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ANTI-RHEUMATIC POTENTIAL OF PAKISTANI MEDICINAL PLANTS: A REVIEW

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Abstract

Present review aimed to provide a comprehensive documentation of plants used as anti-rheumatic ethnomedicines in Pakistan and to suggest future recommendations. Data on anti-rheumatic plants was collected from published scientific papers, reports and thesis using online searching engines such as Google Scholar PubMed and Science Direct. Five distinct zones in the country were classified on the basis of geography, humidity and rainfall. We used Sorenson similarity index for plants and their parts used between different zones. A total of 137 anti-rheumatic plant species representing 55 families and 104 genera are used in Pakistan. Herbs (87 plants) were the primary source of anti-rheumatic medicinal plants, while leaves (22 % plant species) were the most frequently used part in the preparation of ethnomedicinal recipes. Highest number of 52 medicinal plant species were found in Zone A having high mountains and cold climate where the prevalence of rheumatism was more common. *Solanum surattense* was found with highest conservation concerns as it was using in 13 different areas against rheumatism. Results of Sorenson index revealed that there is a similarity of plants and its parts uses between different zones. In conclusions, geography and climate have an important role in causing rheumatic disease. Pakistan has a number of anti-rheumatic plants that are used by the local populations through their traditional knowledge. Moreover, inter zonal similarities among plants and its part uses indicate higher pharmacological potency of these medicinal plants. Further, the review will also provide an insight regarding the conservation status of reported plants.

Key words: Geography, climate, joint pains, ethnomedicines, similarity index

Introduction

Medicinal plants are important therapeutic sources of treating different diseases at local level. It is estimated that 80% inhabitants of developing world rely on traditional medicines (Anon., 2003). It has been reported that 600 to 700 species are used for medicinal purposes in Pakistan (Shinwari, 2010). Ikram *et al*. (2015) have reviewed the already documented ethno-medicinal importance of Apiaceae species found in Pakistan. Similarly, (Khalil *et al*., 2014) reviewed different ethnomedicinal uses of plants belonging to family Euphorbiaceae in Pakistan. Rheumatism is one of the diseases that causes chronic inflammation of the joints and are treated by using various ethnomedicines. Its symptoms include fatigue, loss of energy, low-grade fever, muscle, joint aches and stiffness. It affects 0.5-1% of population all over the world (Lawrence *et al*., 1998). Rheumatism is more common in women than men but the prevalence increases dramatically with age. There is no explanation yet has been documented in relation to geographic variations. People affected by rheumatism have double risk of heart disease, lungs and chest infections, which causes 10-20 % of deaths in individuals (John *et al.*, 2008). The inefficiency of renal function is directly associated with the development of joint pain (Padang, 2006). The estimated prevalence of rheumatism in some developing countries such as Nigeria, Indonesia and Africa showed lower prevalence than that reported from the western countries, while the prevalence of rheumatism in India (0.75 %) is similar to that reported in white population from Manchester (0.8 %) (Alam *et al.*, 2011). In Pakistan, the prevalence of rheumatism is reportedly low as 0.142 % in southern areas to high as 0.55 % in northern areas (Farooqi & Gibson, 1998). People of remote areas of Pakistan used different medicinal plants for the treatment of rheumatism due to the lack of modern medical facilities and expensive treatments. Documentation of plants used as anti-rheumatic traditional medicines in Pakistan was imperative in order to preserve the knowledge because it is generally understood that herbal remedies have less side-effects as compared to allopathic drugs (Hamayun *et al.*, 2003; Khan, 2000). The present review was therefore designed to compile the entire fragmented literature on traditional plants used to treat rheumatism. This review will identify the prioritizing plants for further pharmacologically and phytochemical screening. Furthermore, the review will provide an insight regarding the conservation status of these plants.

Methodology

The literature related to the present study (anti-rheumatic medicinal plants) was studied between May 2012 and May 2013. For collection of data, available literature on the plant species were consulted from published scientific papers, reports from national organizations and thesis through online searching engines such as Google Scholar, PubMed and Science Direct using specific keywords such as “medicinal plants”, “traditional medicines”, “medicinal plants in forests” and “mountains and plains”. A total of 250 published and unpublished articles were studied but only 200 articles related to ethnobotany, geographical distribution and conservation status of anti-rheumatic plants were selected

for current review. We reviewed the reference lists of about 75 of the selected literature having more detailed, comprehensive and accurate information. Data collected was compiled and analyzed using Microsoft Excel 2007 and Microsoft Word 2007. The ethnobotanical table included: botanical name of the plant species, their respective families, medicinal uses, habit and reproductive status, preparation of drugs, localities where the plants found, and references (Table 4).

The study area was classified into five distinct zones on the basis of geography, humidity and rainfall and was named as A, B, C, D and E (Table 1) (Salma *et al*., 2012) with some modification. Zone A (Cold climate and high mountains) is located between 34° N to 38° N and 70° E to 78° E in the Himalaya, Hindukash and Koh-e- Sufaid mountain ranges. Its temperature ranges from 7-21 ^{0}C where as annual rain fall is about 67 mm (Sheikh *et al.*, 2002; Ali & Qaiser, 2009). Geographically zone B (Mild cold climate and Sub Mountains) is located between 31° N to 34° N and 70° E to 75° E. Normally temperature of this zone ranges from 10-35^{0}C where as rain fall is about 67mm. Zone C (Climate is cold in winters and hot in summers) having somewhat mesic environment, located between 27° N to 32° N and 64° E to 70° E. The temperature of various areas of this zone such as Quetta, Zhob, Kalat and Khuzdar is ranging from 0-35^{0}C where as rain fall is about 33 mm. The hottest and dry zone is D (Bahawalpur , Jacobabad and Khanpur), having high temperature in summer, ranges from 5-40^{0}C where as rain fall is about 23 mm. Zone E (Coastal cities, near to Arabian Sea) located between 24° N to 31° N and 62° E to 72° E. Its temperature is ranging from 10-35^{o}C where as annual rain fall is about 32.1 mm.

Table 1. Zonal distribution of plants on the basis of geography, humidity and rainfall (Salma *et al*., 2012).

No.	Zone	Geographical position	Annual precipitation	Temperature	Locations	Reported plants
1	**Zone A** (Cold climate and high mountains)	34° N to 38° N & 70° E to 78° E.	66.64 mm	Maximum 21 ^{0}C & minimum 7 ^{0}C	Chirat, Chitral, Dir, Gilgit, Muzaffarabad, Saidu Sharif Skardu, Swat, Parachinar.	52
2	**Zone B** (Mild cold climate and Sub Mountains)	31° N to 34° N & 70° E to 75° E.	66.99 mm	Maximum 35 ^{0}C & minimum 10 ^{0}C	D.I. Khan, Islamabad, Lahore, Lakki Marwat, Peshawar, Rawalpindi, Sialkot and Tank.	41
3	**Zone C** (Climate is cold in winters and hot in summers).	27° N to 32° N & 64° E to 70° E.	32.92 mm	Maximum 35 ^{0}C & minimum 0 ^{0}C	Kalat, Khuzdar, Quetta and Zhob.	27
4	**Zone D** (Hottest and dry zone).	28° N to 32° N & 67° E to 75° E.	22.65 mm	Maximum 40 ^{0}C & minimum 5 ^{0}C	Bahawalpur, Jacobabad, Khanpur, Multan, Nara Desert, Rhori, Sibbi.	12
5	**Zone E** (Coastal cities, near to Arabian Sea).	24° N to 31° N & 62° E to 72° E.	32.1 mm	Maximum 35 ^{0}C & minimum 10 ^{0}C	Hyderabad, Karachi, Nawabshah.	05

Types of rheumatism

The term rheumatism has no clear boundary and more than hundred different conditions are labeled as rheumatic disease. Some common and more important types are discussed here, in which one is Osteoarthritis. It primarily affects cartilage and causes joint pain along with their stiffness (Sangha, 2000). Rheumatoid arthritis is another disease of the joint, which results in pain, stiffness, swelling and loss of joint's function. In northern Pakistan the estimated prevalence of rheumatoid arthritis is 0.55% (Alam *et al*., 2011). Another most common form of arthritis which affects various parts of the body in childhood is called juvenile idiopathic arthritis (Sangha, 2000). Charles *et al.* (2008) reported some important types of rheumatisam as Fibromyalgia, Spondyloarthropathies and Systemic lupus. Sometime a chronic pain occurs in the tissues of neck, spine, hip and shoulders which is another form of joint pains called Fibromyalgia. Systemic lupus is an autoimmune disease, which results in the pain and inflammation of skin, kidneys, heart, lungs, blood vessels and brain (Silman, 1993). Spondyloarthropathiesis another common form of joint pain which affects the spine, but may also affect the hips, shoulders and knees (Silman,, 1993). Infectious arthritis is also known as septic arthritis or bacterial arthritis. Typically septic arthritis affects one large joint in the body, such as the knee or hip. However, septic arthritis can also affect multiple joints if the infection rapidly spreads (Sangha, 2000). Charles *et al.* (2008) reported Gout, Polymyalgia rheumatic, Polymyositis and Tendinitis as different types of rheumatism. Gout is a disease of feet, especially the big toe. The swollen site may be red and warm. It occurs when uric acid deposits in the joints. Polymyalgia rheumatic results in the aching and stiffness about the upper arms, neck, lower back and thighs (Solomon *et al.*, 1975)**.** Polymyositis is the inflammation of muscles of the body and connective tissues, affecting lungs and heart. Ageing and overuse also cause inflammation and chronic pain of tendon which is technically called Tendinitis. Its symptoms are swelling, pain and irritation. There are many other types of rheumatism that are prevailing in most parts of the developing world. In Pakistan, the most common types of rheumatism can be linked with the herbal medicines that are used in the

treatment of rheumatism. Herbal drugs are cheaper and free from side effect, if readily available. Keeping in view the prevalence of rheumatism, it was the first attempt to document the anti-rheumatic plants in Pakistan.

Discussion

Zonal distribution of the plants: Pakistan has a unique geographical location with altitudinal variation ranging from the sea level to the world's second highest mountain (K2) with an average altitude of 8, 611 m asl (Ali & Qaiser, 1986). This variation is associated with different ecological zones having diversity of plant species. Geography may be considered as one of the major reasons in causing and promoting rheumatic diseases as different climatic and topographic variables have already been indicated as the major reasons behind rheumatic diseases (Pausas & Austin 2001). A five zonal categorization of Pakistan geography indicated most plant species (52) in zone A, being used against rheumatism followed by zone B (41 species), zone C (27 species), zone D (12 species) and zone E (5 species). The high number of ethnomedicinal uses against rheumatism in zone A might be due to higher plant diversity, extensive studies in northern regions of Pakistan, high rheumatism prevalence, high rainfall and low temperature (Ali & Qaiser, 1986). These environmental conditions are most favorable for microbial growth involved in soil fertility. Zone B ranked second after zone A having large number of medicinal plants used for rheumatism that might be due to the reason of having high number of cultivated species in this zone coupled with favorable environmental conditions. Least number of plant species was documented from Zone E that might be due to its arid and semi-arid nature, water scarcity due to lesser rainfall and less soil fertility. All these factors are responsible for low species richness in the zone. Factors like water, temperature, light, environmental heterogenecity and potential approaches might be the reasons of varying plant richness and diversity (Pausas & Austin, 2001). Slight changes in temperature or precipitation or a difference in the frequency and magnitude of extreme climatic events like frost or drought could substantially alter the composition, distribution, and abundance of species in different location. Changes in climate also affect the nature of zonation (Stevens, 1989).

Family and genus-wise classification: The reported 137 plant species belong to 104 genera and 55 families. Among these plant species 126 are wild and 5 species cultivated. High utilization and dependency on wild species might be due to the interest of locals in cultivation of only staple food and cash crops in Pakistan. Farmers never allow traditional healers to harvest the plants in such a manner and quantity that they do in the wild, therefore the local people mostly depends upon wild plant species for medicinal purposes. The anti-rheumatic plant species belonging to different plant families, among which the most dominant family was Asteraceae containing 15 species followed by Fabaceae (13 species) and Solanaceae (9 species). Other prominent families were Brassicaceae, Caparaceae, Euphorbiaceae, Leguminoseae, Polygonaceae, Ranunculaceae and Zygophyllaceae, Ephedraceae, Poaceae, Lamiaceae and Betulaceae. Asteraceae family was found the leading plant family among that might be due to having large number of plants and presence of variety of chemical compounds against rheumatism (Abad *et al*., 2012). Members of Solanaceae family containing high anti-rheumatic plants that might be due to the presence of steroids, flavonoids and alkaloids and their scientifically proved efficacy *in-vitro* (Shravan *et al.,* 2011). It is well known that not all the plant parts contain the same concentration and types of the active constituents. For instance, leaves of *Capparis spinosa* L (Caparaceae) were used to treat arthritis instead of the root bark because it is more rich part of the bioactive anti-rheumatic compounds (Stickel *et al.,* 2000). The plants of family Brassicaceae are used in the treatment of rheumatisam (Kirtikar & Basu, 1975). Four flavonoids compounds were isolated from the genus *Erucaria* (Brassicaceae), which were effective against rheumatism (Marzouk, 2011). The menthol in the Lamiaceae essential oil of spearmint (*Mentha* species) induces a local anti-rheumatic effect (Benoit *et al.,* 1976). Triterpenoid compounds (triterpene, saponins) appear to be widely distributed among the Lamiaceae, which are anti-rheumatic. Leaves of *Betula pendula* (Betulaceae) contains more triterpene alcohols as compared to other parts of the plant (Fisher & Seiler, 1961) and flavonoid compounds (Hansel & Haas, 1983) that can be used for anti-rheumatic activity. The latex of Euphorbiaceae used as anti-rheumatic is much effective as compared to its other parts.

Growth habit wise classification of the plants: Growth habit is an important category for the classification of the taxons, therefore the anti-rheumatic medicinal plants were tabulated according to their respective growth habit. Present review showed that the dominant life-form of anti-rheumatic plants were herbs (87 plants) followed by shrubs (32 plants) and trees (18 plants) (Table 2). The most frequent and common uses of herbs for medicinal purposes might be due to easy availability, high effectiveness, traditional beliefs, easy harvesting and packaging in comparison to other growth forms. Extensive ethnomedicinal use of shrubs might be linked to their availability throughout the year. With regard to trees, their extensive use in the preparation of ethnomedicines might be linked to their ability to withstand long dry seasons, thus resulting in their availability throughout the year (Adnan *et al*., 2014). They are usually used for non-medicinal purposes as fuel, furniture, timbers, lumbers, roof thatching and fencing therefore the people give less attention towards their ethnomedicinal uses.

Reproductive status: This review indicates that 79 plant species were annual, in which majority of 64 species was documented as herbs followed by 15 shrub species (Table 2). Perennial plants were 55 in number including 21 herbs, 18 trees and 16 shrubs. Biennial plants were only 3 in number, in which 2 were herbs and single species was reported to be shrub (Table 2). In the present review article the annual anti-rheumatic plant species were more as compared to the other reproductive categories such as biennial and perennial. It might the reason that annual plant species are mostly herbs, which are documented to be ethnomedicinally

used in the present study (Table 2). The annual plants grows rapidly and are easily available to the local people, therefore it might be another reason of their abundance in the reported study. Perennial and biennial occurred after the annual because they were mostly shrubs and trees. The local people especially collectors of the ethnomedicinal plants pay little attention towards trees. Hard work in cutting and collection might be the reasons of little use of the biennial and perennial anti-rheumatic plants.

Table 2. General attributes of medicinal plants. Others* indicates bulbs, corm, gum and latex.

Attribute	Herbs.	Shrubs.	Trees.	Total species	Percentage
Habit	87	32	18	137	100
Reproductive status					
Annual	64	15	0	79	58
Perennial	21	16	18	55	40
Biennial	2	1	0	3	2
Part use					
Leaves	33	16	10	59	22
Whole plant	26	8	4	38	14
Roots	24	11	2	37	14
Seed	15	7	9	31	12
Fruits	9	4	9	22	8
Others*	7	5	9	21	8
Flower	10	5	5	20	7
Bark	2	4	12	18	7
Stem	7	5	2	14	5
Rhizome	7	0	0	7	3
Drugs preparation					
Infusion	62	14	5	81	48
Decoction	25	19	9	53	31
Soaked as juice	8	2	0	10	6
Syrup	9	1	0	10	6
Edible fresh	7	0	1	8	5
Pad form	6	1	0	7	4
Status					
Wild	84	27	15	126	92
Cultivated	3	1	1	5	4
Wild/ Cultivated	0	4	2	6	4

Distribution of the plants by part used: The plants parts used for making herbal preparations were leaves, stems, branches, barks, woods, roots, flowers, fruits, seeds, pods, rhizomes, oil, latex, tubers and whole plant. Leaves were the most frequently used part (22 %) followed by whole plant (14 %) and roots (14 %) (Fig. 1). Majority of the herbal medicines was obtained from the leaves as they act as reservoirs for metabolites or exudates, which are believed to have medicinal value for human body (Balick & Cox, 1996). The people use these herbal medicines for various disorders from centuries. In the present article, there are some plant species, which are important but they contain some less toxic phytochemical as well. These uses of less toxic plants were noted to be practiced by herbalists rather than the locals. These toxic plants include *Calotropis procera* (Aiton) Dryand, *Citrullus colocynthis* (L.) Sch., *Datura stramonium* L., *Digitalis purpurea* L., *Euphorbia helioscopia* L., *Euphorbia tinctoria* Boiss., *Nerium oleander* L., *Ricinus communis* L., *Solanum nigrum* L. and *Withania somnifera* (L.) Dunel (Al-Qura, 2009). The use of whole plant as remedy was administered for herbaceous plant species (Table 3). However, harvesting of roots of herbaceous plants for medicinal purposes is not sustainable as it threatens the survival of the same plants used to treat human ailments. It is well recognized by conservationists that medicinal plants primarily valued for their root parts and those, which are intensively harvested for their bark often tend to be the most threatened by over-exploitation (Flatie *et al.,* 2009).

Table 3. Sorensen similarity index (SC). ZA represents Zone A and so on.

Zones	SC of plant species	SC of plant's part used
ZA*ZB	0.01	0.05
ZA*ZC	0.01	0.06
ZA*ZD	0.01	0.05
ZA*ZE	0.05	0.08
ZB*ZC	0.01	0.05
ZB*ZD	0.19	0.15
ZB*ZE	0.04	0.006
ZC*ZD	0.04	0.07
ZC*ZE	0.07	0.12
ZD*ZE	0.01	0.07

Sorensen similarity index was used to check similarity among different geographical zones of Pakistan in term of their plants and part used for the treatment of rheumatism (Table 3). The index showed that increase in similarity between zones for plants is directly related to the parts uses (Fig. 2). This result implies that there are strong inter cultural similarities among different zones of Pakistan in using anti-rheumatic plants showing their pharmacological potential.

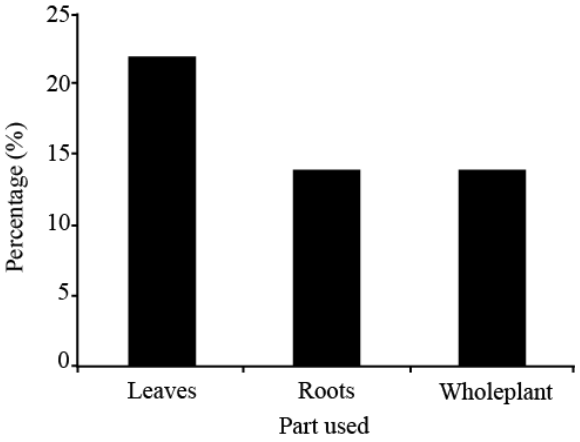

Fig. 1. Part use wise classification of the plants.

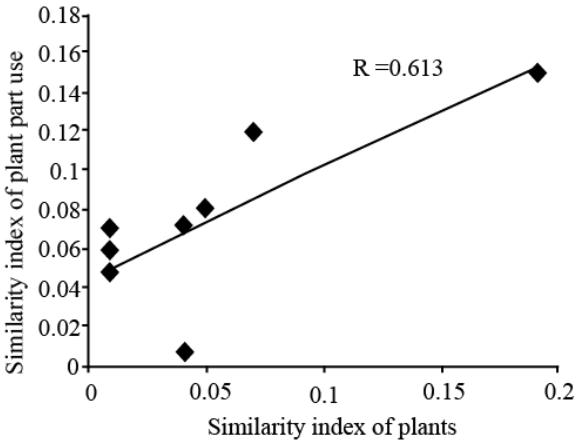

Fig. 2. Sorensen index correlation between plants and part uses.

Drug preparation: Plant remedies were often utilized in the form of decoction and infusion. Various parts of 81 plant species (48%) are being used as infusion while 53 plant species (31%) are being used as decoction (Table 2). Infusion or decoction is not almost the common method of preparation of medicinal anti-rheumatic plants to be used internally. Other preparation methods include socked as juice (10 plant species), syrup (10 plant species), edible fresh (8 plant species) and pad form (7 plant species). All the plant species were mono-therapeutic in use. The majority of plant species used as traditional medicines have similar applications in other regions of Pakistan such as *Aloe vera* (L.) Burm. F, *Melia azedarach* L. and *Tribulus terrestris* L. etc. Leaves of *Aloe vera* (L.) Burm. F are being used as anti-rheumatic herbal part through infusion in Attock, Mandi Bahaudin, Jalalpur Jattan and Gujrat Punjab. Similarly, *Melia azedarach* L. leaves, fruits, bark and seeds are being used through decoction in Sothern Punjab and Bannu. *Tribulus terrestris* L. fruits, roots and shoot are also being used in Morgah biodiversity park Rawalpindi, Batkhela and Valley Alladand Dehri through infusion. Such similarities in the cross-cultural usage of the traditional plant remedies are a strong indication of the bioactivity potential of the documented plant species.

Conservation status: Pakistan is a developing country and most of the people depend on agriculture. The rural community is mainly living in proximity to vegetation, hence they have knowledge on medicinal plants used against various diseases including rheumatism. But the rapid and haphazard collection of the plant species adversely effected natural vegetation. Moreover, unsustainable collection practices and lack of marketing capacity has deteriorated the existence of certain medicinal plants (Adnan & Hölscher, 2012). The medicinal plants diversity declines due to degraded and poor ecosystem because they carry high pathogens and vector burden (Shinwari & Qaiser, 2011). Mostly children and women are involved in medicinal plants collection and processing. They usually do improper collection, carrying and processing due to which they loss a major quantity of medicinal plants (Ahmad & Javed, 2007; Hamayun, 2004). The present review showed that *Solanum surattense* Burm. F was found to be the most abundant plant species used followed by *Withania somnifera* (L.) Dunal, *Ricinus communis* L., *Dodonaea viscosa* (L.) Jacq., *Calotropis procera* (Aiton) Dryand,, *Colchicum luteum* Baker, *Acacia modesta* Wall., *Capparis decidua* (Forsk) Edgew, *Chenopodium album* L., *Peganum harmala* L., *Tephrosia lupinifolia* DC, *Paeonia emodi* Wall ex.Royl, *Alhagi camelorum* Fisch, *Asparagus racemosus* Willd, *Salvadora oleoides* Decne., *Solanum nigrum* L. and *Tribulus terrestris* L. Endemic species of Himalaya *Solanum surattense* Burm. F was found to be the most abundant plant species because it has been used in about many locations. Hence, these plants are getting more threat from the overexploitation. If proper conservation measures are not taken, the decrease in its abundance would be found in the near future. Moreover, it is wild species throughout the country, therefore there is a severe threat to its wild habitat. In the present study, 126 species are wild while only 5 species are cultivated that have anti-rheumatic properties. Many of the important medicinal species might be facing the danger of threat and rareness in the area due to over and multipurpose uses. *Saussurea lappa* is an extremely endangered species because of its high medicinal value (Qureshi *et al.*, 2007). Similarly, population of *Solanum surattense* Burm. F and *Withania somnifera* (L.) Dunal are decreasing at an alarming rate. Taxa viz, *Pistacea integerrima*, *Paeonia emodi*, *Skimmia laureola*, *Taxus wallichiana* and *Aesculus indica* are extensively exploited by the local people for their various ethnobotanical uses. Due to over exploitation by the local people, a drastic decrease has been observed in the population of these species in wild. A gentle attention is needed for the plant conservation from the government, and NGO's with the help of local peoples by creating awareness in them. Rapid urbanization and unplanned exploitation have resulted in loss of such medicinally important species.

Table 4. Anti-rheumatic medicinal plants and their uses in Pakistan.

Botanical name	Family	Local name	Locations	Reproduction status/Habitat	Status in nature	Part used	Drug preparation
Acacia modesta Wall.	Fabaceae	Phulai; Reenn	Mianwali, Isakhel; Barroha, Bhara Kahu and Maanga; Siran valley, Mansehra	Perennial Tree	Wild	Leaves; Bark; Wood and gum	Decoction; Infusion
Acacia nilotica (L.) Delile	Fabaceae	Kikar	Cholistan	Perennial Tree	Wild	Seeds	Infusion
Achyranthes aspera L.	Amaranthaceae	Lainda; Ubat Kandri; Phut kanda	Siran Valley, Mansehra; Nara desert; Dera Ghazi Khan.	Perennial Herb	Wild	Fruits; All parts; roots; Leaves and stem	Soaked as juice; Infusion
Aconitum heterophyllum Wall. ex Royle	Ranunculaceae	Sarba wali; Patris	Dir Kohistan Valley; Siran Valley, Mansehra	Annual Herb	Wild	Tuber or rhizome; Latex; Roots	Pads form; Decoction
Acorus calamus L.	Acoraceae	Skhawaja	Malam Jabba valley; Valley Alladand Dehri, Batkhela	Perennial Herb	Wild	Rhizome	Infusion
Actaea spicata L.	Ranunculaceae	Kayay Zuch	Bugrote valleys Gilgit	Perennial Herb	Wild	Roots and berries	Infusion
Adhatoda vasica Nees	Acanthaceae	Baikar; Bansa;	Upper Dir; Jhelum	Annual Shrub	Wild	Leaves; Whole plant	Decoction; Infusion
Aeruva javanica (Burm.) Juss	Amaranthaceae	Kanthi; Booh	Lahore- Islamabad motorway; Nara desert	Annual Herb	Wild	Leaves and whole plants	Syrup; Infusion
Aesculus indica (Wall. ex Cambess.) Hook.	Hippocastanaceae (Sapindaceae)	Bankhore	Kaghan Valley, Mansehra	Perennial Tree	Wild	Seed	Decoction
Alhagi maurorum Medik.	Fabaceae	Tunda; Jawansa.	Bannu; Jhelum	Annual Herb	Wild	Leaves and flowers; Whole plant	Decoction; Infusion
Alhagi camelorum Fisch.	Fabaceae	Athariyum; Javasa; Jawan; Khush	Cholistan; D.I Khan; Bugrote valleys Gilgit	Annual Herb	Wild	Leaves; Flower; Whole plant	Infusion; Decoction
Allium humile Kunth	Amaryllidaceae	Jangli Thom.	Poonch Valley Azad Kashmir	Annual Herb	Wild	Bulbs	Pads form
Aloe barbadensis Mill.	Xanthorrhoeaceae	Kunwar Ghandal; Ghee Kanwar; Zargia	Morgah biodiversity Park Rawalpindi; Takht- e-Nasrati and Ahmad Abad, Karak	Annual Herb	Wild	Leaves; Whole plant	Infusion; Decoction
Aloe vera (L.) Burm.f.	Xanthorrhoeaceae	Kwargandal; Aloe	Attock; Mandi bahauddin; Jalalpur Jattan, Gujrat, Punjab.	Perennial Herb	Wild	Leaves	Infusion
Althaea officinalis L.	Malvaceae	Risha Khatmi / Tukhm-e-khitmi	Morgah biodiversity park Rawalpindi	Perennial Herb	Wild	Flowers; Leaves; Roots; Fruits and seeds.	Decoction
Angelica glauca Edgew.	Apiaceae	Chora	Sothern Punjab	Biennial Herb	Wild	Aerial parts	Infusion
Arctium lappa L.	Asteraceae	Chero	Bugrote valleys Gilgit	Biennial Shrub	Wild	Roots and seeds	Decoction
Artemisia maritima L.	Asteraceae	Spelagzai	Chapursan Valley Gilgit	Annual Shrub	Wild	leaves; Flowers and buds	Decoction
Asparagus racemosus Willd.	Asparagaceae	Shatavar; Satmuli	Kaghan Valley, Mansehra; Jalalpur Jattan, Gujrat, Punjab; Lodhran	Annual Herb	Wild	Whole plant; Roots	Infusion; Syrup
Azadirachta indica A. Juss.	Meliaceae	Dhrek	Lahore-Islamabad motorway	Perennial Tree	Wild/ Cultivated	Bark and fruit	Soaked as juice

Table 4. (Cont'd.).

Botanical name	Family	Local name	Locations	Reproduction status/Habitat	Status in nature	Part used	Drug preparation
Berberis baluchistanica Ahrendt.	Berberidaceae	Zarch	Kalat and Khuzdar regions of Balochistan	Perennial Shrub	Wild	Roots	Pads form
Berberis lycium Royle	Berberidaceae	Toor Kwaray; Ziarlargay	Dir Kohistan Valley; Kot Manzaray Baba Valley Malakand	Perennial Shrub	Wild	Roots; Whole plant	Pads form; Infusion
Bergenia ciliata (Haw.) Sternb.	Saxifragaceae	Butpay	Galliyat	Perennial Herb	Wild	Leaves and roots.	Decoction
Bistorta amplexicaulis (D. Don) Greene	Polygonaceae	Tarwa Pana; Anjabar	Northern area; Miandam Valley	Perennial Rhizomatous Herb	Wild	Rhizome	Infusion
Brassica campestris L.	Brassicaceae	Sarsoon	Dera Ghazi Khan	Annual Shrub	Wild/ Cultivated	Leaves; Seeds and oils	Decoction
Brassica nigra (L.) K. Koch	Brassicaceae	Kali Sarsoon	Isakhel, Mianwali	Annual Herb	Cultivated	Whole plant	Infusion
Brassica rapa L.	Brassicaceae	Turnip	Karachi	Annual Shrub	Wild/ Cultivated	Leaves and roots	Decoction
Buxus papillosa C.K. Schneid.	Buxaceae	Pepper	Sothern Punjab	Annual Herb	Wild	Whole plant	Infusion
Buxus sempervirens L.	Buxaceae	Shamshad	Malam Jabba valley; Dir Kohistan	Perennial Shrub	Wild	Whole plant; Leaves; Stems.	Infusion
Buxus wallichiana Baill.	Buxaceae	Shamshod	Kurd Sharif, Karak; Darra Adam Khel	Annual Herb	Wild	Wood; Leaves	Infusion
Callicarpa macrophylla Vahl	Verbenaceae (Lamiaceae)	Daya	Sothern Punjab	Perennial Shrub	Wild	Roots; leaves	Syrup
Calotropis gigantea (L.) Dryand.	Apocynaceae	Wadha AK; Ak desi.	Jhelum, Punjab	Annual Shrub	Wild	Whole plant; Latex	Decoction; Infusion
Calotropis procera (Aiton) Dryand.	Apocynaceae	Spalmakka; AK; Kehp; Urdu: Ak; Balochi: Kharegh	Lakki Marwat	Annual Shrub	Wild	Whole plant; Latex	Decoction
Capparis aphylla Roth	Capparaceae	Kareen	Isakhel, Mianwali	Perennial Tree	Wild	Whole plant	Infusion
Capparis cartilaginea Decne.	Capparaceae	Unknown	Kurd Sharif, Karak	Perennial Shrub	Wild	Wood	Infusion
Capparis deciduas (Forssk.) Edgew.	Capparaceae	Karin; Kirrer	Attock	Perennial Tree	Wild	Flower and fruit	Soaked as juice
Capparis spinosa L.	Capparaceae	Kirra; Kari	Cholistan; Lahore-Islamabad motorway	Perennial Shrub	Wild	Flowers and fruits; Root and bark	Soaked as juice; Syrup; Edible fresh
Caralluma edulis (Edgew.) Benth. ex Hook. f.	Apocynaceae	Pamankai	Northern areas Miandam Valley	Perennial Succulent Herb	Wild	Stem	Infusion
Caralluma tuberculata N.E.Br.	Apocynaceae	Pawany	Darra Adam Khel	Perennial Succulent Herb	Wild	Stem	Infusion

Table 4. (Cont'd.).

Botanical name	Family	Local name	Locations	Reproduction status/Habitat	Status in nature	Part used	Drug preparation
Carthamus oxyacantha M.Bieb.	Asteraceae	Kunzala	Bannu	Annual Herb	Wild	Seeds oil	Edible fresh
Cassia fistula L.	Fabaceae Leguminosae	Amaltas	Lahore-Islamabad motorway	Perennial Tree	Wild/ Cultivated	Root; Leaves; Flowers and seeds	Decoction
Centella asiatica (L.) Urb.	Apiaceae	Unknown	Bannu	Annual Herb	Wild	Leaves	Infusion
Chenopodium album L.	Chenopodiaceae (Amaranthaceae)	Bathewa; Sarmay; Bathua; Surma	Kaghan valley; Upper Dir; Attock; Shahbaz Khel, Lakki	Annual Herb	Wild	Whole plant; Leaves	Edible fresh; Infusion
Cichorium intybus L.	Asteraceae Compositae	Ishkanachi	Bugrote valleys Gilgit	Perennial Herb	Wild	Whole plant	Edible fresh
Citrullus colocynthis (L.) Schrad.	Cucurbitaceae	Truh.	Kohistan Khirthar National Park	Annual Herb	Wild	Roots and fruits	Soaked as juice
Clematis orientalis L.	Ranunculaceae	Murghushi	Bugrote valleys Gilgit	Annual Herb	Wild	Whole plant extract	Infusion
Cleome brachycarpa (Forssk.) Vahl ex DC.	Cleomaceae	Powar; Dhanar Khathoori	Cholistan; Sothern Punjab;Tehsil Isakhel	Annual Herb	Wild	Whole plant	Infusion
Cocculus hirsutus (L.) W.Theob.	Menispermaceae	Llarbillr	Cholistan	Annual Shrub	Wild	Leaves	Infusion
Colchicum autumnale L.	Colchicaceae	Sarba Zeala	Northern areas Miandam Valley	Annual Herb	Wild	Bulb	Pads form
Colchicum luteum Baker	Colchicaceae	Qaimat-Gula; Ziar gulay; Suranjan-e-Talakh; Qaimat guallay; Kamba.	Siran Valley, Mansehra; Dir Kohistan Valley; Kaghan Valley Mansehra; Karakorum regions of Northern Areas of Pak; Northern areas Miandam Valley; Poonch Valley Azad Kashmir	Perennial Herb	Wild	Seeds; Dried corms; Bulbs	Pads form; Decoction
Cotula anthemoides L.	Asteraceae	Babuna	Sothern Punjab	Annual prostrate Herb	Wild	Aerial parts	Infusion
Cressa cretica L.	Convolvulaceae	Unn	Sindh	Annual Herb	Wild	Whole Plant	Infusion
Cuscuta reflexa Roxb.	Convolvulaceae	Akash Bail	Siran Valley, Mansehra	Annual Herb	Wild	Leaves	Infusion
Cymbopogon jwarancusa (Jones) Schult.	Poaceae	Bur/Khawi	Sothern Punjab	Annual Herb	Wild	Leaves; Flowers; Roots.	Decoction
Cyperus rotundus L.	Cyperaceae	Muthar	Siran Valley, Mansehra	Perennial Herb	Wild	Leaves and seeds	Decoction
Daphne oleoides Schreb.	Thymelaeaceae	Anaghonai	Upper Dir	Perennial Shrub	Wild	leaves; Flowers	Decoction
Daphne papyracea Wall. ex G.Don	Thymelaeaceae	Wild pepper.	Poonch Valley Azad Kashmir	Perennial Shrub	Wild	The bark of root; stem and leaves.	Decoction
Datura alba Rumph. ex Nees	Solanaceae	Burbaka	Humzoni, Nwa	Annual Shrub	Wild	Seeds; Fruits; Leaves and bark	Decoction

Table 4. (Cont'd.).

Botanical name	Family	Local name	Locations	Reproduction status/Habitat	Status in nature	Part used	Drug preparation
Datura innoxia Mill.	Solanaceae	Dhatura; Balochi: Khekhura	Lahore Islamabad motorway; Musakhel, Barkhan Balochistan.	Annual Shrub	Wild	Leaves and Seeds	Decoction
Datura stramonium L.	Solanaceae	Porol	Mastuj Chitral	Annual Small Shrub	Wild	Stem; Branches and seeds	Infusion
Desmostachya bipinnata (L.) Stapf	Poaceae	Dub grass	Gujar Khan	Annual Herb	Wild	Roots	Syrup
Dodonaea viscosa (L.) Jacq.	Sapindaceae	Samath; Ghwrasky	Margalla; Lahore-Islamabad motorway; Takht-e-Nasrati; Upper Dir; Sothern Punjab; Valley Alladand Dehri	Perennial Shrub	Wild/ Cultivated	Leaves; Wood; Seeds	Infusion, Decoction
Echinops echinatus Roxb.	Asteraceae	Kantalu	Sothern Punjab.	Annual Herb	Wild	Whole plant	Infusion
Ephedra gerardiana Wall. ex Stapf	Ephedraceae	Asmani Booti	Galliyat	Perennial Herb	Wild	Stem; Root and berries	Infusion
Ephedra intermedia schrenk C.A. Mey.	Ephedraceae	Mowa	Birmal, South Waziristan Agency	Perennial Shrub	Wild	Young stem and branches	Decoction
Ephedra procera C.A. Mey.	Ephedraceae	Mowah	Humzoni, Nwa	Annual Shrub	Wild	Pollens and whole plant	Infusion
Eruca sativa Mill	Brassicaceae	Tara mera	Isakhel	Annual Herb	Wild	Leaves and seeds	Decoction
Euphorbia peplus L.	Euphorbiaceae	Not known	Makerwal & Gulla Khel.	Annual Shrub	Wild	Whole plant.	Infusion
Euphorbia prostrata Aiton.	Euphorbiaceae	Not known	Makerwal & Gulla Khel	Annual Herb	Wild	Whole plant.	Infusion
Fagonia arabica L.	Zygophyllaceae	Damahan	D.I Khan	Annual Herb	Wild	Leaves	Infusion
Ferula assa-foetida L.	Apiaceae	Not known	Karakorum regions of Northern Areas of Pak	Perennial Shrub	Wild	Latex	Decoction
Flacourtia indica (Burm.f.) Merr.	Salicaceae	Bhutankas	Khirthar national Park	Annual Herb	Wild	Fruits and seeds	Decoction
Fragaria nubicola (Lindl. ex Hook.f.) Lacaita	Rosaceae	Good meiva	Poonch Valley Azad Kashmir	Annual Herb	Wild	Whole plant	Infusion
Geranium rotundifolium L.	Geraniaceae	Ratan-jot	New Murree	Annual Herb	Wild	Whole plant	Infusion
Gynandropsis gynandra (Linn) Briq	Cleomaceae	Hurhuria	Cholistan	Annual Herb	Wild	Leaves	Infusion
Helianthus annuus L.	Asteraceae	Myera gul	Bannu	Annual Shrub	Cultivated	Seeds	Decoction
Hyoscyamus niger L.	Solanaceae	Khoob kalan	Dera ghazi khan	Biennial Herb	Wild	Whole plant	Infusion
Impatiens glandulifera Royle	Balsaminaceae	Buntil	Bagh, A.K	Annual Herb	Wild	Leaves and flowers	Decoction
Inula grandiflora Willd	Asteraceae	Poshkara	Leepa Valley Muzaffarabad	Annual Herb	Wild	Roots	Infusion
Juglans regia L.	Juglandaceae	Not known	Karakorum regions of Northern Areas of Pak	Perennial Tree	Wild	Stem	Infusion

Table 4. (Cont'd.).

Botanical name	Family	Local name	Locations	Reproduction status/Habitat	Status in nature	Part used	Drug preparation
Justicia adhatoda L.	Acanthaceae	Aursa; Arosa; Baikar; Baza.	Morgah biodiversity park Rawalpindi; Dir Kohistan Valley; Darra Adam Khel; Valley Alladand Dehri; Batkhela	Perennial Shrub	Wild	Root; Flowers; Leaves and bark	Decoction; Infusion
Lactuca sativa L.	Asteraceae	Dodal	Siran Valley, Mansehra	Annual Herb	Wild	Roots	Syrup
Lactuca serriola L.	Asteraceae	Dodal	Siran Valley, Mansehra	Annual Herb	Wild	Oil and leaves	Edible fresh
Martricaria chamomilla L.	Asteraceae	Babuna	Morgah biodiversity park Rawalpindi	Annual Herb	Wild	Whole herb and flower	Edible fresh
Medicago denticulata Willd.	Fabaceae	Mehna	Dera Ghazi Khan	Perennial Herb	Wild	Seeds and oil	Decoction
Medicago sativa L.	Fabaceae	Ishpith	Bugrote valleys Gilgit	Annual Herb	Wild	Whole plant and seeds	Edible fresh
Melia azedarach L.	Meliaceae	Bakain; Bakana	Sothern Punjab; Bannu	Perennial Tree	Cultivated	Young branches; Leaves and fruits; Bark; Seeds; Flowers	Decoction
Mentha longifolia (L.) L.	Lamiaceae	Welana; Valane	Bannu; Upper Dir	Annual Herb	Cultivated	Powdered dried leaves	Infusion
Mentha sylvestris L.	Lamiaceae	Welana; Valanai	Chapursan Valley Gilgit; Birmal, South Waziristan	Annual Herb	Wild	Leaves and flowers	Decoction; Infusion
Moringa oleifera Lam.	Moringaceae	Suhanjana	Noorpur Thal, Khushab	Annual Herb	Cultivated	Flowers; Fruits	Soaked as juice
Nerium odorum L.	Apocyanaceae	Kaner	Lahore-Islamabad motorway	Perennial Shrub	Wild/ Cultivated	Roots; Leaves and flowers	Infusion
Olea ferruginea Wall. ex Aitch.	Oleaceae	Khuna	Batkhela; Upper Dir; Lahore- Islamabad motorway	Perennial Tree	Wild	Leaves and woods; Bark; Fruits and seeds	Infusion; Decoction
Paeonia emodi Royle	Paeoniaceae	Mamekhi; Mamekh	Chitral; Kaghan valley; Booni Valley	Perennial Herb	Wild	Stem and roots; rhizome	Infusion
Peganum harmala L.	Zygophyllaceae (Nitrariaceae)	Spelani; Harmal; Urdu: Harmal; Balochi: Aspand	Karak; Jhelum; Karakorum regions of Northern Areas of Pak; Musakhel and Barkhan in Balochistan	Annual Herb	Wild	Leaves seed and roots	Infusion; Decoction
Periploca aphylla Decne.	Apocyanaceae	Bararha	Karak	Annual Shrub	Wild	Whole plant	Infusion
Phyllanthus emblica L.	Phyllanthaceae	Amla	Morgah biodiversity park Rawalpindi	Perennial Tree	Wild	Fresh; dried fruits; Seeds; Flowers; Leaves and bark	Infusion
Pistacia integrrima Stew.ex	Anacardiaceae	Kakara	Poonch Valley Azad Kashmir	Perennial Tree	Wild	Fruit galls.	Edible fresh
Plantago major L.	Plantaginaceae	Ispagool	Bagh, A.K	Annual Herb	Wild	Leaves and seeds	Decoction
Polygonum alpimum All.	Polygonaceae	Jangli Masloon	Leepa Valley Muzaffarabad	Annual Herb	Wild	Rhizome	Infusion

Table 4. (Cont'd.).

Botanical name	Family	Local name	Locations	Reproduction status/Habitat	Status in nature	Part used	Drug preparation
Polygonum amplexicaule D. Don	Polygonaceae	Masloon	District Bagh; Poonch Valley Azad Kashmir	Annual Herb	Wild	Whole plant; Rhizome	Infusion
Polygonum glabrum Willd.	Polygonaceae	Basirjoush	Mastuj Chitral	Annual Herb	Wild	Bark; Branches and leaves	Decoction
Pongamia pinnata (L.) Pierre	Fabaceae	Sukhechein	Lahore-Islamabad motorway	Annual Herb	Wild	Leaves and bark	Infusion
Prosopis cineraria (L.) Druce	Fabaceae	Jhand;Shami; Khejri	Jhelum; Cholistan	Perennial Tree	Wild	Bark; Flower and Fruit; Pod	Decoction
Prosopis juliflora (Sw.) DC.	Fabaceae	Pirasu	D.I Khan	Perennial Tree	Wild	Bark; Pod	Decoction
Prosopis spicigera L.	Fabaceae	Jand / Jandi	D.I Khan	Perennial Tree	Wild	Bark and Fruit	Decoction
Portulaca oleracea L.	Portulacaceae	Loonrak	Dera Ghazi Khan	Annual Herb	Wild	Whole plant	Infusion
Rhazya stricta Decne.	Apocynaceae	Sheen Gandaria	Darra Adam Khel	Perennial Shrub	Wild	Stem and leaves.	Decoction
Ricinus communis L.	Euphorbiaceae	Harnoli / Arand	D.I Khan; Morgah biodiversity park Rawalpindi; Mandi Bahauddin; Jhelum	Perennial Shrub	Wild	Seed; Leaves; Oil; Roots; Whole plant	Decoction; Infusion; Pads form
Rubia cordifolia L.	Rubiaceae	Chero	Punjab; New Murree; Central Punjab; Bugrote valleys Gilgit	Perennial Herb	Wld	Roots	Syrup
Rumex crispus L.	Polygonaceae	Taweka	Chapursan Valley gilgit	Annual Herb	Wild	Whole plant	Infusion
Rumex nepalensis Spreng.	Polygonaceae	Obabal	Bugrote valleys Gilgit	Annual Herb	Wild	Roots	Syrup
Salix alba L.	Salicaceae	Not known	Bumburet valley Chitral	Perennial Tree	Wild	Whole plant	Decoction
Salvadora oleoides Decne.	Salvadoraceae	Pilu / Jal; Jhal; Peelu /Jal	D.I Khan; Attock; Sothern Punjab.	Perennial Tree	Wild	Seed; Leaves; Fruit; Root; Bark; Oil	Decoction; Infusion
Salvadora persica L.	Salvadoraceae	Peelu (Red seeded)	Sothern Punjab	Perennial Tree	Wild	Stem; Root; Oil; Seed; Leaves; Bark	Infusion
Saussurea lappa (Decne.) Sch. Bip.	Asteraceae	Minal	Bugrote valleys Gilgit	Annual Herb	Wild	Roots	Syrup
Senna italica Mill.	Fabaceae	Goora wall	Sindh	Annual Herb	Wild	Leaves	Infusion
Sisymbrium irio L.	Brassicaceae	Khobalai	Dera Ghazi Khan	Annual Herb	Wild	Whole plant	Infusion
Solanum miniatum Burnh. Ex Willd.	Solanaceae	Kachmacho	Batkhela	Annual Herb	Wild	Shoot	Infusion
Solanum nigrum L.	Solanaceae	Ghabily; Mako	Bugrote valleys gilgit; Sothern Punjab; Takht-e-Nasrati, Karak.	Annual Herb	Wild	Fruits and leaves	Soaked as juice; Infusion
Solanum surattense Burm. f.	Solanaceae	Kateli; Kundiari; Wara Maraghonrye; Malkudi /Maraghunai; Mokari; Mahori; Kanderi; Mahukeri; Kandiyari; Mohkri; Mohakri; Mohakri	Cholistan; Karak; Bugrote valleys Gilgit; Banda Daud shah Karak; Gujar Khan; Rawalpindi; Noorpur Thal, Khushab; Lakki Marwat; Sothern Punjab; Dera ghazi khan; Poonch Valley Azad Kashmir; Mianwali	Annual Herb	Wild	Whole plant; Berries; Aerial parts; Leaves; Roots	Infusion; Decoction; Soaked as juice

Table 4. (Cont'd.).

Botanical name	Family	Local name	Locations	Reproduction status/Habitat	Status in nature	Part used	Drug preparation
Stellaria media (L.) Vill.	Caryophyllaceae	Salooni booti	Dera Ghazi Khan	Annual Herb	Wild	Whole plant	Infusion
Taraxacum officinale (L.) Weber.	Asteraceae	Shamakay; Zear Gulay; Peryano doli; Dudal Bumbola.	Banda Daud Shah Karak; Dir Kohistan valley; Galliyat	Perennial Herb	Wild	Young leaves; Roots	Infusion; Decoction
Tephrosia lupinifolia DC.	Fabaceae	Fish Poison	Sialkot; Mandi Bahauddin; Jalalpur; Gujrat; Lodhran	Perennial Herb	Wild	Root; Leaf; Stem and bark	Infusion; Decoction
Thalictrum foetidum L.	Ranunculaceae	Halizee	Bugrote valleys Gilgit	Annual Herb	Wild	Tubers	Infusion
Trachomitum venetum (L.) Woodson	Apocynaceae	Bakat)	Mastuj Chitral	Perennial Rhizomatous Herb	Wild	Leaves; Bark and stem	Infusion
Trachyspermum ammi (L.) Sprague	Apiaceae	Ajwain	Morgah biodiversity park Rawalpindi.	Annual Herb	Wild	Seeds and oil	Decoction
Trianthema portulacastrum L.	Aizoaceae	Itsit; Hog weed	Lodhran	Annual Herb	Wild	Whole plant	Infusion
Tribulus terrestris L.	Zygophyllaceae	Gokhur khurd / Behkar; Markondai	Morgah biodiversity park Rawalpindi; valley Alladand Dehri; Batkhela	Annual Herb	Wild	Fruit and root; Shoot	Infusion
Trichodesma indicum (L.) Lehm.	Boraginaceae	Gaozaban	Sothern Punjab	Annual Herb	Wild	Leaves	Infusion
Verbascum thapsus L.	Scrophulariaceae	Khardug; Zangali tambaco	Valley Alladand Dehri; Batkhela	Annual herb	Wild	Leaves; Flowers;	Infusion
Vernonia anthelmintica (L.) Willd.	Asteraceae	Kaari geeri	Sindh	Annual Shrub	Wild	Seeds	Decoction
Veronica anagallis L.	Plantaginaceae	Hazar booti	Dera Ghazi khan	Perennial Herb	Wild	Whole plant	Infusion
Vitex negundo L.	Verbenaceae (Lamiaceae)	Nirgandi; Marwan; Marmandi	Takht-e-Nasrati, Karak; Upper Dir; Humzoni, Nwa	Perennial Shrub	Wild	Flowers; Seeds and Roots; Leaves; Branches	Decoction; Infusion
Withania coagulans (Stocks) Dunal	Solanaceae	Shapianga	Razmak valley, North Waziristan.	Annual Herb	Wild	Leaves; Fruit and seeds	Decoction
Withania somnifera (L.) Dunal	Solanaceae	Koori Chinothi; Asghan / Ashwagandha; Kora paneer; Ak San; Winter Cherry; Asgand; Kotilal; Ak San; Winter Cherry; Koori Chinothi; Beta	Khirthar National Park; Morgah biodiversity park Rawalpindi; Makerwal & Gulla Khel; Sothern Punjab; Sialkot; Mandi Bahauddin; Takht-e-Nasrati, Karak; Jalalpur Jattan; Gujrat	Annual Herb	Wild	Roots and leaves; Seeds; Whole plant; Fruit	Syrup; Decoction; Infusion; Soaked as juice
Woodfordia fructicosa (L.) Kurz	Lythraceae	Dhawi	Siran Valley Mansehra	Perennial Herb	Wild	Fruits	Soaked as juice
Xanthium strumarium L.	Asteraceae	Put Kunda	Dera Ghazi Khan	Annual Herb	Wild	Whole plant	Infusion

Citations: (Ahmad & Hussain, 2008; Adnan *et al*., 2014; Abbasi *et al*., 2010; Ahmad *et al*., 2010; Ahmad, 2007; Ahmad & Hussain, 2008; Ali & Qaiser, 2009; Awan *et al*., 2011; Barkatullah *et al*., 2009; Farooq *et al*., 2012; Hamayun, 2007; Hamayun *et al*., 2006; Hayat *et al*., 2008; Hazrat *et al*., 2007; Hazrat *et al*., 2010; Hazrat *et al*., 2011; Hussain *et al*., 2008, Hussain *et al*., 2007; Ibrar *et al*., 2007; Ishtiaq *et al*., 2007; Jan *et al*., 2011; Jan *et al*., 2008; Khan *et al*., 2013; Khan *et al*., 2007; Mahmood *et al*., 2011a; Mahmood *et al*., 2011b; Manan *et al*., 2007; Marwat *et al*., 2011a; Marwat *et al*., 2011b; Murad *et al*., 2011; Murad *et al*., 2013; Panhwar *et al*., 2007; Qureshi *et al*., 2006; Qureshi *et al*., 2009a; Qureshi *et al*., 2009b; Qureshi *et al*., 2011; Qureshia *et al*., 2007; Saleem *et al*., 2001; Sher & Hussain, 2009; Sher *et al*., 2011; Shinwari & Khan, 2011; Ullah *et al*., 2013; Wazir *et al*., 2007).

Conclusions and Recommendations

The study illustrates the importance of traditional medicines in the treatment and management of rheumatic diseases and ailments in Pakistan. Highly utilized plants in different regions against rheumatism should be tested *in-vitro* for their phytochemical and pharmacological activities. Majority of wild species are being use for medicinal purposes posing great threats on their survival. It was concluded that *Saussurea lappa* is an extremely endangered species because of its high medicinal value and other species like *Solanum surattense* Burm. F and *Withania somnifera* (L) Dunal etc. is decreasing very rapidly. *Pistacea integerrima, Paeonia emodi, Skimmia laureola, Taxus wallichiana and Aesculus indica* areextensively exploited by the local people for their various ethnobotanical uses. It is therefore imperative to mobilize community toward the cultivation of wild medicinal plants. Community should be educated about the proper methods of harvesting of medicinal plants and their processing. Awareness among the community on herbal medication and conservation of anti-rheumatic plants is necessary due to variety of side effects of allopathic drugs.

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