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Natural Extracts and Compounds for Treating Various Respiratory Disease Conditions

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ABSTRACT

Respiratory disorders damage the organs and tissues of the respiratory system, making it harder for organisms to exchange gases. These ailments may be caused by a variety of factors, including infection and air pollution. As the world advances as a consequence of countless industrial breakthroughs, air contaminants have increased, resulting in a rise in the number of illnesses communicated via the air. Although there are medications available to treat these conditions, there are many plants that naturally contain components that may be used to treat them. The purpose of this research is to understand more about the many plants that are utilized to treat respiratory issues across the globe. A comprehensive literature search was undertaken utilizing many databases to support this investigation. The data was analyzed, and the plants were classified based on the sorts of respiratory ailments for which they are used. According to the study's results, there are a variety of medicinal and traditional plants that may be used to treat almost every respiratory ailment. As a consequence, there may be cheaper alternatives to the market's often-expensive synthetic medications. We may be able to employ traditional herbal medicine to replace synthetic treatments, which will help to lessen the side effects that are often associated with commercial pharmaceuticals.

Key Words: Plants, Respiratory, Disorders, Treatment, Therapy, Traditional

INTRODUCTION

The pulmonary system, often known as the respiratory system, is an organ system that includes particular structures and organs for gas exchange. Depending on the kind, size, and evolutionary history of the organism, the architecture and physiology of the respiratory system may change. The human respiratory system consists of the nose, throat, larynx, trachea, bronchi, and two lungs. It gives our bodies oxygen and assists in the elimination of carbon dioxide, two critical processes that the human body must do [1]. The organs of the respiratory system work together in a coordinated manner to execute the following functions. If the normal operations of these organs are interrupted, respiratory difficulties may occur. Diseases affecting the respiratory system's organs and tissues that help in gaseous exchange are known as respiratory disorders. The nerves and muscles involved in breathing, as well as the bronchi, bronchioles, upper respiratory tract, pleura, and pleural cavity, are all included [2]. The most prevalent causes of these disorders

are smoking and air pollution, but in certain cases, neonates are born with undeveloped lungs, which may lead to issues later in life. While some of these infections, like the common cold, are mild and manageable, others, including lung cancer and bacterial pneumonia, may be lethal [3].

The problems of the respiratory system are divided into four categories:

1. Asthma, bronchitis, and other obstructive illnesses are among the most common.
2. Pulmonary hypertension, pulmonary edema, and other vascular diseases are among the most common.
3. Movement-limiting conditions, such as fibrosis, pleural effusion, and so on.
4. Asbestosis, tuberculosis, and other infectious and environmental diseases.

Herbs have been used to treat a variety of diseases and problems, including respiratory issues, for ages. People all

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throughout the world utilize traditional medicines to treat a range of ailments. The World Health Organization (WHO) estimates that about 80% of people in developing countries still depend on traditional medicinal plants for basic health care [4]. In isolated places, the lack of access to the mainland is the primary reason for the use of traditionally available plants rather than contemporary treatments. However, ethnopharmacology knowledge is on the rise, leading to the creation of innovative and safer drugs derived from traditional botanicals [5]. These states feature a diverse range of medicinal plants, ranging from hills to deep forests, thanks to their tropical climate. The locals try to keep remedies for ailments like the common cold, cough, asthma, and so on hand since they are so prevalent. Only a few of the numerous plants used to treat respiratory disorders include *Datura stramonium*, *Adhatoda vasica*, *Curcuma longa*, and others [6]. The data for this study was acquired through an extensive literature search of abstracts from 1987 to 2020. This study looks at a variety of plants that are used to treat different respiratory problems, with the purpose of emphasizing the value of medicinal herbs used by various ethnic groups and giving information to researchers so that traditional claims may be adequately confirmed.

Asthma

The most frequent symptom of this condition is difficulty breathing. Table 1 shows only a few of the many plants that

people have used to treat this condition. The leaves and bark of these plants are the most often used parts. Traditional healers assess patients using their knowledge, and herbal therapies are administered as needed [7].

Bronchitis

People use various parts of the plants listed in Table 2 to treat bronchitis, such as the leaves, bark, and bulb. Healers are unable to differentiate between pneumonia and bronchitis because patients are not checked using modern medical equipment from the onset [8].

Chronic obstructive pulmonary diseases

Lung inflammatory disorders include acute bronchitis and chronic obstructive pulmonary diseases (COPD), which include chronic bronchitis, chronic asthma, and emphysema. COPD, in particular, is the fifth-leading cause of death worldwide. Inflammatory diseases are just that. Antitussives, mucolytics, and bronchodilators are some of the drugs used to treat the symptom in clinical practice, resulting in a disease that is well-controlled. Chronic diseases, on the other hand, are difficult to treat with current medications that only address the symptoms of bronchitis. They have no influence on COPD's pathological development or may even reverse it. As a consequence, a number of pharmaceutical firms are striving to develop innovative COPD treatments that target the illness's pathogenic phases, with the ultimate objective

Table 1. Plants for the treatment of asthma.

S. No.	Family	Part	Preparation	Plant
1.	<i>Abelmoschus manihot</i>	Malvaceae	Flower	Decoction
2.	<i>Abies spectabilis</i>	Pinaceae	Whole plant	Decoction
3.	<i>Achyranthes aspera</i>	Amaranthaceae	Whole plant	Ash
4.	<i>Acorus calamus</i>	Acoraceae	Rhizome	Juice
5.	<i>Adhatoda vasica</i>	Acanthaceae	Leaves, roots	Decoction
6.	<i>Adhatoda zeylanica</i>	Acanthaceae	Roots, leaves	Extract
7.	<i>Albizia julibrissin</i>	Mimosaceae	Bark, seed	Decoction
8.	<i>Allium cepa</i>	Liliaceae	Bulb	Juice
9.	<i>Allium ramosam</i>	Amaryllidaceae	Whole plant	Extract
10.	<i>Alstonia scholaris</i>	Apocynaceae	Latex, bark	Decoction
11.	<i>Ananas comosus</i>	Bromeliaceae	Fruit	Decoction
12.	<i>Aquilaria malaccensis</i>	Thymelaeaceae	Bark	Decoction
13.	<i>Artemisia indica</i>	Asteraceae	Roots, leaves	Decoction
14.	<i>Artemisia nilagirica</i>	Asteraceae	Leaves	Infusion
15.	<i>Averrhoa carambola</i>	Oxalidaceae	Fruit, seeds	Decoction
16.	<i>Benincasa hispida</i>	Cucurbitaceae	Roots	Infusion
17.	<i>Blumea balsamifera</i>	Asteraceae	Leaves	Decoction
18.	<i>Blumea lanceolaria</i>	Asteraceae	Leaves	Infusion
19.	<i>Boerhaavia diffusa</i>	Nyctaginaceae	Roots	Juice
20.	<i>Bombax ceiba</i>	Bombaceae	Whole plant	Decoction

Table 2. Plants for the treatment of bronchitis.

S. No.	Family	Part	Preparation	Plant
1.	<i>Acorus calamus</i>	Acoraceae	Rhizome	Juice
2.	<i>Adhatoda vasica</i>	Acanthaceae	Leaves, roots	Decoction
3.	<i>Aegle marmelos</i>	Rutaceae	Leaves	Powder
4.	<i>Allium sativum</i>	Liliaceae	Bulb	Infusion
5.	<i>Alpina galanga</i>	Zingiberaceae	Rhizome	Infusion
6.	<i>Arenga saccharifera</i>	Aracaceae	Roots	Decoction
7.	<i>Alstoia scholaris</i>	Apocynaceae	Bark	Decoction
8.	<i>Blumea lanceolaria</i>	Asteraceae	Leaves	Infusion
9.	<i>Capsicum annum</i>	Solanaceae	Fruit	Decoction
10.	<i>Cassia fistula</i>	Fabaceae	Roots	Decoction
11.	<i>Cinnamomum glaucascens</i>	Lauraceae	Stem bark	Juice
12.	<i>Cinnamomum glanduliferum</i>	Lauraceae	Stem bark	Juice
13.	<i>Citrus maxima</i>	Rutaceae	Fruit	Juice
14.	<i>Clerodendrum glasdulodum</i>	Lamiaceae	Roots, bark	Extract
15.	<i>Clerodendrum serratum</i>	Lamiaceae	Leaves	Decoction
16.	<i>Clerodendrum siphonanthos</i>	Verbenaceae	Stem, leaves	Decoction
17.	<i>Clerodendrum viscosum</i>	Verbenaceae	Roots	Decoction
18.	<i>Costus speciosus</i>	Zingiberaceae	Rhizome	Powder
19.	<i>Curcuma longa</i>	Zingiberaceae	Rhizome	Powder
20.	<i>Curcuma zedoaria</i>	Zingiberaceae	Rhizome	Infusion

Table 3. Plants for the treatment of COPD.

S. No.	Family	Part	Preparation	Plant
1.	<i>Acanthopanax senticosus</i>	Araliaceae	Root, rhizome	Juice
2.	<i>Aconitum tanguticum</i>	Ranunculaceae	Root	Decoction
3.	<i>Alisma orientale</i>	Alismataceae	Rhizome	Juice
4.	<i>Angelica decursiva</i>	Apiaceae	Root	Decoction
5.	<i>Antrodia camphorata</i>	Polyporaceae	Whole plant	Extract
6.	<i>Alstonia scholaris</i>	Apocynaceae	Stem bark, leaves, latex, flowers	Decoction
7.	<i>Azadirachta indica</i>	Meliaceae	Leaves	Extract
8.	<i>Callicarpa japonica</i>	Lamiaceae	Stem	Powder
9.	<i>Canarium lyi</i>	Burseraceae	Leaves	Extract
10.	<i>Chrysanthemum indicum</i>	Asteraceae	Flower	Extract
11.	<i>Cnidium monnieri</i>	Apiaceae	Fruit, seed	Extract
12.	<i>Eleusine indica</i>	Poaceae	Seeds	Decoction
13.	<i>Euterpe oleracea</i>	Arecaceae	Fruit	Direct
14.	<i>Galla chinensis</i>	Anacardiaceae	Leaves	Decoction
15.	<i>Ginkgo biloba</i>	Ginkgoaceae	Leaves, seeds	Infusion
16.	<i>Gleditsia sinensis</i>	Fabaceae	Thorn	Decoction
17.	<i>Glycyrrhiza uralensis</i>	Fabaceae	Root, rhizome	Infusion
18.	<i>Houttuynia cordata</i>	Saururaceae	Rhizome	Infusion
19.	<i>Juglans regia</i>	Juglandaceae	Leaves, peel, fruit	Infusion
20.	<i>Lonicera japonica</i>	Caprifoliaceae	Flower, seed, leaves	Extract

21.	<i>Lysimachia clethroides</i>	Primulaceae	Leaves	Infusion
22.	<i>Mikania glomerata</i>	Asteraceae	Leaves	Infusion
23.	<i>Mikania laevigata</i>	Asteraceae	Aerial parts	Extract
24.	<i>Morus alba</i>	Moraceae	Leaves	Decoction
25.	<i>Nigella sativa</i>	Ranunculaceae	Seeds	Decoction
26.	<i>Paeonia suffruticosa</i>	Paeoniaceae	Root bark	Infusion
27.	<i>Phellodendri cortex</i>	Rutaceae	Bark	Powder
28.	<i>Punica granatum</i>	Punicaceae	Fruit	Direct
29.	<i>Rabdosia japonica</i>	Labiatae	Leaves	Decoction
30.	<i>Schisandra chinensis</i>	Schisandraceae	Fruit	Direct
31.	<i>Stemona tuberosa</i>	Stemonaceae	Root	Decoction
32.	<i>Taraxacum officinale</i>	Asteraceae	Root	Extract
33.	<i>Taraxacum mongolicum</i>	Asteraceae	Stem	Extract
34.	<i>Uncaria tomentosa</i>	Rubiaceae	Root, bark	Decoction
35.	<i>Viola yedoensis</i>	Violaceae	Roots, leaves, flowers	Decoction

Table 4. Plants for the treatment of common cold.

S. No.	Family	Part	Preparation	Plant
1.	<i>Aconitum ferrox</i>	Ranunculaceae	Whole plant	Decoction
2.	<i>Adhatoda zeylanica</i>	Acanthaceae	Roots, leaves	Extract
3.	<i>Allium sativum</i>	Liliaceae	Cloves	Infusion
4.	<i>Andrographis paniculata</i>	Acanthaceae	Aerial parts	Decoction
5.	<i>Blumea balsamifera</i>	Asteraceae	Stem, root	Decoction
6.	<i>Blumeopsis flava</i>	Asteraceae	Leaves	Decoction
7.	<i>Chrysanthemum indicum</i>	Compositae	Whole plant	Extract
8.	<i>Cinnamomum tamala</i>	Lauraceae	Leaves	Decoction
9.	<i>Citrus maxima</i>	Rutaceae	Fruit	Infusion
10.	<i>Citrus medica</i>	Rutaceae	Leaves	Decoction
11.	<i>Costus speciosus</i>	Costaceae	Rhizome	Decoction
12.	<i>Curcuma aromatica</i>	Zingiberaceae	Rhizome	Decoction
13.	<i>Curcuma cassia</i>	Zingiberaceae	Rhizome	Infusion
14.	<i>Desmodium heterocarpum</i>	Leguminosae	Leaves, bark	Extract
15.	<i>Dichroa febrifuga</i>	Hydrangeaceae	Leaves	Juice
16.	<i>Dillenia indica</i>	Dilleniaceae	Fruit	Juice
17.	<i>Elesine coraana</i>	Poaceae	Whole plant	Decoction
18.	<i>Emblica officinalis</i>	Phyllanthaceae	Fruit	Decoction
19.	<i>Gerbera piloselloides</i>	Compositae	Leaves, rhizomes	Infusion
20.	<i>Gnaphalium affine</i>	Asteraceae	Flower, dried plant	Powder
21.	<i>Hedyotis scandens</i>	Rubiaceae	Leaves	Decoction
22.	<i>Justicia adhatoda</i>	Acanthaceae	Roots	Infusion
23.	<i>Leucas aspera</i>	Lamiaceae	Flowers	Infusion
24.	<i>Ocimum basilicum</i>	Lamiaceae	Seeds, leaves	Extract
25.	<i>Ocimum enuiflorum</i>	Lamiaceae	Seeds, leaves	Extract
26.	<i>Phlogacanthus thyrsoiflorus</i>	Acanthaceae	Leaves	Juice
27.	<i>Phlogacanthus thyrsoiformis</i>	Acanthaceae	Shrub	Extract

28.	<i>Piper nigrum</i>	Piperaceae	Roots	Oral
29.	<i>Trichosanthes tricuspidata</i>	Cucurbitaceae	Stem, roots	Infusion
30.	<i>Vitex negundu</i>	Verbenaceae	Leaves	Curry
31.	<i>Zingiber officinale</i>	Zingiberaceae	Rhizome	Oral

of curing the condition [9]. The plants that may be utilized to treat COPD are listed in Table 3.

Common cold

These include a runny nose, nasal congestion, watery eyes, and other common cold symptoms [10]. Table 4 shows the plants that individuals have used to treat various issues.

Cough

This illness is linked to wheezing, phlegm, throat irritation, and other symptoms [11]. Cough is one of the most common respiratory disorders, thus there are a variety of herbs that might help, as indicated in Table 5.

Idiopathic pulmonary fibrosis

Fibrosis is the overgrowth of fibrous connective tissue in an organ that disrupts or prevents the normal function and architecture of the underlying organ or tissue. Fibrosis is caused by a single cell type known as fibromas, which

are benign tumors made up of fibrous or connective tissue. They may develop in any organ or tissue after emerging from mesenchymal tissue. Pulmonary fibrosis, also known as idiopathic pulmonary fibrosis, is characterized by the production of fibromas in the lungs (IPF). IPF is a sickness or ailment that appears suddenly and for which there is no recognized cause. IPF is a debilitating, age-related lung disease that is deadly and has a high fatality rate. Different problems such as fibroblast differentiation, infiltration of inflammatory cells, extracellular matrix remodeling, and collagen deposition may occur during the wound healing process of injured or scarred lung tissue [12]. Table 6 shows which plants are utilised to treat IPF.

Mumps

Mumps victims may not exhibit any symptoms at all. They may, however, have lymph node enlargement, swallowing difficulty, and other symptoms [13]. Below are some of the herbs that are used to treat mumps (Table 7).

Table 5. Plants for the treatment of cough.

S. No.	Family	Part	Preparation	Plant
1.	<i>Achyranthes aspera</i>	Amaranthaceae	Roots	Juice
2.	<i>Acorus calamus</i>	Araceae	Rhizome	Infusion
3.	<i>Adhatoda vasica</i>	Acanthaceae	Leaves, roots	Decoction
4.	<i>Adhatoda zeylanica</i>	Acanthaceae	Roots, leaves	Infusion
5.	<i>Adiantum philippense</i>	Pteridaceae	Leaves	Decoction
6.	<i>Adiantum raddianum</i>	Pteridaceae	Whole plant	Decoction
7.	<i>Aegle marmelos</i>	Rutaceae	Leaves	Juice
8.	<i>Albizia lebbek</i>	Mimosaceae	Stem bark	Decoction
9.	<i>Albizia macrophylla</i>	Mimosaceae	Stem bark	Decoction
10.	<i>Allium cepa</i>	Liliaceae	Bulb	Juice
11.	<i>Allium sativum</i>	Liliaceae	Bulb	Fried
12.	<i>Ananas comosus</i>	Bromeliaceae	Fruit	Juice
13.	<i>Andrographis paniculata</i>	Acanthaceae	Leaves	Decoction
14.	<i>Areca catechu</i>	Arecaceae	Fruit	Taken directly
15.	<i>Averrhoa carambola</i>	Oxalidaceae	Fruit, seeds	Decoction
16.	<i>Azadiracta indica</i>	Meliaceae	Leaves	Extract
17.	<i>Balanophora dioica</i>	Balanophoraceae	Flowers, inflorescence	Infusion
18.	<i>Begonia roxburghii</i>	Begoniaceae	Leaves	Decoction
19.	<i>Benincasa hispida</i>	Cucurbitaceae	Leaves	Juice
20.	<i>Blumea balsamifera</i>	Asteracea	Leaves	Decoction

Table 6. Plants for the treatment of IPF.

S. No.	Family	Part	Preparation	Plant
1.	<i>Angelica sinensis</i>	Apiaceae	Roots	Infusion
2.	<i>Arenaria kansuensis</i>	Caryophyllaceae	Whole Plant	Extract
3.	<i>Camellia sinensis</i>	Theaceae	Leaves	Decoction
4.	<i>Carthamus tinctorius</i>	Asteraceae	Flower	Juice
5.	<i>Centella asiatica</i>	Mackinlayaceae	Whole Plant	Extract
6.	<i>Citrus reticulata</i>	Rutaceae	Fruits	Juice
7.	<i>Cordyceps sinensis</i>	Cordycipitaceae	Whole Plant	Extract
8.	<i>Curcuma longa</i>	Zingiberaceae	Rhizome	Powder
9.	<i>Eriobotrya japonica</i>	Rosaceae	Fruits	Juice
10.	<i>Houttuynia cordata</i>	Saururaceae	Rhizome	Infusion
11.	<i>Linum usitatissimum</i>	Linaceae	Seeds	Taken directly
12.	<i>Mahonia aquifolium</i>	Berberidacea	Roots	Infusion
13.	<i>Nelumbo nucifera</i>	Nelumbonaceae	Rhizome, seeds	Extract
14.	<i>Nigella sativa</i>	Ranunculaceae	Seeds	Infusion
15.	<i>Oxalis corniculata</i>	Oxalidaceae	Leaves	Decoction
16.	<i>Passiflora edulis</i>	Passifloraceae	Fruit	Juice
17.	<i>Phyllanthus emblica</i>	Euphorbiaceae	Fruit	Juice
18.	<i>Pistacia chinensis</i>	Anacardiaceae	Seeds	Taken directly
19.	<i>Pistacia lentiscus</i>	Anacardiaceae	Resin	Infusion
20.	<i>Punica granatum</i>	Punicaceae	Fruit	Juice
21.	<i>Rosmarinus officinalis</i>	Lamiaceae	Leaves	Decoction
22.	<i>Salvia officinalis</i>	Lamiaceae	Stem, flower	Infusion
23.	<i>Silybum marianum</i>	Asteraceae	Seeds	Taken directly
24.	<i>Tanacetum parthenium</i>	Asteraceae	Leaves	Decoction

Table 7. Plants for the treatment of IPF.

S. No.	Family	Part	Preparation	Plant
1.	<i>Aginata indica</i>	Orobanchaceae	Rhizome	Juice
2.	<i>Laportea crenulata</i>	Urticaceae	Roots	Decoction
3.	<i>Mimosa pudica</i>	Fabaceae	Whole plant	Powder
4.	<i>Sapindus mukorossi</i>	Sapindaceae	Fruit	Juice
5.	<i>Tagetes erecta</i>	Asteraceae	Whole plant	Decoction

Pneumonia

Shallow breathing, acute chest pain, fever, and other symptoms are all signs of pneumonia [14]. The plants that are used to treat pneumonia are listed in Table 8.

Pulmonary hypertension

Pulmonary hypertension (PH) is a disorder in which elevated vascular tone and pulmonary arterial remodeling create an increase in pulmonary vasculature resistance (PAs). After the age of 53, women (80%) are more likely than men to acquire PH. PH is expected to impact more than 100 million people throughout the world. Patients with PH who are not treated have a 2.8-year survival rate. Permanent hypoxia, pulmonary

inflammation, oxidative stress, accelerated proliferation of endothelial cells in pulmonary arteries, and apoptosis suppression are all symptoms of PH, and they all contribute to pulmonary vascular remodeling [15]. The plants that may be utilized to cure PH are listed in Table 9.

SARS-COV-2

Coronavirus 2019 (SARS-CoV-2) is a novel member of the Coronaviridae family that has resulted in a worldwide epidemic of COVID-19. Despite existing pharmacotherapies, such as remdesivir, lotinavir, ritonavir, and ribavirin, which are used to treat hospitalised patients, an increasing number of fatalities continue to occur throughout the globe,

Table 8. Plants for the treatment of pneumonia.

S. No.	Family	Part	Preparation	Plant
1.	<i>Achyranthes aspera</i>	Amaranthaceae	Leaves	Decoction
2.	<i>Acorus calamus</i>	Araceae	Leaves, rhizome	Decoction
3.	<i>Aegle marmelos</i>	Rutaceae	Leaves	Powder
4.	<i>Ageratum conyzoides</i>	Asteraceae	Leaves	Granules
5.	<i>Alstoia scholaris</i>	Apocynaceae	Bark	Decoction
6.	<i>Caesalpinia bonducella</i>	Caesalpiaceae	Seed, fruit	Juice
7.	<i>Chrysophyllum roxburghii</i>	Sapotaceae	Seed	Juice
8.	<i>Cinnamomum glanduliferum</i>	Lauraceae	Stem bark	Juice
9.	<i>Cinnamomum glaucascens</i>	Lauraceae	Stem bark	Juice
10.	<i>Citrus limon</i>	Rutaceae)	Leaves, seed, bark	Paste
11.	<i>Clerodendrum viscosum</i>	Verbenaceae	Roots	Infusion
12.	<i>Crinum asiaticum</i>	Amarylidaceae	Bulb	Juice
13.	<i>Cyclosorus extensa</i>	Thelypteridaceae	Leaves	Juice
14.	<i>Cymbopogon flexuosus</i>	Poaceae	Leaves	Juice
15.	<i>Drymaria cordata</i>	Caryophyllaceae	Whole plant	Extract
16.	<i>Eucalyptus globulus</i>	Myrtaceae	Leaves	Infusion
17.	<i>Fragaria indica</i>	Rosaceae	Leaves	Infusion
18.	<i>Gaultheria fragrantissima</i>	Eriaceae	Leaves	Juice
19.	<i>Lantana camara</i>	Verbenaceae	Leaves	Infusion
20.	<i>Leucas aspara</i>	Labiatae	Leaves, flowers	Decoction
21.	<i>Mirabilis jalapa</i>	Nyctaginaceae	Rhizome, leaves	Extract
22.	<i>Mucuna pruriens</i>	Fabaceae	Seeds	
23.	<i>Musa balbisiana</i>	Musaceae	Rhizome	Paste
24.	<i>Musa superba</i>	Musaceae	Inflorescence	Latex
25.	<i>Nyctanthes arbor – tristis</i>	Oleaceae	Leaves	Decoction
26.	<i>Oldenlandia corymbosa</i>	Rubiaceae	Bark, leaves	Boiled
27.	<i>Oroxylum indicum</i>	Bignoniaceae	Bark	Powder
28.	<i>Phlogacanthus thyrsoformis</i>	Acanthaceae	Flower	Juice
29.	<i>Piper longum</i>	Piperaceae	Leaves	Decoction
30.	<i>Polygonum caespitosum</i>	Polygonaceae	Leaves	Decoction
31.	<i>Polygonum hydropiper</i>	Polygonaceae	Leaves	Decoction
32.	<i>Polygonum plebeium</i>	Lamiaceae	Whole plant	Juice
33.	<i>Rorippa nasturtiumaquaticum</i>	Brassicaceae	Whole plant	Boiled
34.	<i>Solanum Indicum</i>	Solanaceae	Fruits, leaves	Decoction
35.	<i>Solanum torvum</i>	Solanaceae	Roots	Infusion
36.	<i>Stellaria media</i>	Caryophyllaceae	Leaves	Decoction
37.	<i>Stereospermum cheonoides</i>	Acanthaceae	Leaves	Decoction
38.	<i>Thysanolaena maxima</i>	Poaceae	Leaves	Decoction
39.	<i>Vitex peduncularis</i>	Verbenaceae	Leaves	Decoction
40.	<i>Xanthium strumarium</i>	Asteraceae	Seeds	Infusion

prompting scientists to explore new therapeutic agents. Plants, especially antiviral compounds, have historically been a valuable source of therapeutic substances [16]. The

plants that may be utilised to treat SARS-COV-2 are listed in Table 10.

Table 9. Plants for the treatment of PH.

S. No.	Family	Part	Preparation	Plant
1.	<i>Allium sativum</i>	Amaryllidaceae	Bulb	Infusion
2.	<i>Allium macrostemon</i>	Amaryllidaceae	Bulb	Infusion
3.	<i>Allium ursinum</i>	Amaryllidaceae	Bulb	Infusion
4.	<i>Crataegus rhipidophylla</i>	Rosaceae	Berries, leaves, flowers	Juice
5.	<i>Eulophia macrobulbon</i>	Orchidaceae	Tuber	Extract
6.	<i>Kelussia odoratissima</i>	Apiaceae	Leaves	Decoction
7.	<i>Mimosa pigra</i>	Fabaceae	Roots	Extract
8.	<i>Moringa oleifera</i>	Moringaceae	Leaves, stems	Decoction
9.	<i>Rhodiola tangutica</i>	Crassulaceae	Roots, Rhizomes	Powder
10.	<i>Salvia miltiorrhiza</i>	Lamiaceae	Roots	Decoction
11.	<i>Securigera securidaca</i>	Fabaceae	Seeds	Decoction
12.	<i>Terminalia arjuna</i>	Combretaceae	Bark	Powder
13.	<i>Trifolium pratense</i>	Fabaceae	Flower	Juice
14.	<i>Withania somnifera</i>	Solanaceae	Roots	Extract

Table 10. Plants for the treatment of SARS-COV-2.

S. No.	Family	Part	Preparation	Plant
1.	<i>Allium sativum</i>	Alliaceae	Bulb	Infusion
2.	<i>Alpinia galanga</i>	Zingiberaceae	Rhizome	Decoction
3.	<i>Cichorium intybus</i>	Asteraceae	Roots	Decoction
4.	<i>Crocus sativus</i>	Iridaceae	Stigma	Powder
5.	<i>Glycyrrhiza glabra</i>	Fabaceae	Roots, rhizome	Decoction
6.	<i>Phyllanthus emblica</i>	Phyllanthaceae	Fruits	Oral
7.	<i>Rheum palmatum</i>	Polygonoideae	Rhizome	Boiled
8.	<i>Rosa damascena</i>	Rosaceae	Flower	Infusion
9.	<i>Syzygium aromaticum</i>	Myrtaceae	Flower	Infusion
10.	<i>Trigonella foenum-graecum</i>	Fabaceae	Seeds	Extract
11.	<i>Vitis vinifera</i>	Vitaceae	Fruits	Oral
12.	<i>Ziziphus jujuba</i>	Rhamnaceae	Fruits	Juice

Table 11. Plants for the treatment of sore throat.

S. No.	Family	Part	Preparation	Plant
1.	<i>Aeschynanthus maculata</i>	Gesneriaceae	Flower	Juice
2.	<i>Allium sativum</i>	Liliaceae	Cloves	Oral
3.	<i>Bischofia javanica</i>	Euphorbiaceae	Leaves	Juice
4.	<i>Cymbopogon flexuosus</i>	Poaceae	Leaves	Infusion
5.	<i>Diospyros embryopteris</i>	Ebenaceae	Fruit	Infusion
6.	<i>Emblica officinalis</i>	Euphorbiaceae	Fruit	Oral
7.	<i>Morus alba</i>	Moraceae	Leaves	Juice
8.	<i>Oroxylum indicum</i>	Bignoniaceae	Bark, leaf	Decoction
9.	<i>Pratia begonifolia</i>	Campanulaceae	Fruit	Juice
10.	<i>Sterculia villosa</i>	Sterculiaceae	Bark	Juice
11.	<i>Terminalia bellerica</i>	Combretaceae	Fruit	Juice
12.	<i>Zingiber officinale</i>	Zingiberaceae	Rhizome	Oral

1.11. Sore throat

A painful throat isn't always the result of a particular ailment. Overuse of the voice, a dry mouth, and other things might be to blame. The most common complaint of those with sore throats is pain or a scratchy sensation [17]. The herbs that may be used to cure a sore throat are listed in Table 11.

1.12. Tonsillitis

It's caused by inflammation of the tissue at the back of the throat, and it's often accompanied with ear pain and swallowing difficulties. The plants that have been used to treat this ailment are listed in Table 12. Tonsillitis is commonly diagnosed when patients complain of difficulty swallowing or throat pain. Traditional healers sometimes don't discriminate between sore throat, pharyngitis, and tonsillitis, treating them all with the same treatments and only altering the doses on rare occasions [18].

1.13. Tuberculosis

Tuberculosis is a bacterial lung illness. It's simple to spread, and most people who have it don't show any indications or symptoms. When they occur, bloody coughing, shortness of breath, chest pain, and other symptoms are typical [19]. The plants that have been used to treat this bacterial illness are listed in Table 13.

2. DISCUSSION

Respiratory disorders are frequent among people living in different regions of the globe. The region's diverse flora has allowed inhabitants to treat a variety of respiratory ailments using a variety of herbs. According to the tables above, there are a number of plants that may be used to treat a variety of respiratory problems in India and overseas. However, since no laboratory testing has been done, it is hard to tell for sure whether the symptoms reported by the villagers and treated with traditional remedies are the same. More research and testing should be done to ensure that the correct knowledge of plant chemical components is identified and utilised correctly [20].

Nonetheless, the tabulated data might be used to draw the following conclusions:

1. When compared to other plants available in the region, the plant *Zingiber officinale* of the Zingiberaceae family, namely the rhizome, is used to treat respiratory illnesses to a greater extent.
2. Plants of the genera *Ocimum* and *Adhatoda* are regarded to have a broader variety of uses in the treatment of respiratory illnesses.
3. The most common way of preparing plants is decoction.

Table 12. Plants for the treatment of tonsillitis.

S. No.	Family	Part	Preparation	Plant
1.	<i>Abrus precatorius</i>	Fabaceae	Seeds	Solution
2.	<i>Actephila excels</i>	Euphorbiaceae	Leaves	Juice
3.	<i>Bischofia javanica</i>	Euphorbiaceae	Leaves	Juice
4.	<i>Colocasia esculenta</i>	Araceae	Corns, runners	Juice
5.	<i>Crinum asiaticum</i>	Amaryllidaceae	Bulbs	Rubbed over area
6.	<i>Drymaria cordata</i>	Caryophyllaceae	Whole plant	Decoction
7.	<i>Oroxylum indicum</i>	Bignoniaceae	Leaves	Decoction
8.	<i>Sapindus mukorossi</i>	Sapindaceae	Fruits	Soaked in water
9.	<i>Spondias mangifera</i>	Anacardiaceae	Leaves, seeds	Decoction
10.	<i>Stemona tuberosa</i>	Stemonaceae	Tuber	Decoction
11.	<i>Uncaria laevigata</i>	Rubiaceae	Roots	Decoction
12.	<i>Vitex trifolia</i>	Lamiaceae	Leaves	Crushed

Table 13. Plants for the treatment of tonsillitis.

S. No.	Family	Part	Preparation	Plant
1.	<i>Adhatoda vasica</i>	Acanthaceae	Leaves	Juice
2.	<i>Eulophia nuda</i>	Orchidaceae	Tuber	Juice
3.	<i>Gynura conyza</i>	Asteraceae	Leaves	Decoction
4.	<i>Plantago major</i>	Plantaginaceae	Root, stem, leaves	Decoction
5.	<i>Rotheca serrate</i>	Verbenaceae	Leaves, stem	Decoction
6.	<i>Terminalia chebula</i>	Combretaceae	Bark	Oral

- The leaf is the plant's most often utilized part.
- Because cough is one of the most common respiratory disorders among the people here, a wider range of herbs have been used to treat cough in various methods (decoction, infusion, maceration, etc.).

Because they also match with the personal health values of individuals living in a certain place, using these plants instead of conventional medications may have a greater number of advantages. There is a chance of discovering unique plants with crucial medicinal properties in these places, thus much more in-depth and comprehensive study with full scientific understanding is necessary. Because drugs may have serious adverse effects such as drug abuse or dependency, these plants may prove to be effective alternatives to the treatments now in use. The identification of new plants that may assist in the treatment or prevention of respiratory illnesses may benefit people from all over the world. The identification of endangered or extinct species of medicinally useful but previously unknown plants, as well as the discovery of new plants, would contribute in the knowledge of nature [21].

CONCLUSION

A variety of traditional herbs are effective in the treatment of respiratory problems, according to the results of this research. These plants are preferable choices than synthetically manufactured drugs since they have fewer side effects and are more effective. This evaluation may be used as a starting point for any kind of scientific examination into the usage of these plants for the treatment of respiratory and other body issues.

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CONFLICT OF INTEREST

The authors declare no Conflict of Interest regarding the publication of the article.

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