

Medicinal Plants Used to Treat Respiratory Tract Illness in Kaghan Valley, Himalayan Region-Pakistan

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INTRODUCTION

Plants have been used in traditional medicine for several thousand years [1]. From the time immemorial, human civilizations have been exploring and using various plants and plant products to cure the lethal diseases. Different plants species and their uses as medicine are greatly well-known to indigenous communities in different parts of the world. Local people are specialist for mounting inventive practices and products from their surrounding environment particularly, the plant world [2,3]. Many drugs have plant origin, and several plants are currently undergoing investigation to ascertain their therapeutic efficacies [4,5]. The knowledge about the use of traditional herbal medicines gradually perishes, although some of the traditional tribal communities and some human beings which believed in the usage of herbal medicines are still practicing the art of herbal healing effectively [6]. Today according to the World Health Organization (**WHO**), as many as 80% of the world's people depend on traditional medicine for their primary healthcare needs.

There are considerable economic benefits in the development of indigenous medicines and in the use of medicinal plants for the treatment of various diseases [7]. Lack of primary healthcare centers and transportation facilities, prohibitive cost of treatments, side effects of several allopathic drugs have led to increased emphasis on the use of plant materials as a source

of medicines for a wide variety of human ailments [8,9]. It has been estimated that 1.5 billion population of developing countries uses traditional medicines either because the people cannot afford synthetic medicine or because traditional medicines are more acceptable [10].

Pakistan is among the reasonably diverse countries in plant resources, where people's reliance on biological sources for the survival and well-being is very strong [11,12]. Pakistan has more than 6,000 species of higher plants, of which at least 12 percent are used medicinally. The country is among the top ten in exporting raw herbs, with more than 400 local herbal products companies involved in the industry. Documenting the traditional knowledge through ethnobotanical studies is important for the conservation and utilization of plant resources for future generations. In Pakistan, the available modern healthcare services are either insufficient or inaccessible and unaffordable to the majority of people. In addition, due to illiteracy and poverty most of the population is dependent on traditional phytomedicine to cure various ailments. As the country has diverse socioeconomic, ethnic, linguistic and cultural areas, as well as unique biodiversity, copious knowledge of indigenous medicinal plants and their use in treating human ailments might reasonably be expected. In Pakistan the local communities of different regions particularly, who reside in Himalayas have centuries old knowledge and traditional practices of most of the plants occurring in their region. It has been reported that more than 10% of the Pakistani flora (600–700 plant species) is used for medicinal purposes [13,14]. Due to over-collection, however, several plant species have become extinct in the Himalayan regions. The major reason for this loss of plant biodiversity is that most people involved in gathering plant materials (mainly women and children) harvest natural resources thoughtlessly to subsidize their meager incomes as best they can. Many valuable plants are under the verge of extinction. Consequently, there is an urgent need to record and preserve is completely lost.

Respiratory diseases can be caused by several reasons, either by the presence of microorganisms or toxins in the environment (or in the saliva or mucus) which generally attack organisms with nutritional deficiencies, weak or immunologically predisposed to suffer any these discomforts. Among the most common are the respiratory flu, tonsillitis, bronchitis, pneumonia, influenza and pneumonia. The main symptoms of these disorders are often very similar and are manifested in the following ways: Flushing, Cough, Fever, and Headache, throat, ears, or muscle aches, General malaise and Tiredness. Respiratory tract infections continue to be a major health challenge worldwide especially due to the increasingly fast development of resistance to the drugs currently in use. Literature surveys reveal that a lot of work has been done to document medicinal plants to treat respiratory tract diseases [15-22]. However, no systematic documentation is available with reference to Pakistan. Many plant species are traditionally used for respiratory illness treatment, and some have been investigated for their efficacy with positive results. An often-limiting factor to these investigations is lack of comprehensive ethnobotanical data to help choose plant candidates for potency/efficacy tests. The present study attempts to give an overview on medicinal plant species employed in traditional therapies in Kaghan Valley of Himalayan region-Pakistan to treat respiratory problems.

METHODOLOGY

Study Area

The great Himalayas are the largest mountain system in the world with uncounted and unique wild resources. Himalayas of this region has its own climatic system and piedmont habitats that have given rise to considerable biodiversity in ecosystems, species and genetic resources [3,11,23]. Kaghan Valley is situated between latitudes $34^{\circ} 14'$ and $35^{\circ} 11' N$ and longitudes $72^{\circ} 49'$ to $74^{\circ} 08' E$. The valley is a part of District Mansehra, and comprises high altitudinal mountains of the Himalayan region. The valley is about 96 km long and hardly 24 km wide, covering 945 km². Climatically, it falls in Sub-tropical Chir-Pine, moist temperate, dry temperate, sub alpine birch forest, alpine and snow covered peaks zones. The highest peaks of the valley are Malika Parbat, Musa Ka Musalla and Makra Top with elevation ranged 5,291, 4,046 and 3,885 meters,



respectively from sea levels. The average mean minimum and maximum temperatures are 22 and 40°C, respectively. November, December, January and February are the coldest months while other months are moderate. Major land uses are grazing 55%, forest 24.6 %, agriculture 2.6% and the rest is built up, roads or barren land. Every available piece of land is cultivated, from terraces built with great labor on hillsides, to rich irrigated valley bottoms. Maize is grown as major crop,

wheat and rice is also grown in pockets. Potato is replaced by off season vegetables in most of the areas however fruits are less common. The most commercially grown important fruits are apple, walnut, plum, pear and apricot. Almost all the valley is subject to grazing of varying intensity and frequency. Various tribes inhabit the valley like Syed, Gujjars, Swati, Awan, Kashmiri, Maughal and Quarish. The most important among these is the Gujjars tribe, who are famous for their unique culture and lifestyle.

The people of Kaghan valley are mainly dependent on agriculture and livestock rearing. The terrain is hilly with little arable land [6]. It has been reported that, Viral Respiratory Tract Infection (**URTI**) and scabies are common diseases in the area, which are contagious and depend on close living conditions. On the other hand bacterial respiratory tract infections consisting of tonsillitis, pharyngitis and sinusitis collectively are in the proportion of 1:9 with viral URTI which is similar to their global pattern. As the climate of the area is extremely cold, therefore the houses are usually small and less ventilated in order to combat the chilly winds of winter, this could be a risk factor for above mentioned conditions. Respiratory diseases are known to peak three folds in cold weather and high altitudes [24,25]. Consequently, there is a great dependency on the forest resource of the region to cure ailments. The result of study revealed that knowledge about the ethnomedicinal plants, habitat distribution and harvesting time of plant species is still maintained among the people of Gujjar tribe in the study area. Therefore an attempt has been made to catalogue the ethnomedicinal knowledge of plant species used by the Gujjar tribe of Kaghan Valley in the cure of various respiratory tract diseases.

Ethnobotanical Survey

A questionnaire was developed to interview local inhabitants regarding the economic importance of plants in the field. Based on this information, the economical importance of plants of the study area has been determined. Local traditional healers having practical knowledge of plants in medicine were interviewed in 10 study sites during October 2003 to April 2004. During the course of the study, four field trips were carried out in the study area totaling 40 days. Methods of selecting informants depended upon the distribution of local people having folk knowledge. They were requested to collect specimens of the plants they knew or to show the plant species on site. Ethnomedicinal data were collected through general conversations with the informants. The questionnaires were used to obtain information on medicinal plants with their local names, parts used, mode of preparation and administration. Standard method was followed with regard to collection of plant materials, drying, mounting, preparation and preservation of plant specimens. Taxonomic identification of the plant samples was carried out with the help of Flora of Pakistan [26]. The botanical names and respective families were allocated according to angiosperm phylogeny group [27,28]. Medicinal plant species were arranged alphabetically by family name, vernacular name and ethnomedicinal uses. All the preserved specimens were deposited at the Herbarium of Botany Department Hazara University Mansehra Pakistan.

RESULTS

Medicinal plant species used by the inhabitants of Kaghan valley to treat respiratory disorders along with their botanical name, local names, family, part used, and recipes are given as under. The photochemical analysis and pharmacological investigations traditionally used plant species are significant in developing novel drugs to treat respiratory ailments.

***Abies pindrow* Royle**

Local name: Achal/Kachal
Family: Pinaceae
Part used: Shoots and leaves

Recipe: Decoction of the dried shoots and fresh leaves is used to treat cough, asthma and other chest infection.

***Achyranthes aspera* L.**

Local name: Puthkanda
Family: Amaranthaceae
Part used: Leaves and roots

Recipe: Leaves and roots decoction is given in cough and asthma conditions.

***Achillea millefolium* L.**

Local name: Sultani booti
Family: Asteraceae
Part used: Flowers

Recipe: Decoction of flowering tops is used in cold, influenza and allergic mucus problems. Flowers infusion used for upper respiratory phlegm.



Ajuga bracteosa Wall. ex Benth

Local name: Kori booti

Family: Lamiaceae

Part used: Leaves

Recipe: Fresh leaves are boiled in water and decoction is used to cure sore throat.

***Adiantum capillus-veneris* L.**

Local name: Pakha

Family: Adiantaceae

Part used: Leaves

Recipe: The infusion of fronds is used in coughs and cold.

***Aesculus indica* (Wall ex Camb.) Hook.f.**

Local name: Bank khor

Family: Hippocastanaceae

Part used: Leaves

Recipe: Extract of the leaves is used against whooping cough.

***Bistorta amplexicaulis* (D. Don) Green**

Local name: Masloon

Family: Polygonaceae

Part used: Rhizome

Recipe: The rhizome is used for making tea or decoction to cure cough.

***Carum copticum* Benth.**

Local name: Ajwain

Family: Apiaceae

Part used: Seeds

Recipe: Seeds are boiled and decoction is taken orally to treat cough, asthma, throat allergy and as bronchodilator.

***Camellia sinensis* L**

Local name: Chaie

Family: Camelliaceae

Part used: Leaves

Recipe: Leaves are used in making black tea. This tea is taken along with fresh lemon juice and honey to loosen the phlegm and soothes the throat.

***Cinnamomum aromaticum* Nees**

Local name: Dalchini

Family: Lauraceae

Part used: Bark

Recipe: Tea made from bark is used to cure asthma cough and cold.

***Cousinia thomsonii* Clarke.**

Local name: Kandiari

Family: Asteraceae

Part used: Whole plant

Recipe: The plant is edible and locally used for cough and asthma.

***Cymbopogon citratus* L.**

Local name: Lemon grass

Family: Poaceae

Part used: Leaves

Recipe: Leaves are consumed as a herbal tea to relieve cough and nasal congestion.

***Curcuma longa* L.**

Local name: Haldi

Family: Zingiberaceae

Part used: Rhizome

Recipe: Half teaspoon of black pepper and turmeric powder, and one teaspoon of honey are mixed in warm milk. This is taken orally to treat phlegm.

***Cedrus deodara* (Roxb. Ex Don.) G. Don.**

Local name: Deodar

Family: Pinaceae

Part used: Wood

Recipe: Wood extract is useful against pulmonary disorder.

***Delphinium denudatum* L.**

Local name: Jadwar

Family: Ranunculaceae

Part used: Rhizome

Recipe: Powder with water is taken orally to cure cough and fever.

Descurainia sophia (L.) Webb and Benth.



Local name: Khoobkalan

Family: Brassicaceae

Part used: Seeds

Recipe: Powder is used for chest complains throat problems, chest burning as well as for tonsils.

***Elaeagnus angustifolia* L.**

Local name: Karnkoli

Family: Elaeagnaceae

Part used: Fruit

Recipe: Fruits are eaten raw to treat cough.

***Elettaria cardamomum* Maton.**

Local name: Ilaayachi

Family: Zingiberaceae

Part used: Seeds

Recipe: Used as ingredient in herbal teas to cure cough and throat problems.

***Ephedra gerardiana* Wall. ex Stapf.**

Local name: Asmani booti

Family: Ephedraceae

Part used: Aerial parts

Recipe: Decoction of aerial parts is taken orally to treat cough and asthma.

***Ferula assafoetida* L.**

Local name: Hing

Family: Umbelliferae

Part used: Rhizome

Recipe: Powdered rhizome is taken orally against cough and asthma.

***Geranium wallichianum* L.**

Local name: Rattanjog

Family: Geraniaceae

Part used: Rhizome

Recipe: Rhizome decoction is used to cure cough.

***Glycyrrhiza glabra* L.**

Local name: Malhathi

Family: Papilionaceae

Part used: Roots

Recipe: Decoction from roots is effective to reduce phlegm, and provides relief from sore throat as well.

***Hordeum vulgare* L.**

Local name: Jaoo

Family: Poaceae

Part used: Seeds

Recipe: Barley water with honey is prescribed for bronchial coughs and fever.

***Justicia adhatoda* (L.) Nees**

Local name: Behikar

Family: Acanthaceae

Part used: Roots

Recipe: Root powder is given to treat chronic cough and asthmatic patients.

***Micromeria biflora* (Buchi. Ham. ex D. Don) Benth.**

Local name: Thandi booti

Family: Lamiaceae

Part used: Whole plant

Recipe: The stem and the leaves are chewed and the juice is taken orally to relive cough.

***Mentha longifolia* L.**

Local name: Chitta poodina

Family: Lamiaceae

Part used: Leaves

Recipe: Infusion of leaves is taken for treat sore throat and mouth irritation.



Myrsine africana



Nasturtium officinale



Papaver somniferum



Pistacia integerrima



Skimmia laureola



Solanum surratense

Morus laevigata Wall. ex Brandis.

Local name: Shah toot

Family: Moraceae

Part used: Fruits

Recipe: Fruits are eaten raw, or juice is taken orally to treat cough.

***Myrsine africana* L.**

Local name: Mangaya

Family: Myrsinaceae

Part used: Fruits

Recipe: Dried fruits are grinded and powder is taken to treat cough.

***Nastrutium officinale* R. Br.**

Local name: Taramira

Family: Brassicaceae

Part used: Leaves

Recipe: Leaves are cooked and eaten raw, considered effective in cough.

***Papaver somniferum* L.**

Local name: Afune or Post

Family: Papaveraceae

Part used: Fruits

Recipe: Tea made from dried fruit is also effective in asthma, cough and other diseases of the respiratory tract.

***Picrorhiza kurroa* Royle ex. Benth**

Local name: Kurru

Family: Scrophulariaceae

Part used: Rhizome

Recipe: Decoction of rhizomes is used in the treatment of respiratory conditions such as asthma and bronchitis.

***Pinus roxburghii* L.**

Local name: Chir

Family: Pinaceae

Part used: Leaves

Recipe: Leave are very beneficial to respiratory system to treat the diseases of the mucous membranes and respiratory complaints such as coughs, colds, influenza and tuberculosis (TB).

***Pistacia integerrima* J. L. Stewart.**

Local name: Kangar

Family: Anacardiaceae

Part used: Leaves

Recipe: Leaf galls are burnt on oven and sugar is mixed to ash and used for asthma, cough and other diseases of the respiratory tract.

***Portulaca oleracea* L.**

Local name: Kulfa

Family: Portulacaceae

Part used: Leaves

Recipe: The leaves are cooked and eaten raw, and considered to have anti-asthma and anti-inflammatory properties.

***Primula denticulata* Sm.**

Local name: Romatotia

Family: Primulaceae

Part used: Roots

Recipe: Roots are crushed to make powder and used for cough and bronchitis.

***Prunus cornuta* L.**

Local name: Kalakath

Family: Rosaceae

Part used: Fruits

Recipe: Fruits are used as a cure for asthma and cough.

***Saussurea lappa* C.B.Clarke.**

Local name: Kuth

Family: Asteracea

Part used: Roots

Recipe: Dried root powder mixed with honey is used to cure asthma, cough, throat infections and tuberculosis (TB).

***Senecio chrysanthemoides* DC.**

Local name: Chal

Family: Asteracea

Part used: Roots

Recipe: Root extract is given to children against lungs diseases.

***Skimmia laureola* DC.**

Local name: Neer

Family: Rutaceae

Part used: Leaves

Recipe: Smoke of burned leaves is used in cleaning the nasal tract also used in cough and cold.



***Solanum surratense* Bumr.f.**

Local name: Mohrri

Family: Solanaceae

Part used: Leaves

Recipe: The decoction of leaves is used for fever and cough.

***Sisymbrium irio* L.**

Local name: Khoobkalan

Family: Brassicaceae

Part used: Leaves and seeds

Recipe: Leaves and seeds are fried and mixed with soup. This soup is taken orally to warm the body and to treat bronchitis.

***Swertia chirata* (Roxb. ex Fleming) H. Karst**

Local name: Chirata

Family: Gentianaceae

Part used: Aerial parts

Recipe: Aerial parts are boiled and filtered, this decoction is taken orally to cure bronchial and asthma.

***Taxus wallichiana* Zuc.**

Local name: Barmi

Family: Taxaceae

Part used: Leaves

Recipe: Leaves are dried and powder is used in bronchitis, whooping cough and asthma.

***Thymus linearis* L.**

Local name: Chicken

Family: Lamiaceae

Part used: Leaves

Recipe: Powdered leaves are used in making tea. This tea is effective in bronchial catarrh, whooping cough, asthma, bronchitis and other respiratory diseases.

***Triticum aestivum* L.**

Local name: Kank

Family: Poaceae

Part used: Seeds

Recipe: A local sweet meal (halwa), prepared from wheat starch powder is used to treat throat problems.

***Tussilago farfara* L.**

Local name: Watpan

Family: Asteraceae

Part used: Leaves

Recipe: A decoction made of leaves, is taken orally against asthma and cough.

***Urtica dioica* L.**

Local name: Bichoo booti

Family: Urticaceae

Part used: Roots

Recipe: In winter season root decoction is mostly used for cold and cough.



***Verbascum thapsus* L.**

Local name: Gidertumbakoo

Family: Scrophulariaceae

Part used: Leaves

Recipe: Leaves powder is taken orally along with water for asthma and cough.

***Viola odorata* L.**

Local name: Banfiasha

Family: Violaceae

Part used: Whole plant

Recipe: Decoction from whole plant is recommended for cold, cough and sore throat.

***Zanthoxylum armatum* DC.**

Local name: Timer

Family: Rutaceae

Part used: Seeds

Recipe: Seeds are swallowed to cure sore throat and mouth.

***Zingiber officinale* L.**

Local name: Adrak

Family: Zingiberaceae

Part used: Rhizome

Recipe: Rhizome extract mixed is taken along with honey to treat cough.

***Ziziphus jujuba* L.**

Local name: Sinjli

Family: Rhamnaceae

Part used: Fruit

Recipe: Dried fruits are boiled and decoction is used to treat hoarseness of the throat, cough and cold.

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