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Ethno-medicinal survey of important plants practiced by indigenous community at Qamber khel, District Khyber, Pakistan

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Medicinal plants play a crucial role in addressing a variety of health issues in living organisms. The current study was designed to systematically investigate and document the indigenous knowledge in the scientifically underexplored region of Qamber khel, District Khyber, Pakistan. Consequently, this research contributes positively to the field of ethnopharmacology. Prior to collecting ethnomedicinal data, routine field visits were conducted in April 2022 to identify locations and participants for recording traditional knowledge. Ethno-medicinal data was gathered from May to August 2022 using a rapid appraisal approach (RAA), involving direct engagement with indigenous communities through group discussions, corner meetings, and semi-structured interviews. Data were statistically evaluated using the Use Value (UV) index. The study identified a total of 70 medicinal plants from 38 families, with leaves being the most commonly utilized plant parts. The highest use values were recorded for *Withania somnifera* (0.95), *Withania coagulans* (0.92), *Solanum nigrum* (0.91), *Morus nigra* (0.89), *Acacia modesta* (0.88), and *Foeniculum vulgare* (0.85). Gastrointestinal disorders exhibited a high incidence (20%), followed by respiratory diseases (10%), sexual tonic (6%), diabetes (3%), skin disorders (2%), fever (6%), analgesic (6%), nervous disorders (2%), wound healing (4%), kidney diseases (2%), diuretic (1%), abdominal pain (2%), infection (10%), and anti-cancer (1%). The local population largely depends on traditional herbal therapies for primary healthcare. Recognizing this dependence, it is imperative to conduct pharmacological and toxicological investigations on specific flora. Additionally, initiatives should be formulated to address issues related to the conservation of medicinal plants

Keywords: Medicinal plants, Traditional knowledge, Ailments, Herbal therapies, Use value

INTRODUCTION

The documentation of ethno-medicinal information plays a crucial role in shedding light on traditional knowledge, aiding the discovery of modern allopathic drugs (Cox, 2000; Flaster, 1996). In contemporary pharmacopoeia, numerous synthetic drugs originating from plants have been recorded. Currently, in developing countries, approximately 80% of the world's population relies on these traditional therapies to address various ailments (Danoe and Bogh, 1999; Calixto, 2005; WHO, 2002). Medicinal plants encompass various biologically active factors (WHO, 1993). Different therapeutically active plants are utilized in herbal medicines, demonstrating their effectiveness in competing with modern allopathic drugs (Ahmad, 1998). Pakistan boasts a rich diversity of medicinal and aromatic flora due to its unique phytogeography and diverse climatic conditions. It is estimated that about 400–600 medicinal plant species out of 5700 exist in Pakistan. In the early 1950s, nearly 84% of the Pakistani population primarily relied on traditional medicines for primary healthcare (Hocking et al. 1958). However, this dependency has now shifted mainly to remote areas due to rapid lifestyle changes and modernization (Ibrar et al. 2007). Nevertheless, Northern Pakistan is still considered one of the country's richest regions in terms of biodiversity and the cultural

utilization of unique medicinal plant resources (Malcolm et al. 2002). The three mountain ranges—the Himalaya, the Karakorum, and the Hindu Kush (HKH)—collectively harbor about 25,000 species (approximately 10% of world plant species), with around 10,000 being economically or medicinally valuable (Pei, 1992). The majority (60.78%) of Pakistan's population resides in rural areas, facing challenges such as poverty, illiteracy, poor drinking water quality, low women's status, and inadequate sanitation, all of which significantly impact their health (Popović et al. 2016). Moreover, prevalent health limitations in Pakistan, especially in rural areas, include insufficient awareness about health and illnesses, health service perceptions, and societal barriers. The healthcare system in Pakistan is bifurcated into the public sector and the private sector. The allopathic healthcare system, the primary pillar of the public sector, is well-organized and regulated but underutilized due to various shortcomings (Popović *et al.* 2016; Gwalwansh et al. 2014), including inadequate attention to upgrading healthcare facilities, political interference, below-par human resources, and poor management and policy development. The private healthcare sector comprises a few recognized hospitals, health centers, and several unrecognized facilities, including medical practitioners, homeopathists, hakims (physicians using traditional remedies), Unani herbalists, and local herbalists and spiritual therapists (Jan *et al.* 2019). The local population often seeks advice from these institutions and practitioners due to factors like easy availability, affordability, family pressure, and strong community opinions (Popović et al. 2016). They are the primary choice for treating conditions such as depression, epilepsy, infertility, and psychosomatic troubles (Jan et al. 2019). Medicinal plant research in Pakistan primarily involves documenting their cultural values. Local communities in Pakistan possess extensive traditional knowledge about local medicinal plants, which has been passed down through generations. However, this knowledge is currently at risk due to a lack of interest among younger generations, underscoring the need for proper documentation and conservation. The present survey was conducted to assess and preserve the ethnomedicinal knowledge of the Qamber khel community. This study aims to acquaint local and surrounding communities with both the novel medicinal uses of already-known plants and newly reported medicinal plants.

MATERIALS AND METHODS

Study area

The study area is Qamber kheil (33051'58.5"N and 70°47'14.4"E) located in District Khyber. Its elevation from sea level is 1914m.Qamber kheil shares a border with Malakdein kheil, Jamrud etc. The famous Bara River flows through this region of area. There is a very remote and disciplined channel system in this region. The weather here remains mild throughout the year. Due to availability of water vegetation is possible with a variety of being used by the locals for their daily needs. In winter snowfall usually occurs at the summits of surrounding hills. There is a variety of vegetation in the area ranging from herbs to many daily life edible vegetables. The vegetation in Qamber Kheil area is very much resourceful for the locals and help in the day to day needs of the people of the locality. The amount sometimes is much so can be sold for income purpose in the local area Kajore and famous markets like Bara market.

Figure 1: Map of the study area

Ethnobotanical survey

Between April and August 2022, a field survey was carried out in the Qamber khel of District Khyber. Data collection involved semi-structured interviews with elderly community members from three distinct groups, resulting in the selection of 171 participants from the study area. The participants were chosen using a pseudo-random sampling technique, which measures the extent to which a sequence of participants, though produced by a completely deterministic and repeatable process, appears pattern less. Verbal consent was obtained from each participant before recording reported information and ethnobotanical data. Before conducting in-depth interviews, the main objectives of the study were explained, and various questions about the uses of medicinal plants were posed. Information provided by study participants, including medicinal plant uses, botanical names, local names, parts used, culinary preparation methods, and frequency of quotation, was recorded. All interviews were conducted in the

participants' native language, utilizing open-ended questions and recording qualitative data through direct observation. During the ethnobotanical field survey, strict adherence was maintained to the recommendations of the International Society of Ethnobiology (ISE, 2022). Approval was obtained to photograph the informants, and the cooperation of selected informants who participated in semi-structured interviews was gratefully acknowledged, recognizing their indispensable contribution to the study. Voucher specimens for each quoted plant were collected, identified by a taxonomist at the Department of Botany, Qurtaba University of Science and Technology, Peshawar, Pakistan, with the assistance of the Flora of Pakistan. Voucher specimens were deposited in the Herbarium of Qurtuba University, Peshawar. The World Flora Online was utilized to verify the nomenclature and classification of each plant taxon. Ethnobotanical data, along with botanical families and voucher specimen numbers, were presented. Common English names were assigned to each quoted plant taxon, with most sourced from Wikipedia, and a few from other online platforms such as Flowers of India and India Biodiversity Portal. (https://indiabiodiversity.org/species/show/243959)

Preservation and taxonomical verifications

The medicinal plants referenced in the present survey were gathered and recognized by a taxonomist from the Department of Botany at Qurtaba University of Science and Technology. These plants underwent the process of pressing to remove moisture, were treated with a poison solution (1% HgCl2), and were affixed to herbarium sheets. Voucher numbers were allocated to them and they were submitted to the Botany department at Kohat University for future reference. These specimens will be utilized for verification against the flora of Pakistan (Ali and Nasir, 1989–1991; Ali and Qaiser, 1993–2011).

Data organization and analysis

The compilation of data took place using MS Excel. The frequency of citation for each species, as mentioned by the informants, was tallied. The concept of the relative importance of a plant, introduced by Phillips and Gentry in 1993, involves calculating the index of use value. The formula for computing the use value for a species is as follows.

x; $UV_x = \Sigma U_x / N_x$

Ux represents the count of utilization reports provided by each informant for species x, whereas N stands for the overall number of informants describing the particular species x.

Demographic Data of Local Inhabitants

The present study involved surveying a total of 171 participants through conversational questioning, in-person discussions, and focus groups. The participants included individuals from various backgrounds, comprising 39 farmers, 31 homemakers, unemployed elders, 27 plant gatherers, 14 healers, 15 hunters, 26 shepherds, 11 dealers, and 8 salespeople. Interviews were conducted throughout the year, engaging informants from diverse professions and age brackets. The informants' ages spanned from under 18 to over 65 years old, with 33 informants falling between 21 and 40 years and 62 informants being over the age of 60. Among male informants, 12 were under 21, 24 were between 26 and 39, 38 were between 41 and 60, and 50 were beyond 60

Table1: shows gender, age group and literacy level frequency of the respondents

Variables	Categories	Number of Informants	Percentage	Sum of Reports
Gender ratio	Men	49	29	589
	Women	122	72	2710
Age	<20	15	9	107
	21–40	33	20	217
	41–60	58	35	409
	>60	62	37	2564
Educational Background	uneducated	67	40	1682
	matriculate	53	32	839
	Intermediate	27	16	353
	Graduate	18	10	301
	Postgraduate	6	3	126

RESULTS AND DISCUSSION

Traditional knowledge and informant demographic status

The use of medicinal plants for treating various ailments dates back to ancient human civilization. Approximately 20% of all plants worldwide are reported

to be utilized for medicinal purposes in addressing living beings' health issues (Khan et al. 2013). In the study area, indigenous communities, particularly local healers, have employed numerous traditional herbal recipes, playing a significant role in the local healthcare system. Medicinal flora is used as a primary aid in treating ailments, except in severe emergencies, similar to practices in other parts of the country (El-Hilaly *et al.* 2003). This study contributes valuable traditional information about medicinal plants from an area that has been minimally explored in the tribal belt of Khyber Pakhtunkhwa (Adnan et al. 2014). The current investigation reveals a notable decline in the expertise, trust, and knowledge regarding traditional herbal medications due to the recent introduction of allopathic medicines. Comparable results were identified by Sher et al. (2016) in a study conducted in district Chitral. These findings align with other studies illustrating the erosion of valuable knowledge due to modernization (Reyes-García et al. 2003). Moreover, in the study region, significant threats to important medicinal flora include heavy grazing, uncontrolled cutting, deforestation, and collection for fodder purposes by local collectors, consistent with findings reported by Sher *et al*. (2015). Changes in socioeconomic pressure have been linked to the gradual extinction of traditional knowledge about folk herbal medications in the study area (Sher *et al.* 2015). Table 1 provides demographic information about respondents, while Table 2 details local names, parts used, medicinal descriptions, and use values of reported plant species. A total of 197 respondents were interviewed, with medicinal knowledge obtained from 113, and the rest assisting in locating experts with traditional knowledge before conducting the ethno-medicinal survey. Informants were categorized demographically, with a focus on male informants due to cultural restrictions in the area. Gender segregation and veiling (Parda) are prevalent, particularly in interviews between female and male informants, as per religious traditions (Ahmad et al. 2015). Most data were gathered from local healers (Hakims) and elder community members, recognized for their accurate traditional knowledge about medicinal plants' parts and recipes. Traditional herbal recipes prepared by elder community members were found to be more effective than those prepared by younger individuals (Parveen et al. 2007). The ongoing trend of modernization is affecting the transfer of knowledge between generations, and if this continues, it may lead to the gradual disappearance of traditional folk knowledge (Adnan et al. 2014). The decreasing transfer of indigenous knowledge may be attributed to the younger generation's disinterest in learning and practicing traditional knowledge, as indigenous societies increasingly encounter modernization (Adnan *et al.* 2014). Interestingly, during the survey, it was observed that illiterate community members were more aware of traditional knowledge compared to their educated counterparts. Highly educated individuals were found to be less knowledgeable about traditional practices and medicinal plant uses, aligning with findings from different studies in Pakistan (Giday et al. 2009). The study's findings suggest that traditional medication knowledge is scattered and should be compiled systematically to share it beyond the local community through published literature. Although local healers and older individuals in remote areas possess sufficient knowledge about medicinal plant uses, they may not fully grasp the importance of this traditional knowledge. Special initiatives, awareness programs, and projects should be designed to raise awareness within local communities about the significance of medicinal flora.

Table 2 :**Medicinal plant used at Qamber khel of District Khyber, UV = Use value**

Botanical Name	Family name	Local name	Part used	Ethnobotanical uses	UV
Amaranathus viridis Linn.	Amaranthaceae	Arakhy	Leave	It is used for gastrointestinal problem and Antipyretic agent	0.56
Nerium olender Griff.	Apocynaceae	Gandara	Whole plant	Used for ornamental purpose highly toxic for animal	0.69
Calotropis procera R.Brown.	Asclepiadaceae	Spulmay	Whole plant	It is used as anthelmintic and expectorant. Their flowers were used for tumor.	0.63
Calendula arvensis L.	Asteraceae	Zirguly	Leave	Leave are used in digestive disorder usually in spleen enlargement	0.4

Parthenium hysterophorus Linn.	Asteraceae	Banga	Leave and branches	It is used for urine infection, fever and heart problem.	0.31
Eruca sativa Mill.	Brassicaceae	Sharshamy	Whole plant	Oil obtained from seeds, which is used for cooking and as anti scabic. Used as fodder and fuel.	0.48
Fumaria indica Linn.	Fumariaceae	Shshtry	Whole plant	It is useful in stomach disorder, eye infection and in fever	0.7
Malva neglecta Wall.	Malvaceae		Whole plant	Used fot constipation and as fodder	0.74
Melia azedarach L.	Meliaceae	Bakyana	Leave and seed	Leaves used as antiseptic, and seeds used in blood disorders.	0.67
Acacia modesta Wall.	Mimosaceae	Palosa	Whole plant and latex	Leaves used as cooling agent. Bark used as analgesic and latex used for backach Also used as fuel and for shelter.	0.88
Morus nigra L.	Moraceae	Toot	Fruit and seed	Fruit is eaten for throat infection wood is used as fuel	0.89
Oxalis corniculata L.	Oxalidaceae	Trawaky	Whole plant	Used in stomach disorder and Cooling agent	0.71
Solanum suretenses Burn.	Solanaceae	Azghaka	Leaves and roots	Used as expectorant and in cough. It is also used for chest problem.	0.79
Withania coagulans Dunal.	Solanaceae	khamazory	Whole plant	Fruit is used for stomach disorder and diabetics	0.91
Whithania somnifera (L.) Dunall.	Solanaceae	Kotilal	Whole plant	Fruit is used for abdominal pain anxity and sextual tonic	0.94
Coriandrum sativum L.	Umbeliferaceae	Dhanya	Whole plant	It is used as condiments used in digestive disorder. Used for cough and dysentery.	0.8
Foeniculum vulgare Mill.	Umbeliferaceae	Kaga	Seeds	Seeds used in digestive disorder and as condiments	0.85
Callistem lanceolatus	Myrtaceae	Bottle brush	Leaves	For diarrhoea, dysentery	0.78
Cupresus semperirens	Cupressacaea	*Pencil pine*	Needles	Respiratory infections	,75
Rosa indica	Rosaceaea	Rose	Petals	Heals grief, nervous stress	0.66
Dodnea viscosa	Sapindaceae	Hop bush	Stem	Relieves itching, fevers	0.48
Syzygium Jambolina	Myrtaceae	Jamun	Leaves	Anti-bacterial affect	0.74
Cycus revoluta	Cycadaceae	Sago palm	Stem	Prevent high Bp	0.67
Chrysanthemum indicum	Asteraceae	Zyar gule	Flower	Fever, migraine,	0.77

				inflammation	
Ranunculus muricatus	Ranunculaceae	Not known	Leaves	Used for hay fever, arthritis	0.86
Trifolium squarosum	Leguminosae	Not known	Flower	Rheumatism and gout	0.78
Prunus avium	Rosaceae	Not known	Leaves	For treating cancer, obesity	0.37
Callistemon citrinus	Myrtaceae	Sor bottlebrush	Leaves	Anti-bacterial	0.53
Anagalisis arvensis	Primulaceae	Not known	Whole plant	Kidney diseases	0.67
Gazania rigens	Asteraceae	Not known	Flowers	Sterility, headache	0.71
Urtica urens	Urticaceae	Not known	Leaves	Anaemia treatment	0.56
Crepis vesicaria	Asteraceae	Hawks beard	Flower	Eye diseases	0.77
Ziziphus nummularia	Rhamnaceae	Not known	Leaves	Anti-inflammatory,	0.69
Jasminum sambac	Oleaceae	Arabian jasmine	Flower	Antiseptic, epilepsy	0.65
Euphorbia milli	Euphorbiaceae	Crown of thorns	Whole plant	Treatment of hepatitis	0.59
Trigonella foenun	Papilionaceae	Methi	Leaves	Gastric stimulant, antidiabetic	0.94
Eriobotrya japonica	Rosaceae	Loquat	Leave extract	Treatment of cough	0.78
Pinus gerardiana	Pinaceae	Chalghoza pine	Seed	Treatment of ulcer	0.59
Melilotus indicus	Fabaceae	Sweet corn	Flowers	Antibacterial and antioxidant	0.48
Jasminum grandiflorum	Oleaceae	Chambeli	Flower	Sexual impotency	0.75
Albizia lebbeck	Fabaceae	Womens tongue tree	Leaves	Treatment of asthma	0.86
Broussonetia papyrifera	Moraceae	Mulberry	Leaves	Treatment of chronic prostatitis	0.71
Anethum graviolens	Apiaceae	Dil	Seeds	Carminative treatment	0.7
Ficus benjamina	Moraceae	Weeping fig	Fruit	Skin disorder treatment , Constipation and sextual tonic	0.91
Rhazya stricta	Apocynaceae	Eshvarak	Leaves	Diabetes, sore throat	0.88
Solanum nigrum	Solanaceae	Black night shade	Leaves	Treat pneumonia,tumor,fever	0.91
Vicia sativa	Fabaceae	Common vetch	Seed	Bronchitis	0.73
Euonymus japonica	Celastraceae	Not known	Bark	Antidiuretic, antirheumatic	0.76
Allium griffithianum Bioss	Alliaceae	Belandon	Whole	Used as colic and dyspepsia	0.55
Alternanthera pungens Kunth.	Amaranthaceae	Therakay	Leaves	Nutritional effect on body	0.56
Asplenium trichomanes L	Pteridaceae	Tor lakay	Leaves	abdominal pain	0.66

Cedrus deodara L.	Pinaceae	Lmunza	Wood	Burned ash is used for eyes treatment	0.78
Pinus ruxbergii Sargent.	Pinaceae	Kaghazi nakhatar	Wood	Wound healing	0.71
Taxus wallichiana Zucc.	Pinaceae	Sraff	Fruit	Backache treatment	0.52
Cyperus niveus Retz.	Cyperaceae	Gul shod	Roots	Gastro problems	0.75
Tulipa clusiana Hook.	Liliaceae	Pyoz ghulay	Bulb	Improve digestion	0.89
Cynodon dactylon L.	Poaceae	Barawa	Whole	Kidney stones	0.77
Hordium vulgare L.	Poaceae	Warbashe	Seeds	Diarrhoea treatment	0.68
Hyparrhenia hirta L.	Poaceae	Sarding	Leaves	As diuretic	0.45
Setaria viridis L.	Poaceae	Sardal	Leaves	Wound healing	0.69
Pimpinella diversifolia Wall.	Apiaceae	Danyakay	Whole	Stomach problems	0.59
Artemisia vulgaris L.	Asteraceae	Mastyara	Leaves	Treat intestinal worms	0.78
Conyza bonariensis L.	Asteraceae	Nooray	Whole	Used for cough	0.57
Conyza canadensis L.	Asteraceae	Kharbotay	Whole	used for dysentery	75
Cirsium falconeri Petrak.	Asteraceae	Azghay	Stem	For toothache relief	0.52
Erigeron peregrinus Banks.	Asteraceae	Sheengullay	Whole	Gastro relief	0.65
Launaea secunda Hook.	Asteraceae	Dadukha	Leaves	Pain reliever	0.72
Citrullus lanatus Thunb.	Cucurbitaceae	Hindwana	Fruit and seed	Skin nourishment and sextual tonic	0.72
Mentha arvensis L.	Lamiceae	Shna poodena	Leaves	Purifies blood	0.78
Nepeta cataria L.	Lamiceae	Mithakha	Leaves	Reduces stomach burns	0.86

Medicinal flora and its relative importance

Phillips and Gentry (Phillips *et al.* 1993) introduced an index for calculating the relative importance of a species in terms of its traditional use. This quantitative method aids in validating and indicating the relative importance of either a species or the entire family. Various plant species exhibited diverse values in terms of their use value index, as shown in Table 1. In this study, a notably high use value was recorded for *Peganum harmala* (0.93), which significantly contributed to the treatment of various ailments. Other plants with elevated use values include Withania somnifera (0.95), *Withania coagulans* (0.92), *Solanum nigrum* (0.91), *Morus nigra* (0.89), *Acacia modesta* (0.88), and *Foeniculum vulgare* (0.85). The use value plays a crucial role in assessing the therapeutic potential of any medicinal plant; a higher use value indicates greater traditional importance for the indigenous community. The medicinal plant with the lowest use value was *Parthenium hysterophorus* (0.14), and its lower use value may be attributed to its scarcity in the area or the indigenous people's lack of awareness regarding the medicinal potential of this plant species.

Medicinal plants use

The current study presents information on 70 species of medicinal plants utilized by the indigenous population in the surveyed area. The documented medicinal plants identified in the recent survey belonged to 38 families and 66 genera. The most commonly utilized parts of plants were leaves (37%), followed by the whole plant (26%), seeds (12%), and so forth. Numerous studies conducted in diverse ethnic communities have consistently reported the prevalent use of leaves in traditional healing practices [43–50]. The widespread acknowledgment of the therapeutic role of leaves in traditional herbal medicine may be attributed to the abundance of biologically active components found within them (Mahmood *et al.* 2013). Harvesting leaves and other aerial parts of medicinal plants is considered more sustainable than extracting roots for species preservation (Ghimire *et al.* 2008). Beyond leaves, various other plant parts such as flowers, bark, stems, seeds, and fruits are also utilized, with the choice depending on user preferences and the specific plant species. The preference for leaves in traditional medicine may be due to their easy availability, processing methods, and minimal conservation concerns (Ticktin, 2004). Medicinal plants with multiple uses serve

as strong indicators of the presence of biologically active therapeutic components and other phytoconstituents. These observations may prompt further research into the medicinal applications of such plants (Adnan *et al.* 2014). The frequent use of specific plant parts suggests their potential strong medicinal value, highlighting the need for further evaluation through biochemical screening and pharmaceutical assessment to validate local and indigenous knowledge. The study revealed the use of various medicinal plants against specific diseases or categories of diseases. Reported medicinal plants were employed for 33 different types of diseases, including serious ailments such as cardiac problems, hepatitis, sexual problems, gastrointestinal disorders (20%), sexual tonic (6%), diabetes (3%), respiratory diseases (10%), skin disorders (2%), fever (6%), analgesic (6%), nervous disorders (2%), wound healing (4%), kidney diseases (2%), diuretic (1%), abdominal pain (2%), infection (10%), cooling (2%), miscellaneous (24%), and anti-cancer (1%) . These results indicate a high occurrence of gastrointestinal problems, a common concern not only in the study area but throughout the entire country, leading to a higher mortality ratio if left untreated (Ribeiro *et al.* 2010). The study highlighted the use of medicinal plants against 68 different diseases, emphasizing the urgent need for prompt and effective treatment, particularly for serious conditions like cardiac problems, hepatitis, sexual problems, and diabetes. People typically collect medicinal plants from open areas due to the region's rich diversity of such plants. Commonly used medicinal plants include Withania somnifera, Solanum nigrum, *Ficus benjamina*, *Withania coagulans, Orus nigra, Acacia modesta, Foeniculum vulgare, Mentha arvensis*, and *Malva neglecta*, among others. The current exploration also revealed the overharvesting of economically valuable species such as *Withania coagulans* and *Withania somnifera*, prompting the need for cultivation to restore their ecological roles and counter the threat of overconsumption. The utilization and enhanced efficacy of medicinal plant combinations can be attributed to synergistic or additive effects. Preparation methods for medicinal plants may vary among individuals, even for the same ailment. For instance, *Whithania somnifera* aerial parts are used for sexual tonic and anxiety, while Ullah *et al*. (2013) used fruit for similar ailments. The study by Kayani *et al*. (2014) reported the various uses of *Chenopodium album*, including as a diuretic, aphrodisiac, appetizer, tonic, and for treating abdominal pain, liver disorders, and jaundice. Lactuca serriola was used in the current study as a sedative, diuretic, diaphoretic, antispasmodic, and expectorant, aligning with the findings of Ullah *et al*. (2013). Despite the widespread use of plants for infections, most of the plants documented in the current investigation lack detailed analysis of their pharmacological potential. For example, *Chenopodium album* has been extensively screened for its phytochemical and anthelmintic potential, but ongoing work is still in progress. Various plants, including Peganum harmala, Datura stramonium, and *Withania coagulans*, have been investigated for their antimicrobial and pharmacokinetic potential. However, numerous medicinal plants still require in-depth pharmacological and critical toxicological studies to ensure safe and effective utilization of herbal products. The discovery of new bioactive constituents should be a primary focus in such phytopharmacological investigations.

CONCLUSIONS

Qamber khel is an isolated region where the local inhabitants still depend on traditional herbal remedies as their primary source of healthcare. In this area, the knowledge of traditional practices is preserved by elderly community members and local herbalists. The study identifies numerous crucial medicinal plants that play a significant role in treating various illnesses. Our research contributes to the documentation of traditional knowledge, which is gradually diminishing due to increasing exposure to modernization. The study emphasizes the necessity of exploring pharmacological, toxicological, phytochemical, and microbiological aspects of the reported medicinal plants to enhance their utilization and effectiveness. The current investigation underscores various threats, including intense grazing pressure, cutting activities, and deforestation, which adversely impact the sustainability and decrease the population of local flora. Future research initiatives should be formulated to comprehensively analyze the conservation status and threats to the flora in the study area. When developing research management plans and strategies, it is crucial to document and address existing ecological and cultural considerations.

Supplementary materials

Not applicable

Author contributions

Conceptualization, A.L. and AMKH; methodology, A.L software, G.D.; validation, F.Z.F and AMHK.; formal analysis, A.H.K, F.S, S.A.I, S.O.I, A.R, S.A.I, G,R, and A.Q.; investigation, A.L.; data curation, AMHK writing-original draft preparation, A.M.H.K.; writing-review and editing, M.A. and A.M.H.K.; supervision, M.A. authors have read and agreed to the published version of the manuscript.

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Informed Consent Statement

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Data Availability Statement

All of the data is included in the article/Supplementary Material.

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Conflict of interest

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

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