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Exploring Herbal and Natural Product Use as a Preventive Health Strategy During COVID-19: Insights from District Qilla Abdullah, Balochistan

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ABSTRACT

COVID-19 pandemic significantly impacted global health systems, particularly in rural and resource-limited regions, where communities often rely on traditional medicine for managing infections. In District Qilla Abdullah, Balochistan, Pakistan, local populations turned to indigenous medicinal plants to treat and prevent COVID-19-related symptoms such as fever, cough, sore throat, fatigue, loss of taste, diarrhea and respiratory difficulties. This study aimed to document and analyze the prevalence and cultural importance of herbal remedies used during the pandemic. Ethnobotanical data were gathered through interviews with traditional practitioners and local residents. A total of 80 plant species belonging to 38 botanical families were identified, *Lamiaceae* family emerged as the most dominant, represented by 12 species. Quantitative indices, including Relative Frequency of Citation (RFC), Use Value (UV), Family Importance Value (FIV), Fidelity Level (FL), and Use Reports (UR), were employed to evaluate the relevance of each plant. *Trachyspermum ammi* L. recorded the highest RFC (0.05) and FIV (4.5), reflecting its widespread use across the region. Other culturally significant species included *Adiantum capillus-veneris*, *Artemisia vulgaris* L., and *Zingiber officinale* Roscoe, each with an FIV of 4.0. Remarkably, *Camellia sinensis* L. Kuntze and *Terminalia chebula* Retz. showed a Fidelity Level of 100%, indicating unanimous agreement among informants regarding their efficacy in symptom management. In terms of usage diversity, *Adiantum capillus-veneris* had the highest Use Reports (UR = 6), followed by *Glycyrrhiza glabra* L. with five distinct therapeutic applications. Despite the documented therapeutic value of these species, access was hindered by challenges such as seasonal unavailability and elevated market prices during the pandemic. This study highlights the enduring relevance of traditional medicinal knowledge in rural healthcare systems and underscores the importance of integrating validated ethnobotanical practices into formal healthcare policies, especially in the context of public health emergencies like COVID-19. These findings also provide a foundational dataset for future pharmacological investigations and conservation planning of medicinal plant resources in the region.

Keywords: *COVID-19, Herbal and Natural Product, Quantitative indices, Ethnobotanical Practices, Trachyspermum ammi, Adiantum capillus-veneris, Camellia sinensis L, Glycyrrhiza glabra L*

1. INTRODUCTION

The COVID-19 pandemic, which emerged in 2020 as a result of the SARS-CoV-2 virus, profoundly impacted global populations, influencing not only physical health but also mental, social, and economic well-being. The pandemic was marked by elevated infection and mortality rates, alongside dramatic disruptions to daily life and societal norms (Clemente-Suárez et al.,2021). In response to the uncertainty and limited availability of effective pharmaceutical treatments during the initial phases, populations worldwide increasingly turned to herbs and natural products as preventative and supportive interventions. The surge of interest in traditional and complementary remedies was particularly pronounced in areas where healthcare infrastructure was limited, and reliance on cultural practices remained strong. Herbal products were adopted primarily to boost immune function and alleviate symptoms associated with COVID-19, especially when formal medical solutions were rare (Alotiby and Al-Harbi, 2021). The shift highlights a broader global trend towards complementary and alternative medicine (CAM), underpinned by cultural familiarity, economic necessity, and accessibility. The renewed attention to herbal and natural treatments reflects a growing consumer awareness of non-conventional health practices, evident in both developed and developing regions. Increasingly, traditional remedies are being acknowledged and incorporated even within modern clinical settings. Thiab et al. (2022) reinforce this view by underscoring the practicality, affordability, and cultural relevance of herbal therapies, especially in rural and underserved populations where conventional medicine may be less accessible. In South Asia, traditional medicine played a prominent role during the pandemic. Plants like *Curcuma longa* (turmeric), containing the active compound curcumin, were widely consumed for their anti-inflammatory and immune-stimulatory effects (Memarzia et al., 2021). Similarly, *Zingiber officinale* (ginger) and *Allium sativum* (garlic) were used for their antimicrobial and antioxidant properties among the general population (Panpatil et al., 2013). The Ministry of AYUSH in India formally recommended herbal decoctions incorporating *Ocimum sanctum*, *Cinnamomum verum*, and *Piper nigrum* to strengthen immune defenses (Gupta et al., 2023). Among indigenous and rural populations, traditional medicinal knowledge is not only historical but actively preserved and transmitted through generations. For instance, in sub-Saharan Africa, plant-based medicine remains a primary healthcare approach due to widespread trust in traditional healers and the economic constraints of accessing formal medical services. Sharma et al. (2023) note that individuals in these communities often favor herbal medicine as a cost-effective, locally available alternative to institutional healthcare. This trend is further supported by behavioral shifts toward natural health practices. As Goetzke and Spiller (2014) explain, there is an increasing global inclination particularly among younger demographics toward self-care and the use of organic, non-prescription products as part of a broader healthy living movement. The convergence of cultural, economic, and health-related factors has fueled a resurgence in herbal medicine practices in recent years. As Sen and Chakraborty (2017) articulate, herbal remedies are deeply rooted in global healthcare traditions and remain integral to contemporary wellness practices. However, this growing dependence on herbal products also raises concerns around regulation, efficacy, safety, and misinformation. To address these challenges, coordinated efforts by governments, research institutions, and healthcare organizations are essential. Establishing standardized protocols, conducting clinical validation, and promoting informed usage are critical steps to ensure safe integration of herbal medicine into public health strategies. In Balochistan, the increased reliance on traditional remedies during the pandemic was informed by longstanding cultural and ethnopharmacological practices. Local populations commonly turned to species such as *Peganum harmala* (wild rue), *Nigella sativa* (black seed), and *Berberis lycium* (Indian barberry), which are traditionally believed to possess immunomodulatory and antiviral properties. These practices are deeply embedded in the collective response of the community to health crises, embodying a culturally rooted belief in the healing power of natural substances. Against this backdrop, the present study focuses on District Qilla Abdullah, a region in Balochistan with a rich repository of traditional medicinal knowledge. The study aims to empirically investigate the usage patterns and cultural significance of herbal and natural products employed during the COVID-19 pandemic. By documenting these practices, the research seeks to bridge the gap between traditional and biomedical health paradigms, offering deeper insight into ethnic minority health behavior and community-based resilience mechanisms. As noted by Raza et al. (2020), there is a significant lack of comprehensive studies on medicinal plant usage in Balochistan, underscoring the need for focused research to inform public health planning and policy formulation. The findings of this study are expected to generate valuable region-specific data that can enhance culturally competent healthcare policies. By identifying and integrating traditional practices into contemporary healthcare frameworks, policymakers and healthcare providers can foster greater community trust and participation. Ultimately, this research supports a more inclusive approach to health systems strengthening, particularly during pandemics. It demonstrates the potential of herbal and natural remedies in disease prevention and management, while also emphasizing the importance of evidence-based policy and cross-cultural integration. It will contribute to the broader discourse on sustainable healthcare solutions that align with both scientific standards and cultural values.

2. MATERIALS AND METHODS

2.1. Study Site

The present study was conducted in Qilla Abdullah District, located in the northwestern part of Balochistan, Pakistan. It encompasses the Toba Plateau and a series of uniform hill ranges characterized by long central ridges intersected by numerous spurs. This varied terrain, combined with its climatic conditions, shapes both the livelihood and the healthcare

practices of the region's inhabitants. The district's dry and temperate climate provides ideal conditions for horticulture and agriculture, with Qilla Abdullah being widely recognized for producing high-value fruits such as apples, peaches, and grapes, alongside vegetables including potatoes and tomatoes. Beyond agriculture, the area especially the Gulistan sub-division is distinguished by its rich ethnobotanical heritage. Generations of indigenous knowledge have enabled communities to identify, cultivate, and utilize medicinal plants for a wide range of ailments. This traditional healthcare system continues to serve as the first line of defiance for many residents, particularly in remote areas where modern medical facilities are limited. For this study, ethnobotanical surveys were carried out in key locations including Gulistan, Abdur-Rahmanzai, Jungle-Pir-Alizai & Abdullah Khan. Data-collection focused on documenting the traditional-medicinal uses of plants, with particular emphasis on species applied during the COVID-19 pandemic. The findings reveal that local populations not only relied heavily on medicinal plants to manage respiratory and systemic symptoms but also adapted their traditional remedies to meet the challenges of the pandemic. Such reliance reflects both the cultural resilience of the community and the practical importance of accessible, plant-based healthcare during times of medical and economic hardship. By linking the region's geographic, climatic, and cultural characteristics to the observed patterns of medicinal plant use, this study underscores the significance of Qilla Abdullah as a reservoir of ethnopharmacological knowledge. The results demonstrate that local environmental conditions directly influence plant availability and diversity, which in turn shape healthcare practices. These insights provide a valuable foundation for future research, conservation planning, and the integration of validated traditional remedies into regional health policies, particularly in preparation for future public health emergencies.

2.2. Data Collection and Study Design

Traditional medicinal knowledge was documented between June and November 2024 through seven targeted field visits to the study sites. A total of 200 participants (80 men and 120 women) were engaged using purposive sampling to identify individuals recognized for their expertise in herbal medicine, supplemented by a small number of randomly selected respondents from educational institutions. Participants ranged in age from 20 to 80 years, with most having no formal education. Considering the cultural norms of the rural study area, women were interviewed in their homes by female facilitators, while male respondents were approached by male research assistants. All participants were informed of the study objectives, and their consent was obtained to ensure privacy and protection of indigenous knowledge. Data collection employed semi-structured interviews, a standardized questionnaire, and focus group discussions, conducted in Pashto, the local language. The questionnaire recorded vernacular plant names, parts used, preparation methods, plant availability, and ailments treated. Medicinal plant specimens were collected seasonally from diverse habitats including plains, forests, hilltops, and valleys. For each species, four samples were gathered to ensure accurate identification, with notes on habitat type, morphology, flower color, and aroma. Photographs of plant specimens and relevant cultural contexts were also taken to support documentation.

Figure 1. Interviews with local participants on traditional medicinal plants for COVID-19 treatment.

2.3. Plants identification and collection

The medicinal plants reported by participants during the survey were sourced from the local vegetation of the study area, as well as from traditional herbalists ("pansars") and practitioners ("hakeems") within District Qilla Abdullah. Collected specimens were mounted on herbarium sheets for long-term preservation and subsequently identified using the *Flora of Pakistan*. Taxonomic verification was further carried out by experts at the University of Balochistan.

Table 1: Demographic Characteristics of Study Participants

Category	Group	Participants (n)	Percentage (%)
Sex Distribution	Male	80	40%
	Female	120	60%

Age Range	20–40 years	30	15%
	41–60 years	100	50%
	61–80 years	70	35%
Education Level	No Formal Education	85	42%
	Completed Primary School	40	20%
	Completed Middle School	25	12%
	Completed Secondary School	32	16%
	Higher Education (University Degree)	17	8%
Occupation (Females)	Homemakers	60	30%
	Teachers (Primary Level)	10	5%
	Teachers (Secondary Level)	16	8%
	Health Professionals (LHWs & Doctors)	2	1%
	Students	32	16%
Occupation (Males)	Retail Shop Owners	12	6%
	Herbal Practitioners (Hakeems/Pansaars)	16	8%
	Agricultural Workers	20	10%
	Teachers (Primary Level)	10	5%
	Teachers (Secondary Level)	10	5%
	Medical Practitioners (Doctors)	2	1%
	Students	10	5%

2.4. Data Analysis

Various ethnobotanical indices were applied to analyse the collected data, including Use Value (UV), Fidelity Level (FL), Relative Frequency of Citation (RFC), Use Report (UR), and Family Importance Value (FIV).

2.4.1. Use Value (UV)

The relative importance of plant species was assessed using the Use Value (UV) formula.

$UV=\sum U/n$

The Use Value (UV) of each plant species was calculated following the formula proposed by Phillips et al. (1994). Where U represents the number of used reports cited by each informant, and n denotes the total number of informants.

2.4.2. Frequency Citation (FC)

The Relative Frequency of Citation (RFC) was calculated as:

RFC=NFC/N×100

where *FC* is the number of times a specific taxon was mentioned, and *N* is the total number of citations for all taxa. This formula expresses RFC as a percentage, reflecting the relative prominence of each species among all reported plants.

2.4.3. Relative Frequency Citation (RFC)

The Relative Frequency of Citation (RFC) was used to identify the most therapeutically important medicinal plant species in the study area and was calculated using the formula described by Tshikalange et al. (2016).

RFC=FC/N (<RFC<1)

2.4.4. Fidelity Level (FL)

The Fidelity Level (FL) represents the percentage of respondents who cited the use of a specific plant species for treating a particular disease. The FL index was calculated using the formula described by Tumoro and Maryo (2016).

FL= (Np /N X 100)

Where *Np* is the number of respondents who mentioned the plant for the same ailment, and *N* is the total number of respondents who reported the plant for any ailment.

2.4.5. Family Importance Value (FIV)

The Family Importance Value (FIV) was calculated using the formula described by Gautam and Gautam et al (2017), where *FC* is the number of informants who cited species belonging to a particular plant family, and *N* is the total number of informants participating in the study.

FIV=FC /N X 100

2.5. Significance of the study

The primary aim of this study was to document the diversity, sources, and current status of medicinal plants used in District Qilla Abdullah for the prevention and management of COVID-19, while systematically recording the ethnobotanical knowledge of local communities regarding the preparation of traditional remedies for viral infections and COVID-19-related symptoms.

2.6. Documented Medicinal plants

Our ethnobotanical investigation documented a total of 80 medicinal plant species distributed across 38 botanical families. Each species was systematically recorded with its vernacular name, taxonomic classification, plant part(s) utilized, method of preparation, and associated therapeutic applications primarily targeting symptoms commonly linked to COVID-19, such as cough, cold, asthma, and influenza. The data reveal that the family Lamiaceae was the most prominent, contributing 12 species and representing 15% of the documented flora, thereby underscoring its central role in local traditional medicine. This was followed by Asteraceae with eight species, and Apiaceae and Rosaceae, each contributing five species. Moderate representation was noted in Amaranthaceae, Amaryllidaceae, Fabaceae, Solanaceae, and Moraceae, with three species each. Additionally, Berberidaceae, Chenopodiaceae, Lauraceae, Zingiberaceae, Malvaceae, and Plantaginaceae were represented by two species apiece. The remaining 26 families comprising Papilionaceae, Pteridaceae, Caryophyllaceae, Asphodelaceae, Cannabaceae, Cruciferaceae, Ephedraceae, Myrtaceae, Fumariaceae, Umbelliferaceae, Poaceae, Ranunculaceae, Papaveraceae, Zygophyllaceae, Polygonaceae, Lythraceae, Piperaceae, Combretaceae, Vitaceae, Rhamnaceae, and others were each represented by a single species. This taxonomic distribution reflects both the substantial botanical diversity of the region and the cultural emphasis placed on particular plant families especially Lamiaceae for the management of respiratory illnesses during the COVID-19 pandemic.

2.7. Frequently Used Plant Parts and Preparation Methods of Herbal Remedies

The ethnobotanical analysis indicated that leaves (27%), seeds (21%), and whole plants (21%) were the most frequently utilized plant parts in the preparation of herbal remedies for the prevention and management of COVID-19. This pattern is likely influenced by their consistent availability across seasons, ease of harvesting, and strong grounding in local ethnomedicinal traditions. In particular, leaves and seeds are recognized for their versatility, as they can be efficiently processed into teas, decoctions, and infusions, or incorporated into daily diets, thereby facilitating both preventive and therapeutic applications within the community.

Table 2: Most used species of the area

Family Name	Number of Species
Lamiaceae	12 Species
Asteraceae	8 Species
Apiaceae	5 Species
Rosaceae	5 Species
Amaranthaceae	3 Species
Amaryllidaceae	3 Species
Fabaceae	3 Species
Solanaceae	3 Species
Moraceae	3 Species

3. QUANTITATIVE ANALYSIS

In this ethnobotanical assessment, *Trachyspermum ammi* emerged as the most frequently cited species, with a Frequency of Citation (FC) value of 9, underscoring its prominence in the local medicinal repertoire. It was closely followed by *Adiantum capillus-veneris*, *Artemisia vulgaris*, and *Zingiber officinale*, each with an FC of 8, whereas *Nigella sativa* was referenced by six informants. The species with the lowest citation frequency was *Otostegia limbata*, mentioned by only a single respondent, suggesting either limited local use or low recognition among the study population.Analysis of Use Reports (UR), which reflects the number of distinct therapeutic applications per species, revealed that *Adiantum capillus-veneris* exhibited the greatest versatility, with six unique uses recorded. *Glycyrrhiza glabra*, *Zingiber officinale*, and *Ziziphora tenuior* followed, each associated with five distinct use reports. Furthermore, *Camellia sinensis*, *Cinnamomum zeylanicum*, *Ephedra intermedia*, *Foeniculum vulgare*, *Ferula foetida*, *Nigella sativa*, and *Trachyspermum ammi* were each linked to four documented medicinal uses. Notably, 17 species were reported with only a single therapeutic application, reflecting either a narrow ethnomedicinal role or potential underreporting within the sampled population.

3.1. Use value (UV), relative frequency of citation (RFC) and family index value (FIV)

Artemisia absinthium, *Camellia sinensis*, *Ephedra intermedia*, *Foeniculum vulgare*, *Glycyrrhiza glabra*, *Ocimum sativum*, *Plantago major*, *Thymus vulgaris*, and *Ziziphora tenuior* exhibited the highest use value (UV = 1.0), reflecting their extensive ethnomedicinal applications. The lowest UV was recorded for *Haloxylon griffithii* (UV = 0.25), indicating its relatively limited use within the study area. The highest relative frequency of citation (RFC = 0.05) was associated with *Trachyspermum ammi*, suggesting its broad recognition and cultural significance among the local community. Conversely, *Otostegia limbata* had the lowest RFC (0.005), indicating its limited citation by informants. In terms of family importance value (FIV), *Trachyspermum ammi* ranked highest (FIV = 4.5), followed by *Adiantum capillus-veneris*, *Artemisia vulgaris*, and *Zingiber officinale* (each with FIV = 4.0). The lowest FIV values (0.5) were recorded for *Withania coagulans* and *Otostegia limbata*, underscoring their comparatively minor role in the ethnobotanical repertoire.

3.2. Fidelity level (FL)

The fidelity level (FL) reflects the degree of informant consensus regarding the therapeutic efficacy of ethnomedicinal plants for specific ailments, with higher values indicating greater perceived potential for disease treatment. In the present study, FL values ranged from 50% to 100%, with values above 50% considered significant. Notably, *Camellia sinensis* and *Terminalia chebula* each achieved an FL of 100%, indicating complete consensus among informants regarding their use in the treatment of cough, cold, chest congestion, constipation, and asthma. In contrast, *Ajuga parviflora* and *Ficus carica* recorded the lowest FL (50%), reflecting only moderate agreement on their medicinal applications.

4. RESULTS

Among the documented plant species in this study, *Trachyspermum ammi* was the most frequently mentioned, with a citation count (FC) of 9, indicating its key importance in traditional medicinal use within the community. Close behind were *Adiantum capillus-veneris*, *Artemisia vulgaris*, and *Zingiber officinale*, each reported by eight informants. *Nigella sativa* was cited by six individuals, showing moderate recognition. In contrast, *Otostegia limbata* was the least referenced species, being

identified by only one respondent. The analysis of use reports (UR), which reflects the number of distinct medicinal applications per species, showed that *Adiantum capillus-veneris* had the broadest range, with six different uses. This highlights its adaptability and diverse therapeutic value. *Glycyrrhiza glabra*, *Zingiber officinale*, and *Ziziphora tenuior* followed closely, each associated with five unique uses. Additionally, *Camellia sinensis*, *Cinnamomum zeylanicum*, *Ephedra intermedia*, *Foeniculum vulgare*, *Ferula foetida*, *Nigella sativa*, and *Trachyspermum ammi* were each linked to four reported medicinal purposes, reflecting their significant, though slightly less varied, ethnobotanical applications. In contrast, 17 species were reported for a single use, suggesting a more limited ethnopharmacological role. In terms of use value (UV), *Artemisia absinthium*, *Camellia sinensis*, *Ephedra intermedia*, *Foeniculum vulgare*, *Glycyrrhiza glabra*, *Ocimum sativum*, *Plantago major*, *Thymus vulgaris*, and *Ziziphora tenuior* demonstrated the highest UV (1.0), reflecting their widespread utilization and perceived therapeutic importance. The lowest UV was recorded for *Haloxylon griffithii* (0.25), indicating limited use in the study area. The highest relative frequency of citation (RFC) was recorded for *Trachyspermum ammi* (RFC = 0.05), highlighting its broad cultural recognition, while *Otostegia limbata* exhibited the lowest RFC (0.005), reflecting minimal citation among informants. Regarding family importance value (FIV), *Trachyspermum ammi* ranked highest (FIV = 4.5), followed by *Adiantum capillus-veneris*, *Artemisia vulgaris*, and *Zingiber officinale* (FIV = 4.0 each). The lowest FIV values (0.5) were observed for *Withania coagulans* and *Otostegia limbata*, underscoring their comparatively minor ethnobotanical significance. Fidelity level (FL) values ranged from 50% to 100%, with values above 50% considered significant. *Camellia sinensis* and *Terminalia chebula* each achieved an FL of 100%, indicating complete consensus among informants on their use for treating cough, cold, chest congestion, constipation, and asthma. Conversely, *Ajuga parviflora* and *Ficus carica* recorded the lowest FL (50%), reflecting moderate agreement on their medicinal applications. The combined ethnobotanical indices reveal that species with high FC, UR, UV, RFC, and FL values, such as *Trachyspermum ammi*, *Camellia sinensis*, and *Adiantum capillus-veneris*, hold substantial cultural importance and therapeutic versatility. These plants are not only widely known within the community but are also used to treat multiple ailments, suggesting both high availability and strong traditional validation. Conversely, species with low index values, such as *Otostegia limbata* and *Haloxylon griffithii*, may be of limited distribution, have specialized uses, or be subject to knowledge erosion, indicating a need for targeted conservation and documentation efforts.

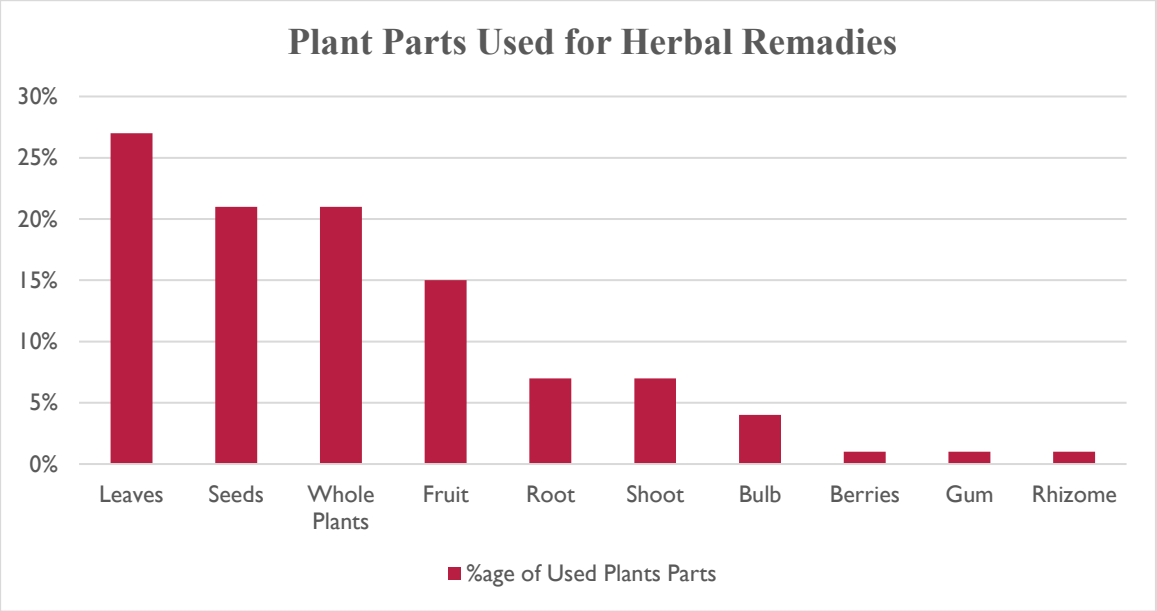

Figure 2: The Utilization of Plant Parts for Herbal Remedies

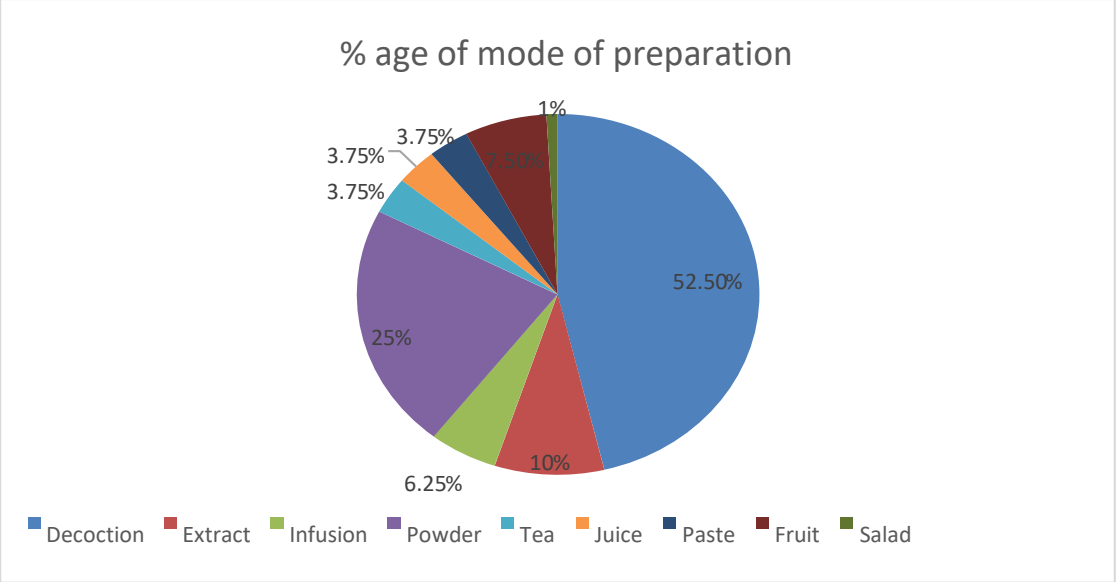

Figure 3: Different %age of Preparatory Modes

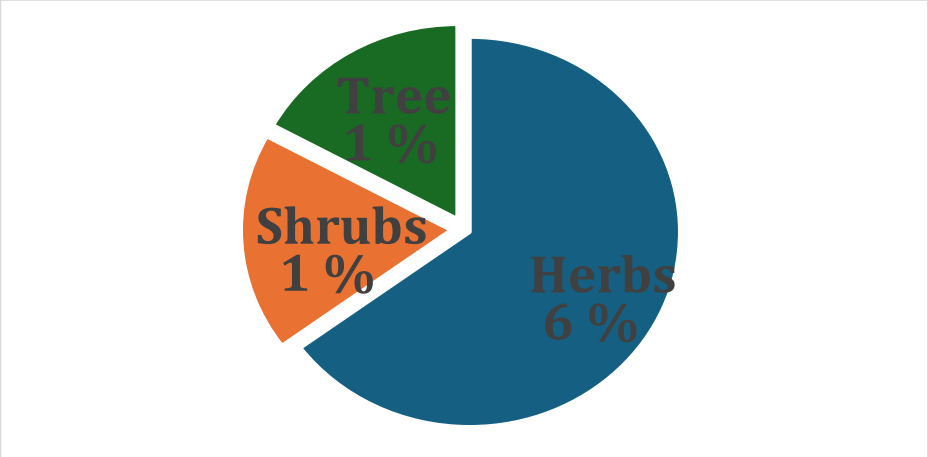

Figure 4: Different type of Plant Life and their %age used in the study

5. DISCUSSION

This study reveals that local communities in Pakistan possess extensive traditional knowledge about the use of medicinal plants, particularly during the COVID-19 pandemic. Informants from various educational and occupational backgrounds provided valuable insights into how they utilized plant-based remedies to manage pandemic-related symptoms. This strong reliance on medicinal plants highlights the region's limited access to formal healthcare, which became even more apparent during the pandemic when people had to manage health concerns independently. Due to regional differences in plant availability, traditional remedies vary based on local flora. In Pakistan, as in other parts of the world, biodiversity changes across ecological zones, influencing the plants accessible for medicinal use. Respondents in the study reported sourcing plants from diverse locations, including kitchen gardens, spice shops, local healers (hakeems and pansars), and the native wild flora of the area. This diverse sourcing underscores how embedded medicinal plant use is within the daily practices of these communities. This study identified the specific plant parts used to treat COVID-19 symptoms. Leaves were the most frequently used (27%), followed by seeds and whole plants (21% each), fruits (15%), roots and shoots (7% each), bulbs (4%), and berries, gum, and rhizomes (1% each). The preference for leaves is consistent with other ethnobotanical studies. For instance, Odebunmi et al. (2022) in Nigeria reported that leaves were the most commonly used part for managing COVID-19 and flu symptoms, accounting for 39% and 31% respectively. While preparation methods were not recorded in this study, prior research indicates that decoction and infusion are typically used, especially for plant parts like leaves and

seeds. In the same Nigerian study, decoction was the dominant method for COVID-19 remedies (81%), while infusion was more common for treating flu (33%) and cough (28%) (Odebunmi et al., 2022). Several plant families were frequently cited by participants. Lamiaceae was the most represented, with 12 species, followed by Asteraceae (8 species), and Apiaceae and Rosaceae (5 species each). Other families such as Amaranthaceae, Amaryllidaceae, Fabaceae, Solanaceae, and Moraceae were each represented by 3 species. These findings are consistent with global ethnobotanical patterns. For example, Amiri and Joharchi (2013) documented Lamiaceae as the most important family in Mashhad, Iran, with 26 species, followed by Asteraceae, Fabaceae, and Apiaceae with 23, 20, and 19 species respectively. Similarly, a study among the Yi people in Mile, China, identified Asteraceae, Lamiaceae, and Fabaceae as the most commonly used plant families (Li et al., 2024). The study employed quantitative ethnobotanical indices to evaluate the importance of individual species. Use Value (UV), which measures the frequency of use and perceived importance of a plant, reached the maximum score of 1.0 for *Artemisia absinthium*, *Camellia sinensis*, *Ephedra intermedia*, *Foeniculum vulgare*, *Glycyrrhiza glabra*, *Ocimum sativum*, *Plantago major*, *Thymus vulgaris*, and *Ziziphora tenuior*. These high UV values indicate a strong cultural preference and suggest potential therapeutic efficacy. By contrast, UV values in other regions were notably lower. In the Eastern Ghats of India, UV ranged from 0.2 to 0.89, with the highest value recorded for *Acacia modesta* (0.89) (Sulaiman et al., 2020). In Bangladesh, UV values among indigenous groups ranged from 0.03 to 0.43, with the highest for *Rauvolfia serpentina* (Faruque et al., 2018). Relative Frequency of Citation (RFC), which indicates how often a species is mentioned by informants, was highest for *Trachyspermum ammi* (0.05), showing its broad acceptance within the community. For comparison, RFC values in the Eastern Ghats ranged from 0.059 to 0.285, with *Acacia modesta* being the most cited species (Sulaiman et al., 2020). In Bangladesh, the range was 0.02 to 0.25, with *Rauvolfia serpentina* again having the highest RFC (Faruque et al., 2018). These variations point to differences in cultural practices, available species, and regional health traditions. The Family Importance Value (FIV) analysis reinforced the prominence of Lamiaceae, which emerged as the most significant family due to its high species count. This aligns with findings from Chail Valley, where Lamiaceae also had the highest FIV, confirming its central role in traditional medicine (Belhaj et al., 2023). Fidelity Level (FL), which measures the consensus among informants for the use of a species in treating a particular ailment, ranged from 50% to 100% in this study. *Camellia sinensis* and *Terminalia chebula* achieved an FL of 100%, indicating unanimous agreement on their use for managing symptoms such as cough, cold, chest congestion, constipation, and asthma. These findings are supported by pharmacological studies, such as Khan et al. (2021), who found both tea and *Terminalia chebula* to have promising activity against SARS-CoV-2. On the other hand, *Ajuga parviflora* and *Ficus carica* had the lowest FL (50%), suggesting only moderate agreement among participants regarding their medicinal uses.This study enriches our understanding of how traditional knowledge supported community health during the COVID-19 crisis. In areas where formal healthcare systems are limited or overburdened, medicinal plants remain an essential component of primary healthcare. The high UV, RFC, and FL values for certain species indicate their cultural and medicinal significance and suggest they may have pharmacological potential worthy of further investigation. Moreover, these findings highlight the importance of preserving traditional knowledge and promoting the sustainable use of medicinal plants, especially those under high usage pressure, to ensure their availability for future generations.

6. CONCLUSION

This study provides a comprehensive account of ethnobotanical knowledge related to the use of medicinal plants for managing symptoms associated with COVID-19 in a region with limited healthcare infrastructure. The high Use Value, Relative Frequency of Citation, and Fidelity Level recorded for species such as *Trachyspermum ammi*, *Camellia sinensis*, and *Adiantum capillus-veneris* highlight their cultural significance, therapeutic versatility, and potential pharmacological relevance. The predominance of certain plant families, notably Lamiaceae, and the extensive use of diverse plant parts reflect both the richness of local flora and the adaptability of traditional healing practices during a global health crisis. By situating these findings within the broader ethnobotanical literature, the study not only documents region-specific medicinal plant knowledge but also underscores its universal relevance for public health preparedness. In an era where pandemics can rapidly overwhelm healthcare systems, preserving and scientifically validating such indigenous knowledge offers an invaluable, low-cost complement to modern medicine. Furthermore, the identification of culturally important species calls for targeted conservation strategies to ensure their sustainable availability. This integration of traditional wisdom, pharmacological research, and conservation action has the potential to strengthen community resilience and contribute to global efforts in developing accessible, plant-based therapeutic interventions for emerging diseases.

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