was to document medical plant knowledge and identify the most culturally significant medicinal plant species and botanical families in Chakwal, Rawalpindi and Islamabad cities of Pakistan.

The specific goals were as follows:

- (i) To analyze the composition and abundance of common indigenous medicinal plants in Chakwal, Rawalpindi, and Islamabad, Pakistan
- (ii) To investigate the most important cultural species in each area
- (iii) To ascertain the methods of utilization and cultivation of indigenous medicinal plants in the study area's rural communities.

4. Material and Methods

4.1. Data Collection

The field work information was conducted during the periods June to December 2019 at three cities of Pakistan, Chakwal, Rawalpindi and Islamabad Punjab. Semi-organized survey was applied through casual and formal meetings with the communities in both three cities. Semi-organized meetings were arranged and utilized as guide following (Martin 1995; Cotton 1996).

Data was acquired through person interviews with nearby healers (Hakeem) and gathering conversations with agriculturists and people. Individuals were inquired to supply data approximately each local restorative plant, counting the vernacular name, origin, blossoming period and their uses, route of administration, techniques for planning of different plans explicit to the local area and plant parts that were utilized for therapeutic value.

The questionnaire was divided into two sections, the first collecting general socioeconomic and demographic characteristics (age, gender, level of education, and activities of the informants) and the second collecting data on ethnomedicine knowledge (acquisition of knowledge, medicinal use, and dosage of medicinal plants) shown in (Appendice 9).

4.2. Description of the fieldwork in Chakwal city

Field work was done from 16 communities in the city. Mentioned that the issues with the frailty, past issues with ransacking of customary indigenous information done by outsider organizations, influenced the assortment of information. Firstly, the assent for the utilization of the meeting was asked and after that the semi-organized questionnaire applied. A complete of 51 meetings were applied together some are in various languages e.g., Urdu, Punjabi, Sindi, Pashto and English, but most of them in local language Panjabi. One interpreter who knows various languages in nearby city was utilized.

4.2.1. Geography

Chakwal is in the south of Rawalpindi city which 97km away. It lies between 32° 56' north and 72° 54' east. The environment is cool with sub humid climate. Almost 90% population lives in rural areas. Vegetation of Chakwal is scrubby the rainfall mostly

received during monsoon season in between mid of July to the mid of September with the range of 350-500 mm.

The winter rain begins in January and persists up to beginning of March. The mean monthly temperature ranges 5.9-38.4 °C, whereas January being the coldest and June the hottest month of the year. Temperature during summer is 15-40°C and during winter is 4-25°C. In winter the temperature often drops below zero, usually in December and January.

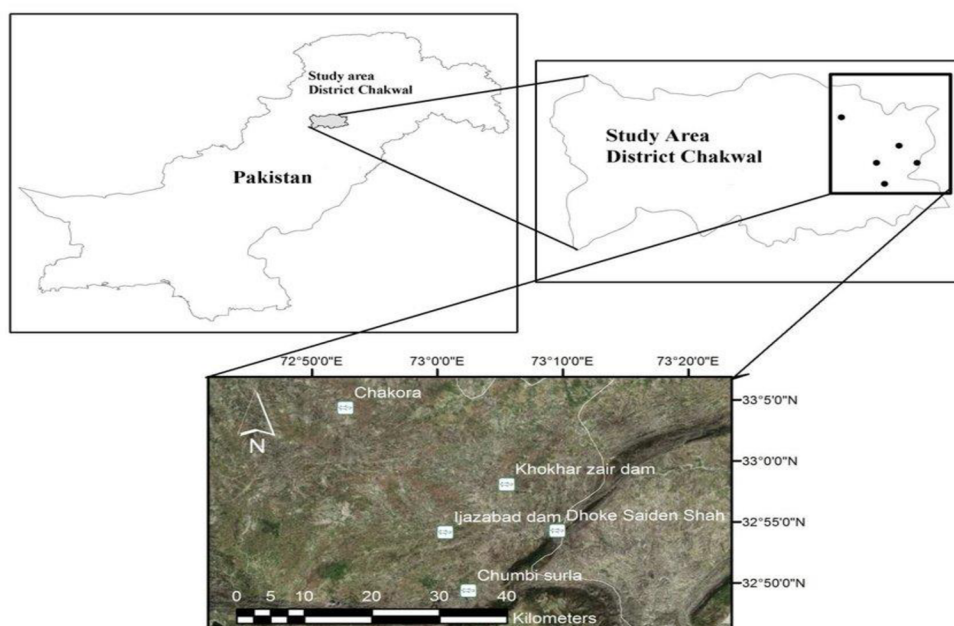


Figure 1 Study area Chakwal city of Pakistan

(Source: https://www.researchgate.net/figure/Map-showing-locations-of-sampling-sites-in-District-Chakwal-Punjab-Pakistan_fig1_323627861)

4.3. Description of the fieldwork in Rawalpindi city

Ethnobotanical data was gathered from neighborhood occupants by using semi-organized questionnaires. An aggregate of 40 informants were chosen by random testing in the different places. Sums of 30 meetings were applied in Punjabi language and 10 meetings in English, data was recorded in Urdu. The member perception was additionally essential for the meeting to have a superior translation and examination of the information announced by sources. On normal each meeting endured 20 minutes.

4.3.1. Geography

It was the capital of Pakistan from 1959 to 1969. The city lies on the Potwar Plateau 9 miles 14 km southwest of Islamabad, the national capital. The district has an area of 5,286 km². It is situated on the southern slopes of the north-western extremities of the Himalayas, including large mountain tracts with rich valleys traversed by Mountain Rivers. State is contributing to diverse herbal medicines.

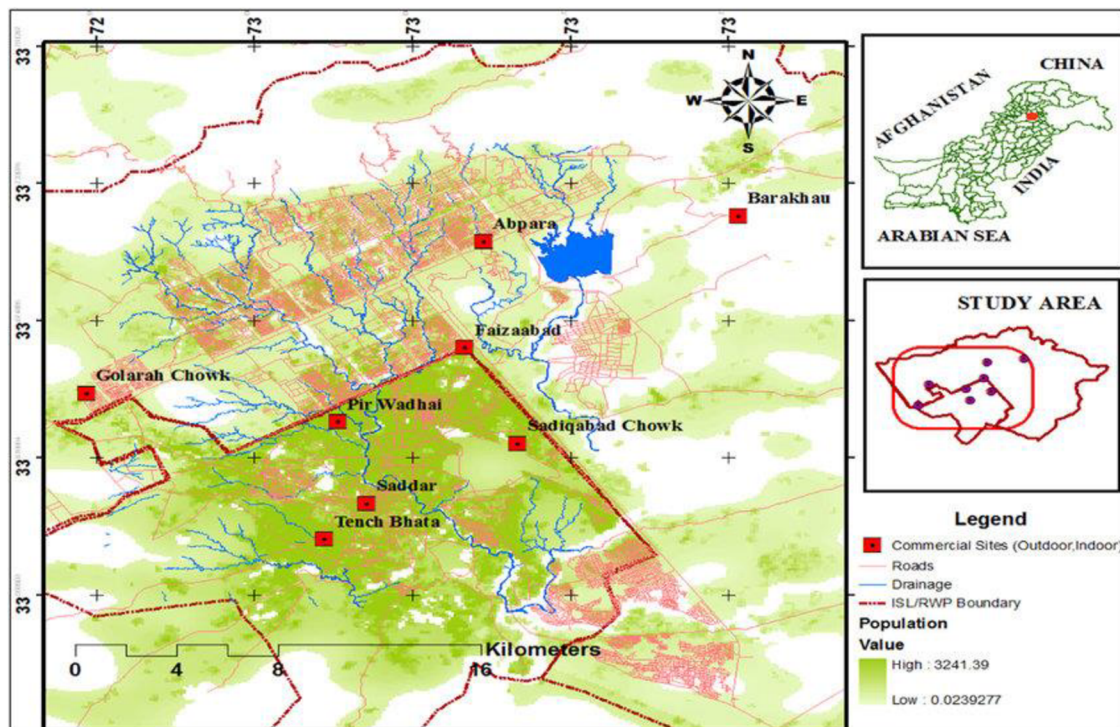


Figure 2 Study area Rawalpindi city of Pakistan

(Source: [https://www.researchgate.net/figure/Map-of-the-study-area-and-Rawalpindi-](https://www.researchgate.net/figure/Map-of-the-study-area-and-Rawalpindi-Pakistan_fig1_320944858)

Pakistan_fig1_320944858)

4.4. Description of the fieldwork in Islamabad city

The field work was completed from 40 communities in the city. A sum of 150 meetings were directed and recorded. The meeting included open conversation about the status of conventional information and the view of latest things among the communities.

4.4.1. Geography

Islamabad is located at Northeast of its twin city Rawalpindi. The city is located within the Islamabad Capital Territory, which is federally controlled, even though historically Islamabad has been a part of the Punjab province. The area of Islamabad consists of 906 km², in which the urban area consists of 220.15 km² and rural area is 466.20 km² respectively. Winter seasons fall in from October to March and summer duration remains from April to September. Weather of Islamabad tends to change over several factors such as western disturbance, fog, dust storm, southwest monsoon and continental storm. Islamabad has the highest literacy rate in Pakistan, which is about 88%.

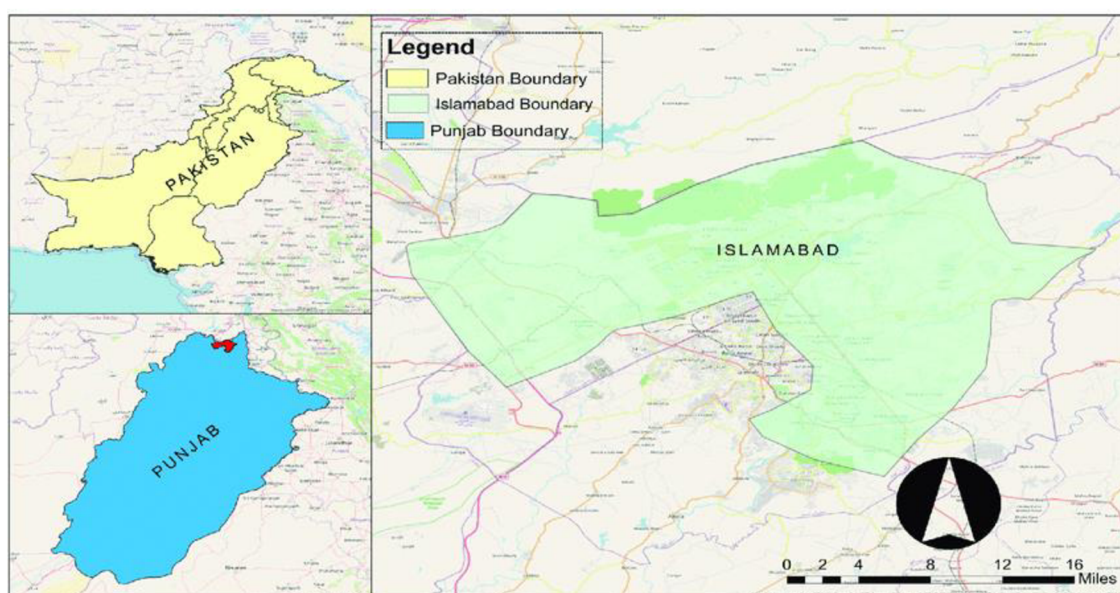


Figure 3 Study area Islamabad city of Pakistan

[https://www.researchgate.net/profile/Muhammad-Rizwan-](https://www.researchgate.net/profile/Muhammad-Rizwan-50/publication/342802683/figure/fig1/AS:911274795888643@1594276250905/Map-showing-study-area-of-Islamabad-Inset-is-map-of-Pakistan.png)

[50/publication/342802683/figure/fig1/AS:911274795888643@1594276250905/Map-showing-study-area-of-Islamabad-Inset-is-map-of-Pakistan.png](https://www.researchgate.net/profile/Muhammad-Rizwan-50/publication/342802683/figure/fig1/AS:911274795888643@1594276250905/Map-showing-study-area-of-Islamabad-Inset-is-map-of-Pakistan.png)

4.5. Quantitative Data Analysis

Ethnomedicinal information was quantitatively examined utilizing various quantitative indices, for example, use value (UV), relative frequency of citation (RFC), fidelity level (FL) and informant consensus factor (ICF). The records are resolved from the responses and level of understanding among witnesses, and they set authentically

different parameters that evaluate the data, affinity and fill in as subjective reference. All given information about use was included and arranged in the sickness's classification. The information was then organized and investigated with the accompanying quantitative ethnobotanical records.

4.5.1. Use Value (UV)

Use value (UV) was determined by applying standard procedures (Salvadori et al. 2020).

$$UV = U/n$$

Where U is the complete number of use reports for a given plant species and 'n' is the total number of informants asked for a given plant species. UV will be high if the value is near (1) which indicates many use reports for a given plant and centrality of plant species among informants while the UV will be low if its value is close to (0) which shows not many use reports for a given plant species.

4.5.2. Relative Frequency of Citation (RFC)

Quantitative index Relative Frequency of Citation (RFC) was calculated to assess the local importance of plant species (Bibi et al. 2014).

$$RFC = FC/N \quad (0 < RFC < 1)$$

This index is representing the frequency of plant citations (FC, the number of informants mentioning the use of the species) divided by the total number of informants participating in the survey N. The RFC value might be 1 for a given plant varieties if informants report the specific plant species as useful and the RFC worth could be 0 if no one notices the use of plant species.

4.5.3. Informant consensus factor (ICF)

Informant consensus factor (ICF) was calculated by formula (Heinrich et al. 2019).

$$ICF = Nur - Nt/Nur - 1$$

Where 'Nur' demonstrates the quantity of use reports for a particular disease category and 'Nt' refers to the quantity of taxa used for the disease category. ICF is utilized to show the local knowledge on the use of medicinal plant species for a specific ailment. The ICF esteem goes from (0 to 1).

4.5.4. Fidelity level (FL)

Fidelity level FL represents the percentage of informants claiming the use of a certain plant for the same major purpose, which can be calculated for the most frequently, reported diseases or ailments (Alexiades et al. 1996).

$$FL (\%) = (I_p/I_u) \times 100$$

Where “Ip” is the number of informants that claim a use of a plant species to treat a particular ailment, and “Iu” is the number of informants that use the plants as a medicine to treat any given disease.

5. Results

5.1. Ethnobotany study in Chakwal city of Pakistan

5.1.1. Socio-economic data

The study was conveyed between June to July 2019. Information was gathered from 51 sources 71% men, 29% woman in the range of 20 and 81 years of age shown in (Table 1). The ages of the respondents were important in this study because they identified those in a position to recognize the use and conservation of medicinal plants. The respondents were divided into five age groups. The vast majority who reacted 33% were grown-ups between 31-40 years old. The group that recorded a higher number of plants was 31-40 years of age, trailed by the group of peoples between 41-50 years of age. Around 85% of effectively utilize restorative plants for the therapy of sicknesses, the rest just consumed inconsistently.

The therapy of infections with conventional medication, which incorporates the utilization of restorative plants, is carefully accepted by the informants as a feature of their family and social tradition. This was communicated by 53% of the sources of all age categories, while around 46% think that it as an accomplishment of reaching at objectives to bring down costs, 29% is to pay for the therapy of their afflictions and 17% esteem for its effectiveness against ailments.

The advancement of conventional information is given through the family 80%, the local communities 14% and experts 7%. The peoples who visit trained professionals are less in numbers, and just 27% of the peoples visit routinely.

Table 1 Socio-demographic characteristics of 51 informants in Chakwal, Pakistan

Demographic variables	Demographic category	No. of informants	%
Gender	Woman	37	71
	Man	14	29
Age	20-30	9	15
	31-40	20	33
	41-50	15	22
	51-60	7	11
	+61	0	0
Activity	Farmer	20	33
	Public worker	11	18
	Housewife	10	17
	Student	5	8
	Teacher	58	8
	Others	0	0
Public health insurance	Insured	20	33
	Uninsured	31	44

5.1.2. Diversity of medicinal plant species and their cultural importance

The results show that the residents of Chakwal city use 29 species of medicinal plants belonging to 25 genera and 18 plant-related families, for the treatment of sicknesses in traditional medicine.

Asteraceae family is high rank in this city. There are 12 species were found UR = 181. *Artemisia scoparia* L and *Conyza bonariensis* L species are on top with high FL = 84.4 and FL = 76.3 (Appendix 4).

5.1.3. Method of preparation, administration and plant parts used

The leaves 47% were the most used parts, followed by stems 35% and the whole plant 10% followed by other parts of plants (Figure 4).

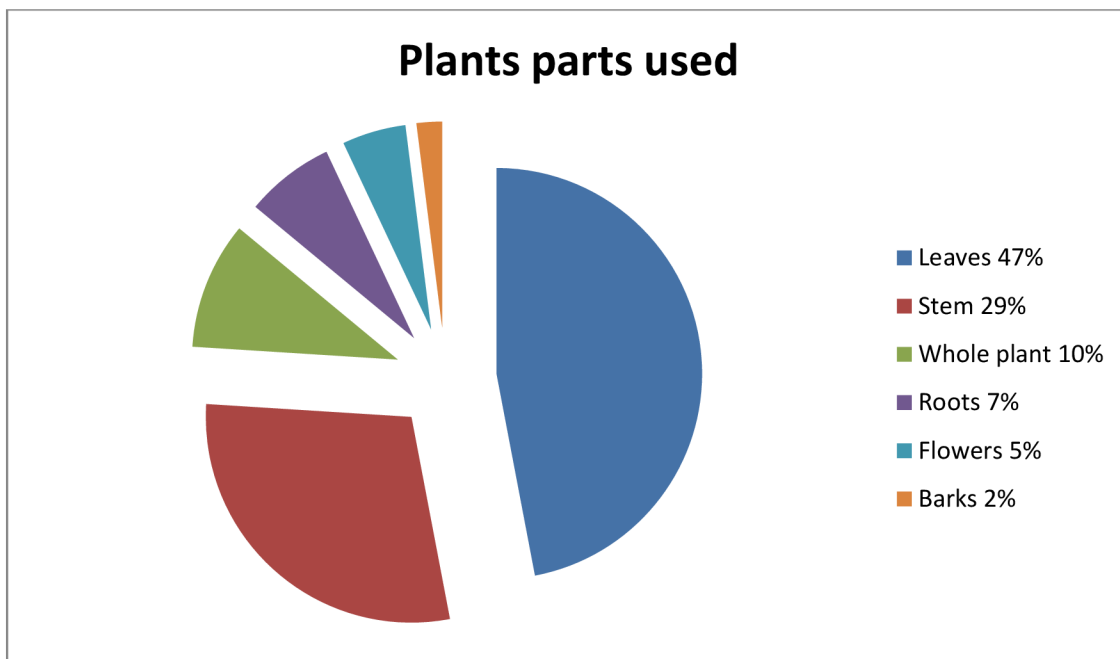


Figure 4 Used parts of the plants for the elaboration of traditional remedies in Chakwal, Pakistan

5.1.4. Use of medicinal plants in Chakwal, city

According to my research Chakwal city population is struggling with serious problems like low pay and awful medical services public framework to utilize or depend more to the herbal medication. Chakwal is one of the cities with less measure of records and studies regarding medicinal plants (Qureshi et al. 2009).

The most common plants were found *Coriandrum sativum* (coriander), *Mentha longifolia* (horse mint), *Protulacae oleraceae* (common purslane), *Puncia granatum*, (pomegranate), *Solnium nigrum* (*black nightshade*) and *Aloe barbadensis* (aloe vera) for daily use.

Almost 90% of this city population uses medicinal plants in first place. All herbal medicines are inferred from plants, regardless of whether within the basic shape of raw plant materials or within the refined form of rough extracts, mixtures (Aziz et al. 2016).

Although residents have access to adequate health care through a single government hospital and a number of private hospitals, the majority of people remain partially reliant on traditional medicines due to a common belief that the elderly prefer to use indigenous traditional methods for treating various ailments rather than modern

medicinal systems. In nutshell control of impulsive utilize of these plant species from which crude medicines obtained and supplies for promoting reason is possible through local people groups (Hamilton et al. 2003).

5.2. Ethnobotany study in Islamabad, city of Pakistan

5.2.1. Socio-economic data

The study was carried between Augusts to October 2019. The information gives the socio-demographic data as home and occupation 35 peoples were interviewed of which 15 women 35% and 20 men 65% were shown in (Table 2). The age of informants ranges from from 20 to 81 years and those basically live-in urban range 73%. The foremost of observers age from 20 to 50 years 24%, though only five informants are more than 60 years old. The sources are basically workers 45% and housewives 27%. But moreover farmers 15%, students and teachers 10% were interviewed the rest of informants 3% are dealers.

Table 2 Socio-demographic characteristics of 35 informants in Islamabad, Pakistan

Demographic variables	Demographic category	No. of informants	%
Gender	Woman	20	65
	Man	15	35
Age	20-30	10	12
	31-40	10	12
	41-50	7	5
	51-60	5	3
	+61	3	1
Activity	Farmer	8	9
	Public worker	5	3
	Housewife	12	14
	Student	5	3
	Teacher	5	3
	Others	0	0
Public health insurance	Insured	25	76
	Uninsured	10	24

5.2.2. Diversity of medicinal plant species and their cultural importance

A total of 55 species herbs belonging to 27 families and 33 genera were found to be used by the peoples in Islamabad city. During the survey, information obtained about the use of plants against different medical problems practiced by the people and Hakims. It was felt worthwhile to record the native uses of plants in this city before the information is lost. The ethnobotanical information aims to be used for the solution of several constraints, the park faced, in achieving the objectives of conservation of the natural environment since its establishment.

5.2.3. Method of preparation, administration and plant parts used

The most common plant parts used by the informants to prepare the medicinal remedies were the leaves 52%, followed by roots 12%, bark 9%, fruits 7%, stems 10%, whole plant 5%, seed 3% and flowers 2%. The plants are usually consumed fresh 83% shown in (Figure 5).

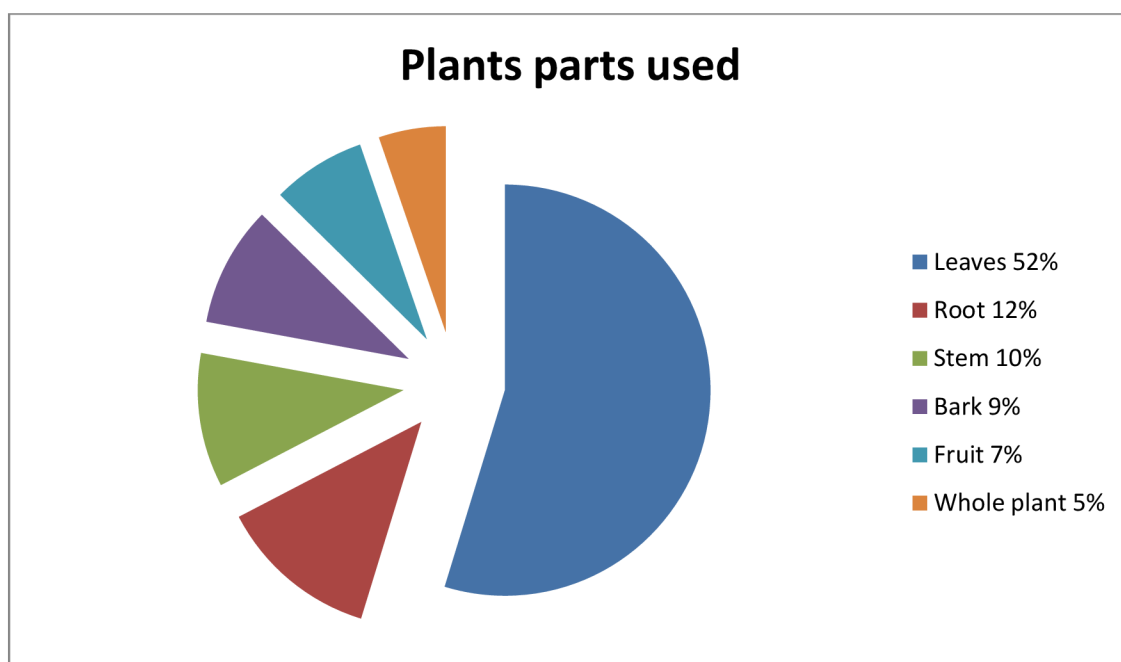


Figure 5 Used parts of the plants for the elaboration of traditional remedies in Islamabad, Pakistan

5.2.4. Use of medicinal plants in Islamabad, city

Most common species found here is *Cannabis sativa* L (Bhang), flowering plant mostly leaves is used in the preparation of herbal medicines. *Stellaria media* L (Chickweed), whole plant and sometimes leaves are used to cure asthma also paste is

applied on wounds. *Chenopodium ambrosioides* (Sweet pigweed) and *Convolvulus arvensis* (Deer's Foot) are used in herbal remedies. Whole plant and leaves are used to purifier blood and used in skin diseases (Shinwari et al. 1999).

The show status of natural tropical forest in city was evaluated by surveying areas once beneath these woodlands. *Salvadora oleoides* is given extraordinary consideration since of its incredible biological and ethnobotanical significance (Leporatti et al. 1994). Islamabad is one of the most advance cities of Pakistan concerning natural and social diversity. There is not much ethnobotanically research was carried out before. So, it was a really nice experience to visit city and collect the information of herbal plants which already lost. But still a lot of peoples convert to herbal medicines due to less side effect and natural contents of remedies (Khan et al. 1994).

For an understanding of their traditions, the concept of impurity and cleansing is additionally basic. Sickness is the result of lack of balance between the different components and it is the objective of the treatment to reestablish this balance.

5.3. Ethnobotany study in Rawalpindi, city

5.3.1. Socio-economic data

The study was conveyed between November to December 2019. A sum of 40 informants between the ages of 20 to 61 took part in the study shown in (Table 3). Despite the high level of percentage holding health care coverage, 70% of the total utilized conventional pharmaceutical to take care of medical conditions. Due to high expenses and length of time required, 25.5% do not typically access medical facilities as the first resource for treatment of diseases. Moreover, 22.7% peoples use plants in a combined form with conventional medicine. The dominant group of the survey participants was between the ages of 41-50, 21%. Only 11% of informants contacted traditional healers to treat illnesses. The medicinal plants were mostly used by women, apart from the old age group 41-50. Men and woman almost have equal knowledge in this city about herbal plants.

Table 3 Socio-demographic characteristics of 40 informants in Rawalpindi, Pakistan

Demographic variables	Demographic category	No. of informants	%
Gender	Woman	20	50
	Man	20	50
Age	20-30	5	3
	31-40	10	8
	41-50	15	21
	51-60	8	5
	+61	2	1
Activity	Farmer	12	9
	Public worker	9	6
	Housewife	10	8
	Student	4	2
	Teacher	5	3
	Others	0	0
Public health insurance	Insured	30	80
	Uninsured	10	20

5.3.2. Diversity of medicinal plant species and their cultural importance

A total of 35 medicinal plant taxa were reported by their common names. 31 plants have therapeutic uses.

5.3.3. Mode of preparation, administration and plant parts used

Leaves 48% are the most important plant part used, followed by seed and fruit 13%, stem is used only 10%. Flowers and whole plant are almost used in same proportion 9% followed by bark and root shown in (Figure 6). Some of the plant's parts like leaves, fruits and flowers are eaten raw. Most of the species taken from wildlife because of that they must need to boil them before consumption due to the toxic compounds present in it.

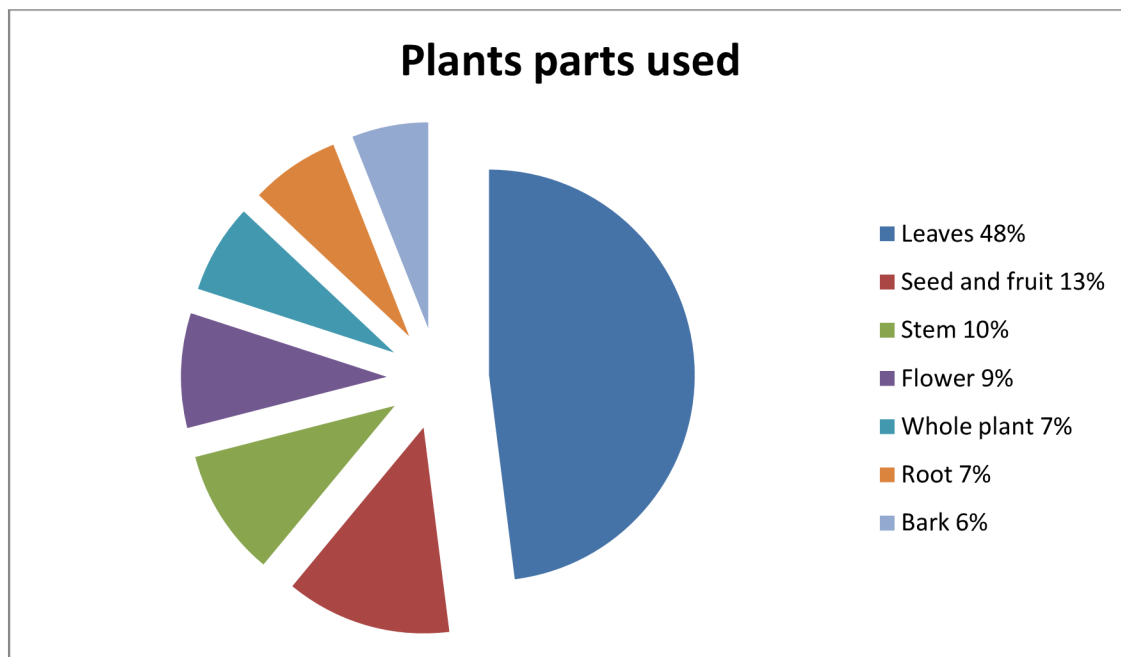


Figure 6 Used parts of the plants for the elaboration of traditional remedies in Rawalpindi, Pakistan

Some of plants used to make herbal tea against fever and cough. Wounds and skin problems peoples of this town use paste in tropical form to treat such infections.

5.3.4. Use of medicinal plants in Rawalpindi, city

In Rawalpindi city only herbalist is the main source of healers because of less income peoples are not able to pay the conventional medicines price. So, the local herbalist is the priority for them to consult. These local healers are very clean and effective in their work because they really know the plants and how to treat different ailments with them (Shabbir et al. 2013).

There are many serious threats are found to herbal plants in this area. They are diminishing due to the over misuse and over utilization. Indigenous knowledge is only held by old peoples (Ahmad et al. 2005).

The entire plant of *Cannabis sativa* (Bhang) is utilized to treat stomach swelling bleeding in animals, particularly bovines and bulls. The leaves of *Cannabis sativa* (Bhang) are squashed with onion and utilized as poultice for boils. New leaves of *Oxalis corniculata* (Khatibot) are squashed and are utilized to quit bleeding from wounds. The plant of *Cynodon dactylon* is squashed to make a paste and utilized for

stopping the bleeding. Tender and new leaves of *Tamarix aphylla* L. are utilized alongside ghee, to fix inflamed or burned areas of the body.

The buds of the flowers of *Solanum surrutense* Kandiani with salt arrangement are utilized for blood cleansing. The majority of the plants in the research region were used for a variety of reasons, including firewood, furniture, home building, animal grazing, livestock feed, and spices. The study indicates that the use of medicinal herbs has become more popular. In the last 10 years, 50% of merchants believe that people's preferences have increased, 30% believe that they have dropped, and 20% believe that they have remained unchanged. When compared to allopathic treatments, the percentage of persons in the area who utilize medicinal plants was 10% to 20%, and their financial ability to pay was 10% to 20%. The results also showed that most dealers' sales of medicinal plants had increased in the last ten years.

5.4. Comparative analysis of medicinal families' dominance in three cities of Pakistan

A comparison of the dominance of medicinal families in three Pakistani cities is shown in (Figure 7). Poaceae came out on top with 30%, followed by Asteraceae with 25% and Fabaceae with 20%. Malvaceae and Moraceae have the same rate of 7%, but Chenopodiaceae has 5% respectively.

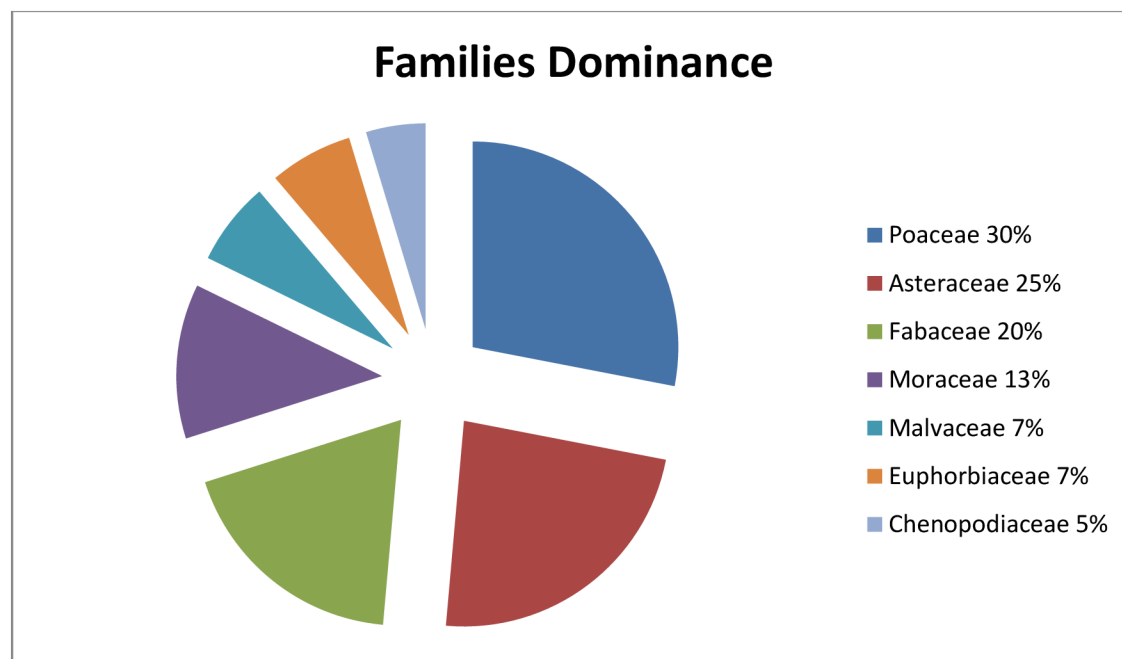


Figure 7 Comparison of medicinal families' dominance in three cities of Pakistan

6. Discussion

6.1. Ethnomedicinal Plant Species of the Study Area Chakwal, Islamabad and Rawalpindi cities

In my study total 119 species of medicinal plants are used to treat different health issues in these three cities of Pakistan. The result of my studies shows that all the communities have huge knowledge of herbal plants. Because of cheap prices and easy availability of these plants most of the peoples now rely on these medicines. This study result quite resembles with past few studies results done in Pakistan (Mahmood et al. 2013).

This is found in my study that vegetation of the area is managed by grass and shrubby land. Noticeable aquatic vegetation of the study region incorporates *Zannichellia palustris*, *Typha angustata*, *Hydrilla verticillata*, *Potamogeton crispus*, *Nymphaea lotus*, *Vallisneria spiralis* and *Nelumbo nucifera*. The normal vegetation of the encompassing fields incorporates *Eleusine compressa* L, *Tamarix aphylla* athel, *Saccharum spontaneum* L, *Dalbergia sissoo* L, *Ziziphus mauritiana* Lam and *Prosopis cineraria* L. Most normal weeds of the space are *Achyranthes aspera* L, *Cynodon dactylon* L Pers, *Euphorbia prostrata* Aiton, *Amaranthus viridis* L, *Xanthium strumarium* L, *Tribulus terrestris* L and *Parthenium hysterophorus* L. This study is quite resembles to one conducted by (Umair et al. 2017) on the use of common medicinal plants and their ecological role.

In present study almost 60-70% of the peoples in rural areas in the whole world (developing countries) still rely on herbal medicines. In this study Poaceae family is on top with 13 species followed by Asteraceae with 12 species. Fabaceae family with 11 species followed by Moraceae and Euphorbiaceae families with 7 species each were found in study area. Malvaceae and Solanaceae family contain 5 and 4 species respectively. Poaceae and Asteraceae are used for the treatment of human illness also reported in different studies done in Pakistan (Umair et al. 2017).

With the development of human settlement throughout the long term, Punjab district has cleared the vast majority of its forest cover, and over a huge piece of the Chakwal, Rawalpindi and Islamabad cities, shrub vegetation has succeeded trees because of this land transformation. This study compares favorably to one conducted by (Hafsa et al. 2016) that a high variety of grass, spices, and bushes endure around here, which

assume a critical part in home grown medical framework. Basic knowledge in young peoples and not proper use of plants, deforestation and no new development of home-grown species is a major issue.

6.1.2. Current status of use and knowledge of medicinal plants in cities of Pakistan Chakwal, Rawalpindi and Islamabad

In the present study most of plants were collected from wild 60%. Others were collected from home nursery 13%, street site 8%, agriculture sites 15% and live fence 4%. Wild area is the foremost sources of restorative plants. Indigenous drugs have been consumed in Punjab as well as these three cities of Pakistan most likely (Bahadur et al. 2020).

According to my study in Chakwal city the poverty is on peak and about 70% of people are facing problems like less income and the education system also not in good condition. Peoples usually live-in small houses or outside of city because of high rent. For these peoples it's very difficult to depend on conventional medicines. Males have more knowledge of herbal plants than females. The other main problem is regarding health insurance. Most of peoples from Chakwal city have not proper health insurance which forces them to use herbal plant remedies. Men 37% have more knowledge than woman 14% about herbal medicines. Farmers discover 20 plants followed by public worker 11 and housewives 10. According to that farmer are on top with traditional plant knowledge. It is also because females are not likely allowed to go out without any specific reason. So, they usually practice herbal medication at home. In countryside of Chakwal city, these expert women are also source of healer to help woman in villages. These woman's help other females close to area during pregnancy because hospitals are far and costly for them. This study is close resembles to study done by (Murad et al. 2013).

In present study it is noted that Rawalpindi city is more divers and advance than Chakwal city. Almost 70% of peoples properly got health insurance which cover maximum of their medical cost. Because of more belief on herbal medicines, peoples usually preferred it and for very serious sicknesses they consult with allopathic doctors. Some peoples who have the knowledge of these medicinal plants even do not go to local healers. Because the peoples have more knowledge knows how to make remedies and where to get these plants. It's also useful to save money and to be more efficient in

their work. There is another study done by (Jeffrey et al. 2007) which is somehow close related to present one. Rawalpindi city the carriers of herbal knowledge out of 40 informants, males and females are both on equal level. Farmers indicate 15 species while housewives indicate 10 species respectively. Public worker quite has less knowledge because they usually work in construction area.

The present study revealed that the situation in Islamabad city is totally different 85% of people got proper health insurance because people are more educated and well settle in this city. So, the study indicates that more people those do not have a proper means of earning and low income prefer to use herbal medicines rather than conventional. This city is more advanced, and people belong to high class families and professions. People are more educated and that is why they also have more knowledge on herbal medicines. Total of 55 species are identified in this study from this city. Again, males are on high ranking 65% then women 35%. The other main reason is that because male also have herbal shop where they practice this knowledge and made its profession for them and a way of income. This is supported by another study done by (Umair et al. 2017). Around 15 species are sold in local market through private dealers, local healers (Hakims) and town shops but through traditional knowledge, not by proper scientific information.

6.1.3. Plant Parts Used, Conditions and Mode of Preparation in cities Chakwal, Rawalpindi and Islamabad Pakistan

In my study overall 119 ethnobotanical plants belonging to 58 families were recognized by 119 informants. As comparison in Chakwal city the common plant parts were leaves 52%, followed by roots 12%, bark 9% fruit and stems are almost equal 8% and the rest of plants parts, numerous examinations led in various ethnic communities, have revealed regularly the utilization of leaves in traditional therapies. On the other hand, Islamabad and Rawalpindi cities are more diverse and people in these cities are more educated and have more experiences in handling traditional medicines. Most of the species were found in this region and leaves are also the main plant part but stem 35% is the second plant part which is widely used in herbal medicines.

The utilization of plant species belonging to Poaceae was similar in ethnobotanical reports from Pakistan and Bangladesh (Kadir et al. 2014). In current study the utilization of medicinal plant species belonging to Asteraceae and Poaceae families

agreed with ethnomedicinal flora reported from other parts of Pakistan and in other areas of the world e.g., India (Stepp et al. 2001). In Rawalpindi city leaves are also the main plant part which is used excessively in medicines followed by seeds and fruit 20% used in herbal remedies.

The current study showed as most herbal remedies were prepared in the form of decoctions 20% and infusions 25%, but raw plant material 16% is eaten used for injuries, cuts, bruises, or local pain (e.g., tooth pain). Leaves are the most common plant parts in three cities which followed by stems and then fruit and seed parts. It has been accounted for that plant species with intense bioactive mixtures are frequently portrayed as toxic and medicinal as well, and a useful or an antagonistic outcome may rely upon method for drug preparation and use (Akhtar et al. 2013). On the off chance that we thought about every combination as one single cure the rundown of normal cures could be duplicated. Herbaceous life form and leaves' usage in ethnomedicinal recipes have been reported in several studies as well (Ullah et al. 2013).

My study also indicate that bath and cataplasm 8% were applied to treat skin disorders such as chicken pox, fungus herpes or clean wounds, smashed 4% remedies were used mainly to extract the latex from the plants and treat herpes, bleeding and some inflammations, squeezed 2% and burned 7% remedies were used to treat pain in the ears and wounds. However, in some cases, more than one plant species was used in drug preparation which is described in other study as well (Ssegawa et al. 2007). Decoction is likewise used to prepare drug in conventional healing practices, since it is not difficult to make by blending in with tea, water or soup. In Rawalpindi and Islamabad Poaceae and Fabaceae families' species were found but in Chakwal Asteraceae family species are usually in more in numbers in present study. This may be due to their wide distribution of plant species belonging to Asteraceae and Poaceae also stated in different studies (Murad et al. 2013).

In my study the most common genus found such as *Croton sparsiflorus*, *Datura innoxia*, *Nerium oleander*, *Calotropis procera*, *Solanum*, *Euphobia prostrate* and *Ranunculus sceleratus* show toxic effects, if taken in excessive amount. It is notable that the medicinal plants having perennial nature require delayed time of development for example around 5 to 7 years relying upon the sort of plant species. In this manner, the perennial life cycle is more prominent in medicinal plant species than annual. The wellbeing and adequacy of cited plants should be examined by phytochemical and

pharmacological examination, as it has been recently performed on a few other generally utilized plant species which is somehow little bit related to other studies (Singh et al. 2012).

6.1.4. Uses reports and main diseases

According to my study the communities had a significant variety of traditional uses with a specific frame of ailments. The ICF is calculated for each ailment category and the highest value was calculated for kidney disorder 0.89 follow by oral and dental disorder and hematological disorders 0.88. For genital urinary disorder the ICF value is 0.87, follow by skeleton muscular pain and swelling 0.86. Endocrinal disorders, dermatological disorders and cosmetics are 0.83, followed by other disease. For sexual stimulants value is 0.72 followed by tumorous disorders 0.71 and for liver disorders 0.55 also resembles to another study done by (Krishnaraju et al. 2005).

The diseases of the study zone have been assembled into diverse categories based on the sorts of the infections, condition of the infection as well as treatment resemblance of the infection to the local people. The results of the study appeared that illnesses that are frequent within the consider zone have higher informant consensus factor. It is additionally shown that therapeutic plants that are successful in treating certain infections and well known by community individuals moreover have higher ICF values (Table 4).

In this study it is also found out that in Pakistan larger part of the individuals depends on medicinal plants to discover medicines for their minor and major illnesses. Although in Chakwal city *Ageratum conyzoides* L, *Artemisia scoparia* L, *Sonchus asper* L. While in other two cities *Acacia nilotica* L, *Cassia fistula* L, *Pongamia pinnata* L, *Sorghum halepense* L, *Setaria glauca* L and *Imperata cylindrica* L were told by more informants. These results were also mentioned with past studies on the medicinal utilize of plant species, e.g., among the nearby people groups of Negev locale, Israel (Friedman et al. 1986).

According to current study in Rawalpindi and Islamabad cities the treatment of cough and asthma was done by using these species, *Solanum surattense* and *Tinospora cordifolia*. The fidelity level FL list is utilized to inform plant species that are most favored by the indigenous people groups to treat certain diseases. Plant species with most elevated medicinal uses in each three cities have greatest esteem of FL, i.e.,

100%. The fidelity levels calculated for *Morus nigra*, *Ficus benghalensis* (male sexual power), *Morus alba* (cough), *Solanum surattense* (Wound healing) were 97.0, 94.5, 95.5 and 95.0 respectively shown in (Appendix 4). The most used medical plants in the study area with 100% FL were *Withania somnifera*, *Solanum nigrum*, *Morus nigra* and *Azadirachta indica* which were used as blood purifier, to treat breast cancer and as stomachache, respectively in both three cities which were utilized as blood purifier, to treat breast cancer and as stomachache, individually. Comparatively, fidelity levels of these species were exceptionally high than past reports. A total of 18 studies were chosen for comparative analysis. *Withania somnifera* shows maximum similarity with previously reported work from the surrounding areas. Plant species having high FL are especially curious for biological, phytochemical, and pharmacological considers assessing and demonstrating their legitimacy to present novel drugs and herbal products.

Table 4 ICF values of medicinal plants used against various diseases in Chakwal, Islamabad and Rawalpindi cities of Pakistan

No.	Ailment category	No. of Taxa	No. of UR	ICF
A	Endocrinal disorders	7	35	0.83
B	Respiratory system disorders	44	180	0.76
C	Liver disorders	2	7	0.55
D	Kidney disorders	3	19	0.89
E	Sexual stimulants	9	29	0.72
F	Cardiovascular disorders	9	32	0.75
G	Gastrointestinal disorder	36	150	0.77
H	Dermatodgical disorders and cosmetics	23	128	0.83
I	Poisonous bites	1	2	0.01
J	Oncology	6	20	0.73
K	Ear, eye, hair and throat disorders	16	78	0.81
L	Genital urinary disorders	6	38	0.87
M	Oral and dental disorders	4	27	0.88

6.1.5. Market of Medicinal Plants

The exchange of home-grown unrefined cures in business sectors relies upon botanists, natural ventures, and patients who utilize home grown drugs to fix different illnesses. There is a need to report the significant plant species that have conventional restorative uses and are exchanged home grown business sectors.

My study shows that medicinal plant species available in Punjab Herbal markets in Pakistan are primarily found in district Swat, Lahore, and Afghanistan. Peshawar market also supplies district Punjab and Afghanistan with various imported medicinal plants for local use. The market obtains enormous amounts of herbal materials from district Swat, which is then sent to the markets in Islamabad, Rawalpindi, and Chakwal Punjab.

According to my research in Pakistan's herbal markets the contribution of woman's is less. The idea of sex isolation and veiling (Parda) is overwhelming nearby and as indicated by them this based on their strict custom as report revealed by (Ahmed et al. 2014). Most of the crude home-grown things exchanged in Karachi markets are gotten from the Rawalpindi and Islamabad cities home grown markets. Costs of different things in Karachi city market are for the most part 5 to 15% higher than Islamabad city, reflecting higher transportation, higher labor costs, and benefits of extra agents. Both the Islamabad and Karachi cities herbals markets are the major providers of materials to the huge national herbal pharmaceutical companies. These organizations for the most part buy materials through brokers or so-called suppliers (Shinwari et al. 1999).

Collectors, wholesale and retail dealers in the area are currently performing value-added activities such as product cleaning, drying, cutting, and, in some circumstances, cleaning of the plants or plant parts to be delivered. However, these activities are typically carried out just to the level necessary to achieve the local market's minimum quality requirement. The Export Promotion Bureau and the Forest Department produced information on the national and international commerce of medicinal plants which was used to tour different herbal pharmaceutical enterprises. Technical research on medicinal plant collecting, trade, processing, and national and worldwide marketing was also reviewed. Regardless of the way that these helpful plants are furthermore critical sorts of income for poor people similarly concerning normal merchants, and exporters yet no advancement practices for these remedial plants are found in Pakistan (Parvaiz 2014; Qureshi 2011).

The harvest and trade of high-value medicinal plants in Punjab district is highly disorganized and variable (i.e., from area to area and species to species). Dealers from the national market send representatives to local dealers (beopari) in Karachi to put up their demand, which is a regular marketing avenue for getting plants. The message is passed on by the local dealers to their agents, who have small businesses in the city.

Small shopkeepers and collectors are informed by these agents. The collectors sell the species that tribesmen and they have gathered to local retailers and agents. The therapeutic herbs are sold by collectors for a slight premium over what the gatherers are paid. The majority of the gatherers and collectors are uneducated, and they do not haggle over the price of plant resources. They collect a lot of stuff, but they don't get a lot of money out of it. When the material is ready, the dealers receive it from the agents. Plant materials travel through the 3 stages in this manner.

Study was conducted to investigate methods of creating plants and to give an unrivaled arrangement of the inciting and agronomic necessities, especially of the sorts of restorative plants, synchronous with the diminishing in gather of wild species that will happen once legitimate organization practices are shaped and set up. An extraordinary shortfall of available information on spread what is more, the leading body of critical species limits the extended improvement of plants. This shortfall of information is exacerbated by an absence of significant worth planting materials. Whatever information that exists on the advancement of plants, is not expeditiously available to the farmers who truly could use it. This ought to be ensured that it shows up at where it is required most. During this research, dealers and supplier's catalogues and brochures from companies involved in the medicinal plant trade were also examined.

7. Conclusions

A study on medicinal plant utilization in researched cities uncovered that the communities commonly utilize medicinal plants for keeping up their essential healthcare. Total of 119 herbal plants were recorded in the research area of which 115 species were noted to treat human diseases while 4 species were archived to treat domesticated animal sicknesses. Most of restorative plant species were gotten from the wild practically 70%.

In the investigation region, 75 ailments were accounted for which were being treated by traditional restorative plants. Leaves 52% were utilized for restorative reason more than other plant parts for arrangement of human and animal's cures. While stems 35%, entire plant and fruits were 12% is utilized by the people in study area.

The study discovered that the city of Rawalpindi still has a significant aquifer of medicinal plant knowledge. Remarkably, interviewees from the urban area had more plant knowledge than their rural areas. This is linked to improved market access, which includes the purchase of additional, mostly exquisite medicinal species as well as the utilization of new plant information.

The promotion of medicinal plants is better conformed to and carried out by the local population in Islamabad. The local people use more indigenous species than the other two communities, and ethnomedicine practices are well-established and possibly the best.

The communities in Chakwal are somewhat excluded, with a noticeable lack of health-care facilities. Ethnomedicine is promoted in specific communities, and foreign people's access to traditional knowledge is more ritualistic than in the other two cities.

The major dangers to therapeutic plants and the related information within the consider regions were agricultural extension, firewood collection, development, charcoal generation and dry seasons. Though dangers that dissolve indigenous information exude from secrecy, verbal-based information exchange, and unwillingness of youthful era to pick up the information, inaccessibility of the species, impact of advanced education and awareness components were the main issues.

This study will give a sense of social and economic responsibility among the common individuals, preserve and protect this knowledge. This study too gives premise for the preservation of the local flora, its utilize as nourishment and medicine.

8. Recommendations

Based on this study, the following recommendations were suggested.

- The nearby local area of the research ought to be engaged with preservation and the executives of plant assets and their native information in their region.
- The Public authority ought to empower and permit the local information and expertise of herbal medication experts.
- Local government must provide awareness for youthful age, to keep away from adverse consequences on the therapeutic plants and related information nearby, thus, documentation of the restorative plants of the area needs to proceed.

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APPENDICES

Appendix 1 Photo documentation of ethnobotanical data collection from herbal shop in Chakwal city Pakistan



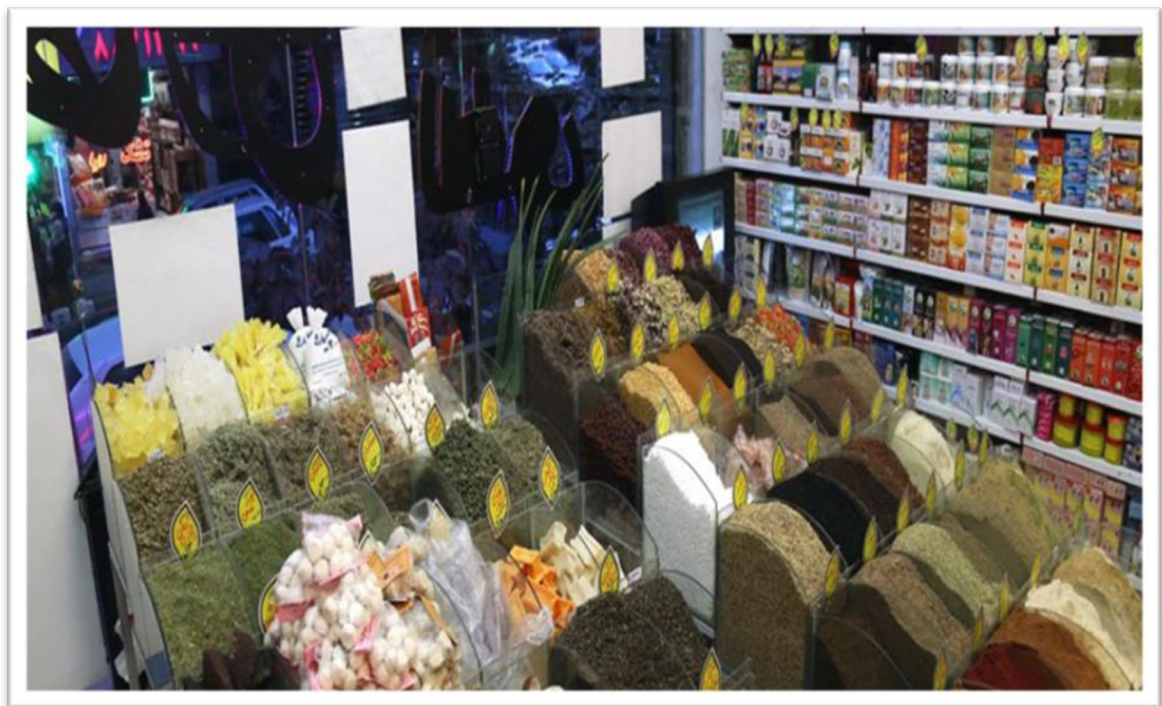
Appendix 2 Photo documentation of ethnobotanical data collection from herbal shop in Chakwal city Pakistan



Appendix 3 Photo documentation of ethnobotanical data collection from small herbal market in Chakwal city Pakistan



Appendix 4 Photo documentation of ethnobotanical data collection in herbal shop of Islamabad city Pakistan



Appendix 5 Photo documentation of ethnobotanical data collection in herbal market of Islamabad city Pakistan



Appendix 6 Photo documentation of ethnobotanical data collection of herbal remedies preparation in market of Islamabad city Pakistan



Appendix 7 Photo documentation of ethnobotanical data collection in herbal shop of Rawalpindi city Pakistan



Appendix 8 Photo documentation of ethnobotanical data collection of herbal remedies transportation from market to shops Rawalpindi city Pakistan



Appendix 9 Photo documentation of ethnobotanical data collection of herbal remedies selling in streets of Rawalpindi city Pakistan



Appendix 10 Empty questionnaire to collect informant's data from Chakwal, Rawalpindi and Islamabad cities of Pakistan

Czech University of Life Science Prague
Master in Tropical Crop management and Ecology

Traditional use of Medicinal Plants

Investigador Responsable: Muhammad Arslan
Research work on Medicine



Please answer the following questions, that will be useful to understand how much the traditions of the indigenous communities are preserved, especially regarding the use of medical plants.

General Data

1. Place: _____ 2. Area: __urban__ __rural__ 3. Main job: _____

Sex: Masculine __ Femenine __ 4. Age: ->20 21-30 31-40 41-50 51-60 61<+

Use of Medical Plants

1. Do you use medical plants to solve your health problems? yes ___ no ___
2. Do you use medical plants as a first aid to solve medical problems? yes ___ no ___
3. Why do you use traditional medicine? Please select one or more options
a) it's cheap b) it's a family custom c) it's highly effective d) I live far away from any medical center/hospital e) I don't have a health insurance
f) other _____
5. How long have you been taking it using medical plants?
->1 year 2-3 years 4-6 years 7-10 years +10 years
6. Where did you get your knowledge from? Family costumes ___ my community ___ traditional doctor ___ market ___ school ___ other

7. According with your own knowledge or perception, do you believe that smaller number of plants is used nowadays? Yes ___ no ___
8. Do you visit a traditional doctor on a regular basis to get advice about which plants you should use? yes ___ no ___, if NO, How did you choose the right plants? _____
9. How do you usually get the plants? you pick them ___ you grow them in your own garden ___ you buy them Other _____
10. If you buy them, where do you go? Pharmacy ___ herbalists ___ markets ___ other (shops, supermarkets) _____

Appendix 11 List of the medicinal plant species used by the informants in Chakwal, Islamabad and Rawalpindi cities of Pakistan

Family/Scientific name	Comon name	Parts of plant used	Ailments	Group	Status-dry or fresh	Route of administration	Preparation mode	UR	FL %
Aizoaceae									
<i>Trianthema portulacastrum</i> L.	Horse parslane	Leaves	Liver infection, asthma	C, B	Dry	Oral	Powder	10	62.0
Amaranthaceae									
<i>Achyranthes aspera</i> L.	Prickly-chaff flower	Root	Kidney stone,	D	Dry	Topical, oral and as toothbrush	Powder	25	82.3
<i>Alternanthera sessilis</i> L.	Alligator weed	Leaves	Eye pain, snake bite	I, K	Fresh	Tropical, oral	Juice	10	56.0
<i>Amaranthus spinosus</i> L.	Spiny pigweed	Leaves	Caner	J	Fresh	Gargle, oral	Juice	11	58.3
<i>Amaranthus viridis</i> L.	Slender amaranth	Leaves	Painful urination, eye pain, snakebite, cough and asthma	L, K, I, B	Fresh	Oral	Juice	19	68.6
Anacardiaceae									
<i>Mangifera indica</i> L.	Mango	Bark, leaves	Diarrhea, blood pressure	G, F	Dry	Tropical, oral	Powder	14	62.1
Annonaceae									
<i>Polyalthia longifolia</i> L.	Mast tree	Bark	Stomachache, fever	G, B	Fresh	Tropical, oral	Juice	18	71.1
Apiaceae									
<i>Anethum graveolens</i> L.	Dil	Seeds	Chronic bronchitis	B	Dry	Oral	Powder	22	74.4
Apocynaceae									
<i>Nerium oleander</i> L.	Oleander	Leaves	Toothache, ear infection	M, K	Dry	Oral	Powder	25	85.4
Araceae									
<i>Pistia stratiotes</i> L.	Water lettuce	Leaves	Painful urination, cough and asthma	L, B	Fresh	Tropical, oral	Juice	22	73.0
Araliaceae									
<i>Schefflera arboricola</i> L.	Dwarf schefflera	Fruit	Cut and wounds	H	Fresh	Tropical, oral	Paste	20	68.7
Asclepiadaceae									
<i>Calotropis procera</i> L.	Milk weed	Leaves	Cut and wounds, skin burns	H	Dry	Tropical, oral	Paste	27	85.4
Asteraceae									
<i>Ageratum conyzoides</i> L.	Goat weed	Leaves	Sexual dysfunctin	E	Fresh	Oral	Juice	19	72.5
<i>Artemisia scoparia</i> L.	Wormwood	Whole plant	Malarial fever	B	Dry	Tropical, oral	Powder	27	84.4
<i>Carthamus oxyacantha</i> L.	Wild safflower	Seeds	Male infertility, heart disease	E, F	Fresh	Oral	Oil	14	70.9
<i>Cirsium arvense</i> L.	Creeping thistle	Leaves	Cough, asthma	B	Fresh	Tropical, oral	Juice	15	73.5
<i>Conyza bonariensis</i> L.	Hairy fleabane	Leaves	Diarrhea, blood pressure	G, F	Dry	Oral	Juice	19	76.3

<i>Lepidium didymum</i> L.	Swine cress	Stem	Tumors, blood purifier	O, N	Dry	Oral	Powder	18	76.8
<i>Eclipta prostrata</i> L.	Trailing eclipta plant	Whole plant	Blood purifier, hepatic tumor	N, O	Dry	Tropical, oral	Powder	14	70.0
<i>Launaea procumbens</i> L.	Creeping launaea	Leaves	Sexual disorder, skin infection	E, H	Fresh	Oral	Paste	9	52.0
<i>Parthenium hysterophorus</i> L.	Feverfew	Root	Fevers, headache, stomachaches	B, P, G	Dry	Oral	Juice	12	58.6
<i>Sonchus asper</i> L.	Spiny leaved Sowhistle	Leaves	Cough, bronchial asthma	B	Dry	Oral	Powder	12	55.6
<i>Taraxacum campyloides</i> L.	Dandelion	Leaves	Diabetes, constipation, liver disorder	A, G, C	Dry	Oral	Powder	11	57.0
<i>Xanthium strumarium</i> L.	Cocklebur	Root	Diabetes, constipation, inflammation	A, G, H	Dry	Tropical, oral	Powder	11	57.7
Boraginaceae									
<i>Heliotropium strigosum</i> Willd.	Hairy heliotrope	Whole plant	Blood purifier, urinary tract infection	N, L	Dry	Oral	Powder	15	69.8
Boraginaceae									
<i>Trichodesma indicum</i> L.	Tricodescum	Leaves	Fever	B	Dry	Oral	Paste	18	70.9
Brassicaceae									
<i>Brassica rapa</i> L.	Field mustard	Seeds	Blood purification	N	Dry	Tropical	Powder	16	78.8
<i>Sisymbrium irio</i> L.	London rocket	Fruit	Chest problem, wound	P, H	Dry	Tropical	Powder	17	78.4
Cannabaceae									
<i>Cannabis sativa</i> L.	Marijuana	Leaves	Loss of appetite, cancer	G, J	Fresh	Oral	Paste	29	82.6
Caryophyllaceae									
<i>Stellaria media</i> L.	Chickweed	Leaves	Stomachache, asthma	G, B	Fresh	Tropical, oral	Paste	14	70.0
Ceratophyllaceae									
<i>Ceratophyllum demersum</i> L.	Common contail	Leaves	Diarrhea	G	Fresh	Tropical, oral	Juice	26	87.0
Chenopodiaceae									
<i>Chenopodium album</i> L.	Lamb's quarter	Shoot, Flower	Inflammation, injurie	H	Fresh	Oral	Juice	30	80.2
<i>Chenopodium ambrosioides</i> L.	Sweet pigweed	Shoot, Flower	High blood pressure	F	Fresh	Tropical, oral	Juice	15	71.9
<i>Chenopodium murale</i> L.	Australian-spinach	Seeds	Cold and cough, sexual dysfunction	B, E	Dry	Oral	Powder	17	76.3
<i>Bassia indica</i> L.	Indian bassia	Leaves	Heart oil	F	Fresh	Oral	Oil	16	77.8
<i>Suaeda vermiculata</i> L.	Akali seepweed	Leaves	Hepatic tumor	O	Fresh	Tropicl, oral	Juice	17	79.2
Convolvulaceae									
<i>Convolvulus arvensis</i> L.	Deer's foot	Leaves	Blood purifier, joint pain	N, P	Fresh	Oral	Paste	9	65.0
Crassulaceae									
<i>Bryophyllum pinnatum</i> L.	Air plant	Leaves	Kidney and pancreatic stone,	D	Fresh	Tropical, oral	Paste	9	63.0
Cucurbitaceae									
<i>Citrullus colocynthis</i>	Bitter apple	Fruit,	Stomachaches	G	Dry	Oral	Oil	8	60.0

L.		seeds							
<i>Cucumis melo</i> L.	Pickling melon	Leaves	Dysuria, leucorrhoea	L	Dry	Oral	Paste	8	64.3
Cyperaceae									
<i>Cyperus rotundus</i> L.	Nut grass	Roots	Dermatitis, indigestion	H, G	Dry	Oral	Powder	32	80.8
Euphorbiaceae									
<i>Chrozophora tinctoria</i> L.	Giradol	Leaves	Throat ache, vomiting	K, G	Fresh	Oral	Juice	25	74.4
<i>Croton bonplandianus</i> L.	Herbel piment	Roots, leaves	Bone fracture, fever, cardiac tonic	P, B, F	Fresh	Tropical, oral	Juice, powder	21	67.5
<i>Euphorbia dracunculoides</i> L.	Dragon spurge	Fruit, leaves	Head achne, skin parasites	B, H	Fresh	Oral	Juice, powder	23	71.4
<i>Euphorbia helioscopia</i> L.	Sun euphorbia	Whole plant, leaves	Constipation, cholera	G	Dry	Oral	Powder, juice	23	74.4
<i>Euphorbia pilulifera</i> L.	Asthma weed	Flower, leaves	Cough, asthma, indigestion, diarrhea, eye pain	B, G, K	Dry	Tropical, oral and as eye drop	Juice, powder	22	66.7
<i>Euphorbia prostrata</i> L.	Creeping spurge	Leaves	Dysentery, hepatic ulcer, eczema	G	Fresh	Oral	Juice	22	67.5
Fabaceae									
<i>Acacia modesta</i> L.	Amritsar gum	Leaves	Joint pain	P	Dry	Oral	Powder	21	65.5
<i>Acacia nilotica</i> L.	Babul acacia	Leaves	Backbone and joints pain	P	Dry	Oral	Powder	30	80.0
<i>Albizia lebeck</i> L.	Lebeck tree	Flower, seeds	Sexual disorders, blood purifier	E, N	Fresh	Oral	Juice	22	67.6
<i>Alhagi maurorum</i> L.	Camel thorn	Bark	Hyperglycemia, joints pain, odontalgia	A, P, M	Dry	Oral	Powder	25	76.3
<i>Cassia fistula</i> L.	Golden shower	Seeds	Diarrhea, hyperglycemia	G, A	Dry	Tropical, oral	Powder	29	87.0
<i>Dalbergia sissoo</i> L.	Indian rose wood	Root	Bladder and kidney stone, asthma, cough, skin burn	D, B, H	Dry	Tropical, oral	Powder	28	81.4
<i>Indigofera linifolia</i> L.	Common indigo	Seeds	Skin eruption	H	Dry	Oral	Paste	21	69.4
<i>Melilotus indicus</i> L.	Sweet clover	Leaves	Swellings	P	Fresh	Oral	Paste	6	40.0
<i>Pongamia pinnata</i> L.	Pongam oiltree	Leaves, flower	Tooth pain, skin ulcer, hyperglycemia	M, H, A	Fresh	Oral	Powder	12	60.0
<i>Prosopis cineraria</i> L.	Prosopis	Leaves	Skin boils, eye infection	H, I	Fresh	Oral	Paste, juice	9	57.0
<i>Prosopis juliflora</i> L.	Honey mesquite	Flower	Breast tumor, asthma	O, B	Fresh	Oral	Juice	9	53.8
Fumariaceae									
<i>Fumaria indica</i> L.	Indian fumitory	Leaves	Malaria, constipation, cancer	B, G, J	Fresh	Oral	Juice	9	50.0
Hydrocharitaceae									
<i>Vallisneria spiralis</i> L.	Tape grass	Leaves	Leucorrhoea	L	Fresh	Oral	Paste	16	51.9
Lemnaceae									
<i>Lemna minor</i> L.	Duck weed	Leaves	Skin rashes	H	Dry	Oral	Powder	9	47.5
Malvaceae									
<i>Abutilon indicum</i> L.	Indian	Leaves,	Asthma	B	Fresh	Oral	Powder	26	82.5

	mallow	seeds							
<i>Hibiscus rosa-sinensis</i> L.	Rose mallow	Root, leaves	Sexual dysfunction, asthma, cardiac pain	E, B, F	Dry	Oral	Powder, tea	25	80.0
<i>Malva parviflora</i> L.	Cheese-weed	Seeds, leaves	Constipation, sore throat, cough	G, B, K	Dry	Oral	Juice	7	44.0
<i>Malvastrum coromandelianum</i> L.	False mallow	Whole plant	Skin sores, eczema	H	Dry	Oral	Powder	22	42.0
<i>Malvaviscus arboreus</i> Cav.	Sleeping hibiscus	Leaves	Throat ache, diarrhea, skin eruption	K, G, H	Fresh	Tropical, oral	Juice	17	40.0
Marsiliaceae									
<i>Marsilea minuta</i> L.	Water clover	Leaves	Throat ache, diarrhea	K, G	Fresh	Tropical, oral	Juice	21	76.3
Meliaceae									
<i>Azadirachta indica</i> A.	Neem	Seeds, leaves	Fever, blood purifier, hyperglycemia	B, N, A	Fresh	Oral	Oil, powder	61	100
Moraceae									
<i>Ficus benghalensis</i> L.	Banyan tree	Leaves	Premature ejaculation	E	Dry	Oral	Powder	53	95.5
<i>Ficus benamina</i> L.	Weeping fig	Leaves, fruit	Stomachache, skin ulcers	G, H	Fresh	Tropical, oral	Powder	19	66.7
<i>Ficus racemosa</i> L.	Cluster tree	Bark, leaves	Diarrhea	G	Dry	Tropical, oral	Juice	16	64.7
<i>Ficus religiosa</i> L.	Sacred fig	Leaves	Asthma, heart blockage	G, F	Fresh	Tropical, oral	Paste	15	67.7
<i>Ficus virens</i> L.	White fig	Fruit	breast tumor	O	Dry	Oral	Powder	20	74.4
<i>Morus alba</i> L.	White mulberry	Leaves	Cough, constipation	B, G	Fresh	Tropical, oral	Juice	54	94.5
<i>Morus nigra</i> L.	Black mulberry	Root	Sore throat	K	Dry	Oral	Powder	52	97.0
Myrtaceae									
<i>Eucalyptus camaldulensis</i> L.	River red-gum	Leaves	Sore throat, cold, cough	K, B	Fresh	Oral	Juice	18	73.0
<i>Psidium guajava</i> L.	Guava	Flower	Diarrhea, cough	B, G	Fresh	Gragle, oral	Juice	15	69.6
Nelumbonaceae									
<i>Nelumbo nucifera</i> L.	Kanwal	Flower, leaves	Diarrhea, headache	B, P	Fresh	Oral, tropical	Juice, paste	18	71.0
Nyctaginaceae									
<i>Boerhavia diffusa</i> L.	Horse-purslane	Root	Cough, asthma, kidney failure, flu	G, D	Dry	Tropical, oral	Powder	6	38.0
Nymphaeaceae									
<i>Nymphaea lotus</i> L.	Lotus	Root	Malarial fever	B	Dry	Oral	Powder	13	51.7
Oleaceae									
<i>Jasminum officinale</i> L.	Poet's jasmine	Stem	Febricity, cough	B	Fresh	Tropical	Juice	27	84.7
Oxalidaceae									
<i>Oxalis corniculata</i> L.	Clover sorrel	Root, leaves	Diarrhea, wounds, eye inflammation	B, P, K	Dry	Oral	Paste	9	42.9
Papaveraceae									
<i>Argemone mexicana</i> L.	Mexican poppy	Flower	Sexual problems	E	Dry	Oral	Powder	24	86.4

Poaceae									
<i>Avena sativa</i> L.	Common oat	Whole plant	Antispasmodic	B	Dry	Oral	Powder	9	48.0
<i>Cenchrus pennisetiformis</i> L.	White buffel grass	Stem	Cough, asthma, skin irritation	B, H	Fresh	Oral	Juice	10	51.1
<i>Cynodon dactylon</i> L.	Bermuda grass	Root	Stomachache, eye inflammation	G, H	Fresh	Tropical, oral	Juice	11	47.8
<i>Dactyloctenium aegyptium</i> L.	Crow's foot grass	Seeds	Wounds	H	Fresh	Oral	Paste	13	46.0
<i>Dichanthium annulatum</i> L.	Ringed dichanthium	Stem, leaves	Diarrhea	B	Dry	Tropical, oral	Powder	7	40.7
<i>Eleusine indica</i> L.	Goose grass	Leaves	Febricity	B	Fresh	Tropical, oral	Juice	10	42.1
<i>Imperata cylindrica</i> L.	Cogon grass	Shoot, leaves	Wounds and cuts	H	Fresh	Oral	Paste	9	50.0
<i>Panicum antidotale</i> L.	Giant panic	Leaves	Respiratory tract infection, skin diseases	B,H	Fresh	Oral	Juice	12	46.0
<i>Phragmites karka</i> L.	Common reed	Root	Rheumatic pain	K	Dry	Oral	Paste	25	48.8
<i>Saccharum spontaneum</i> L.	Wild cane	Leaves	Fever, body pain,	B, P	Fresh	Oral	Paste	17	70.1
<i>Setaria glauca</i> L.	Yellow foxtail	Leaves	Hair tonic	K	Fresh	Tropical	Juice	17	77.4
<i>Sorghum halepense</i> L.	Johnson grass	Stem	Stomachache, cough	G, B	Fresh	Oral	Juice	19	69.5
<i>Triticum aestivum</i> L.	Wheat	Seeds	Cancer, asthma	J, B	Dry	Oral	Powder	21	59.5
Polygonaceae									
<i>Rumex dentatus</i> L.	Toothed dock	Roots	Wounds and cuts, constipation	H, G	Dry	Tropical, oral	Powder	20	73.9
Pontederiaceae									
<i>Eichhornia crassipes</i> L.	Water hyacinth	Leaves, stem	Cold, flu, respiratory diseases	B	Dry	Tropical, oral	Powder	18	68.8
Portulacaceae									
<i>Portulaca quadrifida</i> L.	Common purslane	Whole plant	Jaundice	L	Dry	Oral	Powder	25	81.1
Primulaceae									
<i>Anagallis arvensis</i> L.	Scarlet pimpernel	Stem	Skin ulcer, cancer	H, J	Dry	Tropical, oral	Powder	20	63.9
Ranunculaceae									
<i>Ranunculus laetus</i> L.	Celery-leaved buttercup	Leaves	Skin infection	H	Fresh	Oral	Paste	20	73.6
Resedaceae									
<i>Oligomeris linifolia</i> L.	Lineleaf oligomeris	Leaves	Diarrhea, throat pain and cough	G, K, B	Dry	Oral	Tea	16	53.3
Rhamnaceae									
<i>Ziziphus nummularia</i> L.	Jujube	Leaves, fruit	Sore throat and cold, hyperglycemia, constipation	K, G	Fresh	Tropical, oral	Paste	13	50.0
<i>Ziziphus mauritiana</i> L.	Chinese apple	Bark, leaves	Chicken pox, diarrhea, asthma	P, G, B	Dry	Tropical, oral	Powder	24	40.0
Rutaceae									
<i>Murraya koenigii</i> L.	Curry leaf	Leaves,	Skin eruption,	H, G	Dry	Tropical, oral	Juice	20	65.0

		bark	diarrhea, hyperglycemia						
Salvadoraceae									
<i>Salvadora oleoides</i> Decne.	Toothbrush tree	Fruit	Toothache	M	Dry	Oral	Paste	16	61.8
Scrophulariaceae									
<i>Misopates orontium</i> L.	Snap dragon	Leaves	Eye inflammation	K	Fresh	Tropical	Juice	13	45.8
Solanaceae									
<i>Datura innoxia</i> L.	Thorn apple	Seeds	Cough, asthma, premature ejaculation	B, E	Fresh	Oral, tropical	Powder	15	55.1
<i>Solanum nigrum</i> L.	Night shade	Leaves, flower	Breast cancer, diarrhea, cardiac pain, sore eyes	J, G, F, K	Fresh	Tropical, oral	Juice	67	98.0
<i>Solanum surattense</i> L.	Thorny nightshade	Fruit	Wound healing	H	Fresh	Oral	Paste	75	95.0
<i>Withania somnifera</i> L.	Winter cherry	Leaves, root	Malarial, fever	B	Dry	Tropical	Powder	80	100
Sterculiaceae									
<i>Pterospermum acerifolium</i> L.	Maple-leaved Bayur tree	Flower	Swellings	P	Fresh	Oral	Paste	11	39.8
Tamaricaceae									
<i>Tamarix aphylla</i> L.	Rukh	Leaves	Wound and boils	H	Fresh	Oral	Paste	17	67.6
Trapaceae									
<i>Trapa bispinosa</i> L.	Water chestnut	Seed	Diarrhea	G	Fresh	Oral	Powder	19	73.0
Typhaceae									
<i>Typha angustata</i> L.	Long cattails	Flower	Diarrhea and dysentery	G	Fresh	Oral	Paste	17	68.9
Verbenaceae									
<i>Lantana camara</i> L.	Lantana	Leaves	Malarial fever, cough, cold	B	Fresh	Tropical	Juice	24	80.8
Zygophyllaceae									
<i>Tribulus terrestris</i> L.	Puncture vine	Whole plant	Diarrhea	G	Dry	Tropical	Powder	40	89.9

A refer to endocrinal disorders, **B** to respiratory system disorders, **C** to liver disorders, **D** to kidney disorders, **E** to sexual stimulants, **F** to cardiovascular disorders, **G** to gastrointestinal disorder (GIT), **H** to dermatodgical disorders and cosmetics, **I** to poisonous bites, **J** to oncology, **K** to ear, eye, hair and throat disorders, **L** to genital urinary disorders, **M** to oral and dental disorders, **N** to hematological disorders, **O** to tumorous disorders and **P** to skeleton muscular pain and swelling, **UR** to use report and **FL** to fidelity level.