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Use of Plants in Traditional Medicines for the Cure of Respiratory Ailments in the Malwa Belt of Punjab, India

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Abstract

Traditional system of medicine is re-emerging health aid in the present scenario. A large number of plants find their use for ethnomedicinal purposes for the cure of acute as well as chronic type of ailments. Respiratory ailments due to their communicable nature are affecting human beings of almost all age groups. The chances of occurrence of such diseases fuel up in areas with high level of pollution. Keeping this in mind, the present study was commenced in the malwa region of Punjab state. During the study, ethnomedicinal knowledge regarding the use of plants against respiratory ailments in the folk medicines was documented. A total of 83 plants belonging to 37 families were recorded to be used against respiratory diseases. Some of the new claims pertaining to the use of plants during the investigation indicate the presence of some valuable phytochemicals present in them and their use in future with more significant perspectives. During the present investigation, it was also felt that there is need of sustainable use of such valuable resources and making the younger generation more aware of ethnomedicinal plants.

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acute and chronic ailments,
respiratory diseases,
Traditional use,
Phytochemicals,
Folk medicine.

Introduction

According to WHO report, about 65-80% of the world population, especially of the developing nations is dependent on plants for their primary health care due to economic reasons and lack of access to modern medical facilities (Calixto, 2005). After facing a setback due to advent of conventional allopathic system of medicine, use of ethnobotanical knowledge regarding use of plants for curative purposes and research has gained a momentum (Heinrich, 2000). Studies also indicate that interest in the documentation of medicinal plants and their usage has been enhanced due to costly synthetic drugs and their side effect (Hoareau *et al*., 1999). Medicinal plants can judiciously used to treat acute as well as chronic health problems. Worldwide and specifically in developing countries, communicable diseases especially acute respiratory infections are one of the significant factor responsible for mortality rate (4 Boutayeb, 2006). According to WHO, after neonatal causes, respiratory problems are second significant factor responsible for the death of children under age of five. Similarly due to high co-occurrence with human deficiency virus (HIV), pneumonia is significantly responsible for mortality among the adults (WHO, 2005a). Modernized life style, industrialization, and pollution are accelerating the chances of respiratory diseases. A variety of drugs are available in the market. But most of these have number of side effects associated with them. Moreover, a major chunk of the population is

deprived of these due to economic reasons. A large number of people in the rural areas rely upon the use of traditional medicines for most of their ailments and respiratory diseases are no exception. Folk medicines are reported to be widely used for both acute as well as chronic respiratory ailments. Asthma, bronchitis, whooping cough, catarrh, sinusitis, rhinitis, common cold and cough are some the common respiratory ailments cured by traditional medicines. The main positive aspect is that these do not have side effects and are pocket friendly to the user (Lewis *et al*., 2003).

There are number of reports regarding the use of medicinal plants for cure of respiratory diseases from the different parts of the world (Loporath *et al*., 2003; Busia, 2005; Focho *et al*., 2009; Nunkoo *et al*., 2012; Maroyi Alfred, 2013; Asadbeigi *et al*., 2014; Kayani *et al*., 2014; Maroyi *et al*., 2015). Ethnobotanical surveys have also been conducted in various parts of India (Yadav *et al*., 2000; Jain *et al*., 2001; Paria, 2005; Mahishi *et al*., 2005; Das *et al*., 2006; Savithramma *et al*., 2007; Patil *et al*., 2008; Arjun *et al*., 2009; Sidhalinga *et al*., 2013; Sahu *et al*., 2014). But most of such studies have been restricted to some area with tribal populations. No doubt tribal people use plants more commonly for their therapeutic values, but still a large number of people living in rural areas or some remote locations depend upon the use of plants for cure of various acute and chronic ailments.

Punjab is one of the prosperous state of India, yet a large number of people are deprived of basic medical facilities. The malwa region occupies the maximum area of the state. Most of the part of the land is under cultivation. A variety of fertilizers and pesticides are used in the fields. This leads to the pollution in the area. These pollutants cause various health problems. Ludhiana, the industrial hub of the state is the worst affected region due to industrial pollution. Thermal power plants and fertilizer factories at Bathinda and Ropar also emit a large number of pollutants in the air. The inhabitants of the malwa belt belong to different social strata. Most of the people belong to middle class and poor people.

The latter mainly include farm labourers or migrant workers. This group of people are worst affected due to respiratory diseases. The most of the population, especially in rural areas is dependent on the local traditional and herbal healers for their medical needs. Keeping in the view above factors, the present study was planned in the malwa region of the Punjab state. In Punjab, a meager work has been carried on this aspect of the plants.

Materials and Methods

The present study was conducted during 2015-2016. Regular and exhaustive forays were made to the areas selected under study (Fig.1) during this period to gather information. For documentation of the information, semi- structured questionnaire was prepared. Traditional practitioners such as vaidyas, hakims and local people were interviewed. Queries were asked in the native language, i.e. Punjabi. Most of the localities were visited at regular intervals. The informants belonged to different age groups. They comprised of both males and female with different literacy level individuals of the area (Table 1).

Fig.1 Showing study area

All the information gathered was cross checked with available literature and other authenticated sources. The plants investigated have been collected, dried and preserved in the form of herbarium sheets following proper guidelines (Jain *et al*., 1977; Martin *et al*., 2004). Photographs of the plants in their habitat were also taken. Plants used in treatment of various respiratory diseases such as common cold, cough, bronchitis, catarrh, nasal and chest congestion, asthma whooping cough and tuberculosis etc. have been documented w.r.t. their botanical name, common name, family, habit, life span, part used and mode of administration was documented in table2.

Results and Discussion

During the present study, 83 plants, falling under 80 different genera belonging to 44 families have been investigated for their ethnomedicinal use for various respiratory diseases. Maximum number of plants belongs

to Asteraceae followed by Fabaceae. Most of the plants documented are dicots, few monocots and only one gymnosperm (fig.2). The present data shows that maximum of the plants used for the medicinal purpose include herbs (50%), followed by trees (29%) and shrubs (17-18%) others (13%) (Fig3). In most of the cases leaves were used either in powdered form or in the form of decoction. Whole plants, roots, bark, flowers, fruits and seeds of many plants were also reported to be used in folk medicines for this purpose. There are some of the new reports from the area, while others have been reported previously by different workers from different parts of the world as well as India. There are some reports of plants used for cure of respiratory diseases, which otherwise have been reported in case of other ailments by some other workers from different regions.

The present study indicates that a variety of plants are used for the cure of various respiratory disorders and diseases such as cough. Cold, flu, coryza, sinusitis, rhinitis, bronchitis, asthma, pneumonia, whooping cough and tuberculosis etc. Most of the plants used for their therapeutic value in respiratory ailments are herbs. In some cases, specific plant part such as root, stem, leaves, flowers, fruits or seeds are used while in others whole of the plant is used for this purpose. However, leaves were reported to be used in maximum cases.

Table.1 Demographic details of the informants

Variable	Demographic category	Percentage
Sex	Male Female	62.8 % 32.7%
Age	25-40 years 40-60 years 61-75 years Above 75 years	20.4% 28.6% 30.2% 20.8%
Literacy level	Illiterate Primary pass Secondary pass Graduate or more	38.2% 26.6% 24.8% 10.4 %

Fig.2 Diversity of investigated life forms

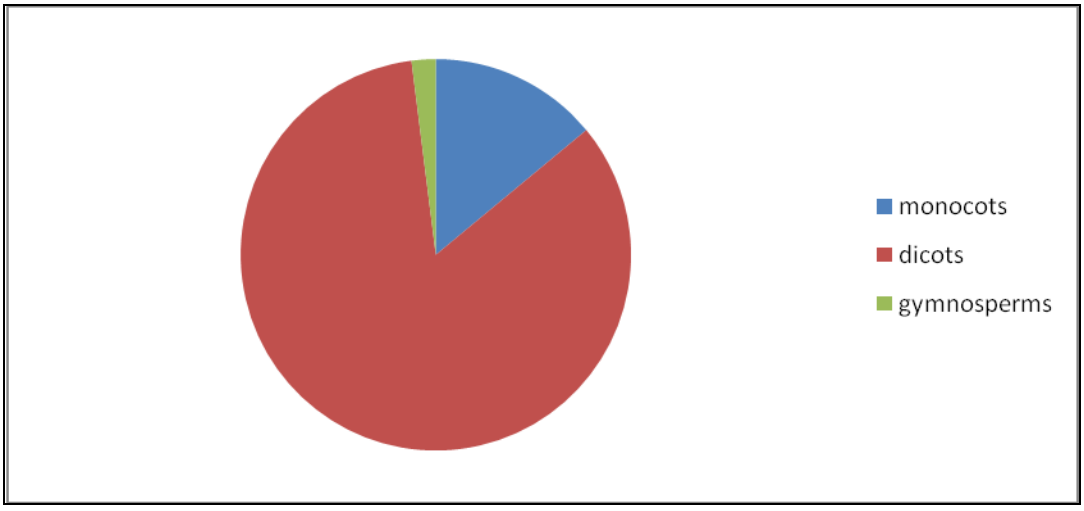


Table.2 An inventory of plants investigated for the traditional treatment of various respiratory diseases in an alphabetical order of their botanical names, along with common name, family, habit, part used and mode of administration recommended

S. No.	Botanical Name	Common Name	Family	Habit	Part Used	Ailment	Mode of Administration
1.	*Abrus precatorius*	Ratti	Fabaceae	Climber	Leaves	Cough	Decoction of Leaves
2.	*Acacia nilotica* Linn.	Kikkar	Mimosidae	Tree	Bark and seeds	Cough,Asthma	Decoction of bark and powdered seeds
3.	*Achyranthes aspera* Linn.	Puthkanda	Amaranthaceae	Herb	Roots	Dry cough andsore throat	Decoction of roots.
4.	*Acalypha indica* Linn.	Indian Nettle/Kuppi	Euphorbiaceae	Herb	Whole plant	Throat infections	Extract of Plant parts
5.	*Aconitum violaceum* L.	Zeharmora	Ranunculaceae	Herb	Roots	Asthma	Powdered roots
6.	*Acorus calamus* Linn.	Sweet myrtle/ Bach	Araceae	Herb	Roots	Throat problems	Root Powder with honey
7.	*Adhatoda vesica* Nees.	Vasaka	Acanthaceae	Shrub	Bark	Asthma	Powdered bark
8.	*Ageratum conyzoides* Linn.	Jangli pudina	Asteraceae	Herb	Whole plant	Cough, asthma, catarrh, Concoction of leaves	
9.	*Ailanthus* excelsa Roxb.	Aralu	Xanthoxylaceae	Tree	Bark, leaves	Asthma	Decoction of bark and leaves
10.	*Allium cepa* Linn.	Piaz/Onion	Liliaceae	Herb	Bulb	Bronchitis and asthma	Juice of Fleshy Stem /bulb
11.	*Allium sativus* Linn.	Lasun/ garlic	Liliaceae	Herb	Garlic cloves	Cough and bronchitis	Garlic extract
12.	*Alstonia scholaris*	Shaitaan/devil's tree	Apocynaceae	Tree	Bark	Bronchitis,chest congestion	Decoction

13.	*Amaranthus viridis*	Chulai	Amaranthaceae	Herb	Leaves	Cough, cold,nasal congestion	Leaf juice
14.	*Artemisia vulgaris* Linn.	Mug wort	Asteraceae	Herb	Leaves and flowers	Cough and cold	Powdered leaves and flower tops with honey
15.	*Asclepias syriaca*	Milkweed	Asclepiadaceae	Shrub	Roots	Bronchitis,catarrh, pleurisy,pneumonia,dry cough,expulsion of mucus	Root powder
16.	*Atropa belladona* Linn.	Belladona	Solanaceae	Shrub	Roots	Asthma,bronchitis,Whooping cough	
17.	*Azadirachta indica Linn.*	Neem	Meliaceae	Tree	Bark	Tuberculosis	Bark Powder With honey
18.	*Barleria prionitis* Linn.	Vajardanti	Acanthaceae	Shrub	Leaves	Cough,bronchitis	Decoction
19.	*Bauhinia varigata* Linn.	Kachnaar	Fabaceae	Tree	Flowers,leaves	Nasal congestion,cough and cold,catarrh	Dried ,powdered flowers as snuff or steam of leaves along with menthe
20.	*Boerhaavia procumbens*	Punernava	Nyctaginaceae	Herb	Leaves	Cough,bronchitis	Leaf juice
21.	*Bryophyllum spp.*	Pathar chat	Crassulaceae	Herb	Leaves	Dry cough	Leaf juice with powdered black pepper
22.	*Butea monosperma*	Palash/Dhak	Fabaceae	Tree	Bark	Bronchitis,asthma	Decoction
23.	*Calotropis procera*	Milkweed/Ak	Asclepiadaceae	Shrub	Flowers	Asthma,Bronchitis	Dried, Powdered flowers with honey

24.	*Cannabis sativus* Linn.	Bhang	Cannabinaceae	Shrub	Leaves	Cough,cold,bronchitis,chest congestion,asthma	Leaf extract
25.	*Capparis aphylla* Linn.	Karir	Capparidaceae	Shrub		Throat infection,catarrh	
26.	*Capsicum annuum* Linn.	Chilly/Mirch	Solanaceae	Herb	Fruit	Cold,cough,flu,nasal Discharge	Paste Along With Honey and ginger
27.	*Carica papaya* Linn.	Papaya/papita	Caricaceae	Tree	Leaves	Cough,asthmaDecoction of roots in cough, smoke of burnt leaves in asthma	
28.	*Cassia fistula* Linn.	Indian Labrnum/Amaltas	Caesalpinioidae	Tree	Bark and leaves	Whooping cough, asthma, throat problems	Decoction of leaves and bark
29.	*Cassia glauca* Linn.	Chotta amaltas	Caesalpinioidae	shrub	Leaves	Cough and sore throat	Gargles With leaves boiled in water
30.	*Centella asiatica* Linn.	Brahmi booti	Apiaceae	Herb	Whole plant	Cough, cold, flu, nasal congestion	Decoction
31.	*Citrus limon*	Lemon	Rutaceae	Tree	Fruit	Cough, cold, asthma	Juice with honey and ginger
32.	*Citrus sinensis* Linn.	Mausambi	Rutaceae	Tree	Leaves,Roots	Asthma, bronchitis	Powdered Seeds with luke warm water
33.	*Conyza sumatrensis*	Buttre weed/Makhan booti	Asteraceae	Herb	Leaves	Nasal congestion,Rhinitis nasal drops	
34.	*Corianderum sativum* Linn.	Coriander /Dhania	Apiaceae	Herb	Whole plant	Dry cough, bronchitis, throat Problems	Powdered Seeds Along with mishri in dry cough ,juice in Throat problems

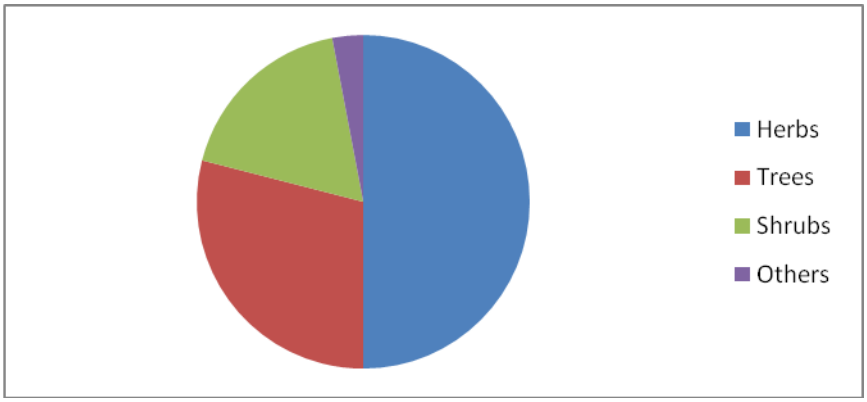
35.	*Cuminum cyminum*	Safed zira	Apiaceae	Herb	Fruit	Asthma and bronchitis	Roasted Powdered seeds along with salt and cloves
36.	*Curcuma longa*	Turmeric/Haldi	Zingiberaceae	Herb	Rhizome	Cold, cough, flu, bronchitis and Asthma	Powdered Or Paste
37.	*Cymbopogon citratus* Linn.	Lemon grass	Poaceae	Herb	Whole plant	Nasal congestion, cold, cough, bronchitis and asthma	Whole Plant Extract
38.	*Cyperus rotundus*	Nagarmotha	Cyperaceae	Herb	Whole plant	Bronchitis,asthma	Whole Plant Extract
39.	*Dalbergia sisso*	Shisham	Fabaceae	Tree	Leaves	Throat problems	Decoction Of Leaves
40.	*Datura stramonium*	Jimson weed/Datura	Solanaceae	Shrub	Leaves,seeds	Bronchitis,Asthma	Dried And Powdered Parts Are Sniffed
41.	*Desmodium triflorum* (L) DC		Fabaceae	Herb	Leaves	Cough, flu, bronchitis	Decoction of leaves
42.	*Ephedra gerardiana*	Dwijpriya	Ephedraceae	Shrub	Stem and leaves	Sinusitis, rhinitis, hay fever, bronchial asthma, cough and cold	Decoction or Powdered form
43.	*Emblica officinalis* Geartn.	Indian gooseberry/amla	Euphorbiaceae	Tree	Fruit and leaves	Common cold and cough, bronchial asthma, chest congestion	Fruit pulp, juice or concoction of leaves
44.	*Eucalyptus globulus* Linn.	Safeda	Myrtaceae	Tree	Leaves	Cold, nasal lockage, chest congestion, bronchitis, asthma	Inhalation of leaf extract

45.	*Euphorbia hirta*	Duddhi	Euphorbiaceae	Shrub	Leaves	Cough,coryza, bronchitis, asthma	Extract of leaves
46.	*Feronia limonia* Linn.	Kaith	Rutaceae	Tree	Fruit	Sore throat	Fruit
47.	*Ficus religiosa* Linn.	Peepal	Moraceae	Tree	Leaves, Fruit	Cough, bronchitis,asthma	Decoction of leaves or fruits
48.	*Foeniculum vulgare* Linn.	Fennel/Saunf	Apiaceae	Herb	Whole plant, mainly fruit	Cough, cold, nasal discharge, Asthma	Decoction of fruits or powdered seeds with luke warm milk
49.	*Fumaria officinalis* Linn.	Pit pappra	Fumariaceae	Herb	Whole plant	Cough, throat problems	Decoction
50.	*Glycerrhiza glabra* Linn.	Liquorice/ Mulatthi	Fabaceae	Shrub	Rhizome	Intermittent cough, chest congestion, bronchitis, asthma	Portion of rhizome is chewedor decoction
51.	*Hyocyamus niger* Linn.	Khurasani ajwain	Solanaceae	Herb	Seeds	Cough, coryza, asthma, throat infections	Decoction of seeds
52.	*Ixora coccinea* Linn.	Lal phul	Rubiaceae	Herb	Leaves and flowers	Cough, sore throat, whooping cough, bronchitis, asthma	Leaf juice or dried, powdered flowers with honey
53.	*Lagenaria siceraria* Linn.	Bottle gourd/ Lauki	Cucurbitaceae	Climber	Seeds	Throat problems	Infusion of seeds
54.	*Lippia javanica* Linn.		Verbenaceae	Herb	Leaves	Asthma,Bronchitis	Leaf juice
55.	*Mangifera indica* Linn.	Mango /Aam	Anacardiaceae	Tree	Seeds	Whooping cough,bronchitis,asthma	Roasted, powdered seeds
56.	*Mentha virdis* Linn.	Mint/ Pudina	Lamiaceae	Herb	Whole plant	Cough,cold,flu,Asthma	Tincture or Powdered leaves
57.	*Momordica dioca* Linn.	Jangli karela	Cucurbitaceae	Climber	Fruit	Cough, bronchitis, asthma, hay Fever	Fruit juice

58.	*Musa paradisiaca* Linn.	Banana	Musaceae	Shrub	Fruit	Cough, cold, bronchitis, asthma	Fruit pulp With black Pepper or Ash of banana peel with lemon juice and honey
59.	*Murr aya koeinigii* Linn.	Meetha Neem	Rutaceae	Tree	Leaves	Cough and sore throat	Leaf juice
60	*Nyctanthus arbor-tris* Linn.	Haar-shingaar	Oleaceae	Tree	Leaves, flowers	Asthma	Powdered Seeds or infusion of flowers
61.	*Ocimum basilicum*	Basil /marua	Lamiaceae	Herb	Leaves	Bronchitis, asthma	Decoction of leaves
62.	*Ocimum sanctum* Linn.	Tulsi	Lamiaceae	Herb	Leaves	Asthma, bronchitis	Decoction of leaves
63.	*Piper nigrum* Linn.	Black pepper	Piperaceae	Climber	Seeds	Cough, bronchitis, Asthma, whooping cough	Powdered seeds with honey
64.	Pongamia pinnata Linn.	Karanj	Fabaceae	Tree	Leaves	Cough, asthma	Leaf juice
65.	*Prosopis juliflora* Linn.	Jand	Mimosidae	Tree	Bark	Cough, asthma, bronchitis	Infusion of bark
66.	*Punica granatumLinn.*	Pomegranate/ Anar	Punicaceae	Tree	Fruit	Cough, asthma, bronchitis	Ash of fruit peel
67.	*Rumex denticulata* Linn.	Jangli palak	Polygonaceae	Herb	Leaves	Cough, cold, catarrh	Leaf juice is instilled in nose
68.	*Ruta vulgaris* Linn.		Rutaceae	Shrub	Leaves	Throat infections	Leaf juice with zinger
69.	*Salvia officinalis* Linn.	Sage	Euphorbiaceae	Herb	Leaves,flowers	Bronchitis,asthma	Inhalation of leaves and flowers
70.	*Solanum nigrum Linn.*	Black night shade/ Makoh	Solanaceae	Herb	Leaves	Sore throat	Decoction of leaves
71.	*Sonchus asper* (L)Hill	Asgandh	Asteraceae	Herb	Roots	Cough, throat problems	Powdered roots
72.	*Tagetus erecta* Linn.	Marigold/ Genda	Asteraceae	Herb	Leaves, Flowers	Cough, cold, Bronchitis	Extract
73.	*Terminalia arjuna*	Arjun	Combretaceae	Tree	Bark	Cough, bronchitis, asthma	Decoction

74.	*Thevetia peruviana*	Kaner	Apocynaceae	Tree	Flowers	Cough, nasal congestion	Snuff
75.	*Thymus vulgaris* Linn.	Thyme	Lamiaceae	Herb	Whole plant, leaves,flowers	Asthma, bronchitis, pneumonia	Decoction
76.	*Tinospora cordifolia* Linn.	Gilow	Menispermaceae	Climber	Leaves	Asthma, bronchitis	Juice
77.	*Trifolium pretense*	Red clover	Fabaceae	Herb	Flowers	Asthma, bronchits, whooping cough	Decoction
78.	*Verbascum Thapsus*	Jangli tambacu	Scrophulariaceae	Herb	Leaf,flower root	Cough, bronchitis, Asthma, nasal congestion	Decoction or Powdered roots
79.	*Viola odoratus*	Banafsha	Violaceae	Herb	Whole plant	Cough, cold chest congestion,bronchitis, asthma ,pneumonia	Decoction of Whole plant
80.	*Vitex negundo*	Nirgundi	Verbenaceae	Herb	Leaves	Cough, asthma	Leaf juice
81.	*Xanthium strumanium* Linn.	Cocklebur/ chotta datura	Asteraceae	Shrub	Leaves, Flower	Bronchitis,asthma,Tuberculosis	Infusion of Leaves in TB, fruit juice in asthma
82.	*Zingiber officinale* Linn.	Ginger/ Adrak	Zingiberaceae	Herb	Rhizome	Cough,cold,flu,asthma,bronchitis, Catarrh	Extract
83.	*Zizyphus mauritiana* Lamk.	Ber	Rhamnaceae	Tree	Leaves,bark	Cough, bronchitis	Leaf juice

Fig.3 Showing diversity of habit of documented plants



Various medicines are administered in a variety of modes such as decoction, infusion, tincture, juice, powder, inhalation etc. It was also observed that people in the age group 40-70 years of age showed more knowledge regarding the medicinal value of various plants. Some of the plants are frequently used for medicinal purposes due to their easy availability and comparatively convenient mode of administration, while others are specifically used by traditional medical practitioners only as some of these are not commonly found and also have toxic effects, if administered in larger doses. There were some of the reports indicating use of the same plant for cure of more than one type of ailments. Some of such type of examples include *Acacia nilotica, Achyranthes aspera, Allium cepa, Allium sativus, Boerhaavia procumbens Butea monosperma, Cannbis sativus,Calotropis procera, Cassia fistula,*

Emblica officinalis, Foeniculum vulgare, Ocimum sanctum, Terminalia arjuna, Zingiber officinale etc.

Conclusion

India, especially Punjab is bestowed with a huge diversity of flora due to its climatic conditions and fertile land. A variety of plants growing here are economically important. Most of the portion of the Malwa region of Punjab is under cultivation. A number of plants, both cultivated as well as wild are of immense ethnobotanical importance. Many of the plants are used by traditional healers and common people for their medicinal value. Presently, huge number of people irrespective of their age, sex, country caste and creed are suffering from respiratory diseases. Many of people due to lack of their access to medical treatment or poor economic conditions are solely dependent on traditional and folk medicines. Now a days, even the upper strata of the society is also showing inclination towards the traditional system of medicine due to its long term benefits and almost nil side effects, especially in case of various respiratory ailments like cough, bronchitis and asthma etc. Such studies can be beneficial to investigate the various phytochemicals with promising approach to be used for treatment of both acute as well as chronic respiratory diseases. However, efficacy and safety of traditional medicines is needed to be evaluated. At the same time, conservation strategies should be evaluated for sustainable use of the plant resources. This type of ethnomedicinal studies help to explore the resources of the area for medicinal purposes and preserve the nature's precious gift to the mankind. Such surveys also generate the interest of young and future generations in this aspect of nature and also play a significant role in socio-economic upliftment of the local people.

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