

Ethnomedicinal Uses of Different Plants for the Treatment of Asthma in Pakistan

Munzer Ullah^{1*}, Maliha Sarfraz², Hayat Ullah³, Misbah Ullah Khan⁴ and Maheen Kanwal¹

¹Department of Biochemistry, University of Okara, Pakistan

²Department of Zoology, Faculty of Life Sciences, The Women University Multan, 66000, Pakistan

³Department of Chemistry, University of Okara, Pakistan

⁴Center of Nano Science, University of Okara, Pakistan

*Corresponding author: Munzer Ullah, Department of Biochemistry, University of Okara, Okara-56300, Punjab, Pakistan



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ABSTRACT

Asthma is a chronic respiratory disease that affecting the airways of the lungs and is the most prevalent and leading cause of morbidity and mortality in Pakistan. Hence, we searched the available literature to review the ethnomedicinal use of plants for Asthma in Pakistan, to present perspective for future research, and to generate scientific evidence for the formulation of Phytomedicine. The study aims to review the uses of plants used by the indigenous communities for the treatment of asthma. For the present review, data were collected by using different online databases and searching hard copies of publications, books, thesis from libraries and national organizations. In a current review article, a total of 176 species belonging to 63 families has been listed, used against asthma in Pakistan. Asteraceae was the predominant family having (19 species) followed by, Fabaceae (12 species), Solanaceae (11 species), Lamiaceae (7 species), Apiaceae (6 species), Euphorbiaceae (6 species), Mimosaceae (6 species), Alliaceae (4 species), Amaranthaceae (4 species), Malvaceae (4 species), Nyctaginaceae (4 species), Poaceae (4 species), Polygonaceae (4 species), Ranunculaceae (4 species), Zygophyllaceae (4 species), Apocynaceae (3 species), Brassicaceae (3 species), Ephedraceae (3 species) and so on. Data analysis shows that leaves were most frequently used (24.18%) against asthma followed by roots (15.03%), fruit (12.74%), flower (11.43%), seed (11.11%), bark (6.20%), stem (5.55%), whole plant (4.24%), shoot (1.96%), aerial parts (1.63%), bulb (1.63%), wood (0.98%), gum (0.98%), rhizome (0.98%), latex (0.65%), pod (0.32%) and resin (0.32%). From the literature search, it was concluded that most of the recorded plants have valuable and beneficial effects whereas, the other plants mentioned in many of the publications have given some valuable opportunities for further pharmacological research.

Introduction

Asthma is defined as a chronic allergic pulmonary disease in the majority of developing countries characterized by unpredictable airway complexity [1,2]. Asthma word is of Greek origin which means "panting" [3]. The representative symptoms comprised of panting, breathlessness, wheezing, coughing, and stiffness of the chest [4,5]. Asthma has been recognized as one of the most widespread respiratory complaints all over the world and is identified to be triggered by a variety of factors predominantly

allergens, dust, too much cold air, emotion, professional stimuli, chemicals, and histamine [6-8]. There are 2 types of asthma, that is allergic asthma and job-related asthma [9]. Allergic asthma is triggered by an allergy while occupational asthma occurs in response to a trigger in the workplace. Asthma affects people from all groups' social, cultural and tribal backgrounds [10]. According to ISAAC (1998), asthma affects 1 child in 7 in some societies and about 15 million individuals globally. In 2011 the World Health

Organization (WHO) pointed out that (235 million) people undergo asthma. It has been reported to be the main basis of both morbidity and mortality [11,12].

A lot of factors have been revealed to manipulate asthma exacerbations ranging from viruses, dust, smoking, pollution, urbanization, excessive emotions, fatness, work, genetic factors, family record and meteorological proceedings. The maximum incidence rates of asthma are found in the UK greater than (15%) and in New Zealand (15.1%) [13]. In Pakistan, more than 6 million people suffer from asthma [14]. This demonstrates that asthma is a severe global health problem. The relevance of ethnobotanical medicine remains one of the dependable approaches for discovering effective novel compounds (Fabricant and Farnsworth, 2001). Asthma is an expensive disease as the disease consequences in loss of production caused by absence from work [15]. Usually, antibiotics are not recommended to treat asthma [16]. It is well-linked with contact amongst physically powerful genetic and environmental factors [17]. The pharmacotherapy of asthma is reported to be very difficult [18]. Asthma cannot be cured but its management plays an important role in achieving the primary goals of treatment by avoiding asthma attacks, reducing inflammation and preventing lung damage. The ability to control asthma depends on the prevention of allergic triggers and taking medication as prescribed. The drugs that are currently available for the treatment of asthma are classified as relievers and controllers [19-21].

According to another report around (7.5 million), Pakistani adults and (15 million) children bear asthma owing to rising urbanization, industries, and pollution. A detailed study was conducted by doctors connected with the Aga Khan University Hospital (<https://www.pakistantoday.com.pk> > Karachi). Medicinal plants are used by the public everyone over the human being history and this information of the use of therapeutic plants has been transferred next to rural communities from generation to new generation and is still well conserved amongst a lot of local communities in all over the world [22-26]. Ethnobotanical surveys and ethnopharmacological studies lead to development in this field [26,27]. Until now, a lot of inhabitants use herbal recipes to treat a variety of diseases [28]. Pakistan is to be found in South Asia and is at the joint of Central Asia and the Middle East, which gives its situation enormous value. Pakistan's total land border is 6,774 km extensive and it confines 4 countries. Pakistan limits India in the east whereas Afghanistan and Iran in the west and China are situated at the northeast.

Although surrounded by land commencing 3 sides, the Arabian Sea occurs in the south. Pakistan is well gifted with the affluence of medicinally essential plants which have compounds containing therapeutic values which are used to treat varied human disorders since remote period [29]. A country like Pakistan having diverse environmental zones widespread climatic and soil conditions thus,

the country's flora is very rich in medicinal plants. Pakistan locally trades 200 herbal drugs and widely export seventy-five crude herbal drugs. About 85 percent of these crude herbs are collected from the wild by the local community [30,31]. In Pakistan, people use plants based on their familiarity for a variety of troubles owing to the lack of accessibility of allopathic doctors, medicines, and fear of side effects related to modern medicines [32]. Local medicinal plant information has contributed to several important recent drug innovations [33]. Most of the population about (80%) of the emergent countries is still dependent on the use of conventional therapeutic remedies for their fundamental health care requirements [34-36]. Numerous realistic and prepared investigation approaches are required to care for the pharmaceutical and ethnomedicinal information of plants from loss. The approach of the ethnomedicinal survey is an appropriate practice that can be used to select plants for complete pharmacological evaluation [37-60].

Methods

Data Collection

The literature search was conducted on the ethnomedicinal use of plants against asthma in Pakistan. We searched online sources for collection of data like Science Direct, ISI Web of Science, research gate, Google Scholar and relevant journals with specific search terms such as ethnomedicinal uses of plants for asthma treatment, asthma, antiasthmatic plants, ethnomedicinal plants, medicinal plants, respiratory disorders, ethnomedicinal plants of Pakistan, ethnomedicinal plants of Khyber Pakhtunkhwa, Punjab, Baluchistan, Sindh, Gilgit Baltistan and Azad Kashmir, to limit the geographical range of the search. After collecting the data the main list was organized with information like botanical name of the plant, family name, part used to treat asthma, remedies formulation process, reference for all species and number of citations.

Data Analysis

The data was tabulated to find a total number of species, families, part percent use, percent use for several plants formulated by specific method and number of times a plant was reported. We categorized the therapeutic properties and medicinal potential of plants used by inhabitants of Pakistan against asthma.

Results

Number of Plants Reported and their Diversity

The indigenous use of medicinal plants in the treatment of asthma was evident from ethnobotanical studies that have been conducted by researchers in various parts of Pakistan. In many of these research papers, researchers have reported a higher number of plants used for the treatment of asthma. But very few publications reported medicinal plants only used for asthma. In the literature search for the current review, it was found, that most of these studies lack proper information for the oral use of the reported plants. In a current review article, a total of 176 species belonging

to 63 families has been listed, used against asthma in Pakistan. Asteraceae was predominant family having (19 species) followed by, Fabaceae (12 species), Solanaceae (11 species), Lamiaceae (7 species), Apiaceae (6 species), Euphorbiaceae (6 species), Mimosaceae (6 species), Alliaceae (4 species), Amaranthaceae (4 species), Malvaceae (4 species), Nyctaginaceae (4 species), Poaceae (4 species), Polygonaceae (4 species), Ranunculaceae (4 species), Zygophyllaceae (4 species), Apocynaceae (3 species), Brassicaceae (3 species), Capparadaceae (3 species), Convolvulaceae (3 species), Cupressaceae (3 species), Ephedraceae (3 species), Fagaceae (3 species), Acanthaceae (2 species), Aizoaceae (2 species), Anacardaceae (2 species), Asclepiadaceae (2 species), Chenopodiaceae (2 species), Cucurbitaceae (2 species), Gentianaceae (2 species), Moraceae (2 species), Myrsinaceae (2 species), Pinaceae (2 species), Plantaginaceae (2 species), Rosaceae (2 species), Salvadoraceae (2 species), Valerianaceae (2 species), Violaceae (2 species), Adiantaceae (1 species), Araceae (1 species), Araliaceae (1 species), Arecaceae (1 species), Asphodelaceae (1 species), Boraginaceae (1 species), Buddlejaceae (1 species), Cactaceae (1 species), Cannabinaceae (1 species), Caryophyllaceae (1 species), Elaeagnaceae (1 species), Liliaceae (1 species), Linaceae (1 species), Meliaceae (1 species), Myrtaceae (1 species), Oxalidaceae (1 species), Portulacaceae (1 species), Primulaceae (1 species), Sapindaceae (1 species), Saxifragaceae (1 species), Scrophulariaceae (1 species), Simarubaceae (1 species), Tamaricaceae (1 species), Taxaceae (1 species), Urticaceae (1 species) and Verbenaceae (1 species). Our results concerning the high proportion utilization of family Asteraceae in Pakistan agreed with other ethnomedicinal floras [61-82].

Mostly Reported Plants

Various plants due to their spacious distribution pattern and ethnomedicinal value have been reported indicating that these plants are well-known among people as antiasthmatic plants. According to these reports, *Calotropis procera* is reported in 19 publications which have the highest use-value as an antiasthmatic plant. *Calotropis procera* is followed by *Achyranthes Aspera* having (14 citations), *Solanum surattense* (12 citations), *Hyoscyamus niger* (8 citations), *Justicia adhatoda* (8 citations). Four plants *Ammi visnaga*, *Ephedra gerardiana*, *Peganum harmala*, *Withania somnifera* having (6 Citations). Five plants *Abies pindrow*, *Allium sativum*, *Datura stramonium*, *Euphorbia hirta*, *Pistacia integerrima* are reported in five articles each which are ethnomedicinally used as antiasthmatic plants. Nine plants *Alhagi maurum*, *Bergenia ciliate*, *Capparis decidua*, *Datura metel*, *Lactuca serriola*, *Mentha longifolia*, *Quercus incana*, *Taxus wallichiana* and *Trianthema portulacastrum* are reported in four research reports. Also nine other plants *Actaea spicata*, *Cichorium intybus*, *Desmodium elegans*, *Ferula assa-foetida*, *Ficus religiosa*, *Plantago major*, *Quercus leucotrichophora*, *Saussurea lappa* and *Tephrosia lupinifolia* are reported in three

publication each used against asthma.

Plant Parts Used

In remedies preparation, almost all parts of the plant were used against asthma in Pakistan. These include leaves, roots, fruit, flower, seeds, bark, stem, whole plant, shoot, aerial parts, bulb, wood, gum, rhizome, latex, pod, and resin. Data analysis shows that leaves were most frequently used (24.18%) against asthma followed by roots (15.03%), fruit (12.74%), flower (11.43%), seed (11.11%), bark (6.20%), stem (5.55%), whole plant (4.24%), shoot (1.96%), aerial parts (1.63%), bulb (1.63%), wood (0.98%), gum (0.98%), rhizome (0.98%), latex (0.65%), pod (0.32%) and resin (0.32%). All the plant parts are used to cure asthma but the leaves, roots, whole plant, and seeds are the most favorite parts of the therapeutic plants. Compared with the formerly available information these outcomes are in a comparable pattern as leaves be found frequently used parts [83-90]. The use of roots and whole plants in remedies preparations may create pressure on the flora if exploited accidentally. To uproot the whole plant and underground parts like roots and rhizome is not feasible [91]. The underground parts have a high number of bioactive constituents [92].

Preparation, Forms, Dose, and Using Time of Herbal Remedies

Out of a total of 176 plant species, different methods of preparation of remedies were used by different people in Pakistan. However, in most of the report's formulation methods and time of usage are not mentioned. Different people use different parts of the plant in remedies formulation like some use fresh parts, dry parts, or both forms. The amount of the medicinal recopies preparation (quantity, dose, frequency, duration) is not very accurate, as it commonly different based on application, type of disease, age of the patient, physical health, the severity of disease, and diagnosis and experience of a local traditional healer. Remedies preparation was categorized into various methods in which water acts as dilution media in herbal preparations whereas some remedies were set from dry and fresh plant parts [93]. It is reported that approximately all of the known species used as single herbal recipes with their specific part use for particular ailment while sometimes the mixtures of various parts with extra ingredients like (Milk, honey, butter) may be also used to treat some diseases. The different forms of remedies formulation include decoction (31.01%) which is mostly used formulation method followed by infusion (25.30%), powder (21.63%), juice (7.75%), paste (6.93%), extract (5.71%), smoke (3.67%), vegetable (2.44%), poultice (2.04%), directly used (0.81%) tinctures (0.40%) and ash (0.40%). The literature search for the current review article shows that people of the region reserved remedies of medicinal plants that be utilized in case of need [94-116]. The people gather these plants from their natural habitat or buy from local traditional health healers.

Conclusion

A large amount of accessibility and ease of making of herbal drugs when compared to artificial drugs makes herbal plants the finest option to cure asthma but the purity of extract; action and incidence of side effects are the matters of concern. The ethnobotanical studies conducted revealed that people in Pakistan mostly rely on the available indigenous plant remedies for the treatment of asthma. However, in most ethnobotanical research reports from Pakistan, important information regarding remedies preparation proper dosage and time of use is not well reported. Therefore, proper information regarding parts formulation, dosage and time of use is necessary for utilization and safety in health management. It was found that most of the recorded plants have beneficial and therapeutic effects reported in many of the publications. Awareness among the community on herbal medication and conservation of antiasthmatic plants is also too much necessary. Highly utilized plants in different regions of Pakistan against asthma should be tested *in-vitro* and *in-vivo* for their phytochemical and pharmacological activities.

Competing Interest

The authors declare that they have no competing interests.

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