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HERBAL INTERVENTIONS IN THE MANAGEMENT OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD): A REVIEW

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ABSTRACT

Chronic Obstructive Pulmonary Disease (COPD) remains a leading cause of global morbidity and mortality, characterized by persistent respiratory symptoms and airflow limitation. While conventional pharmacotherapy—including bronchodilators and corticosteroids—effectively manages symptoms, long-term use often leads to adverse effects and diminishing returns in progressive cases. Consequently, there is a burgeoning interest in herbal medicine as a complementary approach. This review examines the therapeutic potential of key botanical agents, such as *Curcuma longa*, *Glycyrrhiza glabra* and *Panax ginseng*, focusing on their anti-inflammatory, antioxidant, and mucolytic properties. By modulating molecular pathways like NF-κB and reducing oxidative stress, these herbal drugs offer a multi-target strategy for stabilizing lung function and improving the quality of life for COPD patients.

KEYWORDS: COPD, Herbal Medicine, Phytotherapy, Inflammation, Oxidative Stress, Bronchodilation.

INTRODUCTION

Herbal remedies, identified as phytomedicines or botanicals, are medicinal substances that originate from plants, including their leaves, seeds, roots and flowers. Although they are commonly viewed as "safe" due to their natural nature, they contain active chemical compounds that can have notable effects on the body and may interact with standard medications.[1, 2]

Chronic Obstructive Pulmonary Disease (COPD) is a complex inflammatory condition primarily driven by long-term exposure to toxic particles, most notably cigarette smoke. The

pathophysiology involves chronic bronchitis and emphysema, leading to irreversible airway remodeling. Herbal drugs, rich in bioactive compounds like flavonoids, alkaloids, and polyphenols, are increasingly studied for their ability to address the systemic inflammation that defines the disease.[3-6]

HERBAL DRUGS AND MECHANISMS OF ACTION

Curcuma longa (Turmeric)

The active polyphenol Curcumin is renowned for its potent anti-inflammatory effects. In the context of COPD, curcumin inhibits the expression of pro-inflammatory cytokines (IL-8, TNF-α) by suppressing the Nuclear Factor-kappa B (NF-κB**)** signaling pathway. Furthermore, it has been shown to restore steroid sensitivity in patients who have developed resistance to traditional corticosteroids.[7]

Glycyrrhiza glabra (Licorice)

Licorice root contains Glycyrrhizin, which acts as a natural expectorant and demulcent. It aids in thinning mucus secretions, making them easier to expel. Its anti-inflammatory properties help reduce bronchial hyperresponsiveness, providing a soothing effect on the mucosal lining of the airways.[8]

Panax ginseng (Ginseng)

Ginseng is classified as an adaptogen that enhances immune function. Research suggests that Ginseng extracts can improve lung function parameters (such as FEV_1) and exercise capacity. Its ginsenosides reduce oxidative stress by upregulating endogenous antioxidant enzymes, protecting lung tissue from protease-induced damage.[9]

Adhatoda vasica (Vasaka)

Commonly used in Ayurvedic medicine, Vasaka contains the alkaloid Vasicine. It acts as a powerful bronchodilator and mucolytic agent. By relaxing the smooth muscles of the bronchi, it helps alleviate the shortness of breath (dyspnea) characteristic of COPD exacerbations.[10]

COMPARATIVE SUMMARY OF BIOACTIVE COMPONENTS

Table No.1.:Comparative Summary of Bioactive Components.

Plant Species	Primary Bioactive	Main Action
Curcuma longa	Curcumin	Anti-inflammatory / Steroid Resensitization
Glycyrrhiza glabra	Glycyrrhizin	Mucolytic / Expectorant
Panax ginseng	Ginsenosides	Antioxidant / Immune Support
Adhatoda vasica	Vasicine	Bronchodilation

HERBAL DRUGS USED IN THE MANAGEMENT OF CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD)

Table No.2.:List of Herbal Drugs used in the management of Chronic Obstructive Pulmonary Disease (COPD).

S. No.	Common Name	Botanical Name	Family
1	Adhatoda / Vasaka	*Adhatoda vasica*	Acanthaceae
2	Ammonicum	*Dorema ammoniacum*	Apiaceae
3	Andrographis	*Andrographis paniculata*	Acanthaceae
4	Anise	*Pimpinella anisum*	Apiaceae
5	Ashwagandha	*Withania somnifera*	Solanaceae
6	Asthma Weed	*Euphorbia hirta*	Euphorbiaceae
7	Astragalus	*Astragalus membranaceus*	Fabaceae
8	Banmethi	*Melilotus indica*	Fabaceae
9	Bibhitaki	Terminalia bellirica	Combretaceae
10	Black Babul	*Acacia nilotica*	Mimosaceae
11	Black Cohosh	*Cimicifuga racemosa*	Ranunculaceae
12	Black Pepper	*Piper nigrum*	Piperaceae
13	Black Seed	*Nigella sativa*	Ranunculaceae
14	Borage	*Borago officinalis*	Boraginaceae
15	Boswellia (Frankincense)	*Boswellia serrata*	Burseraceae
16	Butter Lettuce	*Lactuca virosa*	Asteraceae
17	Butterbur	*Petasites hybridus*	Asteraceae
18	Butterfly Pea	*Clitoria ternatea*	Fabaceae
19	Cardamom	*Elettaria cardamomum*	Zingiberaceae
20	Celery	*Apium graveolens*	Apiaceae
21	Chamomile	*Matricaria chamomilla*	Asteraceae
22	Chestnut	*Castanea sativa*	Fabaceae
23	Cinnamon	*Cinnamomum verum*	Lauraceae
24	Coleus	*Coleus forskohlii*	Lamiaceae
25	Coltsfoot	*Tussilago farfara*	Asteraceae
26	Comfrey	*Symphytum officinale*	Boraginaceae
27	Common Mallow	*Malva sylvestris*	Malvaceae
28	Cordyceps (Fungi)	*Ophiocordyceps sinensis*	Ophiocordycetaceae
29	Crown Flower	*Calotropis gigantea*	Apocynaceae
30	Elderberry	*Sambucus nigra*	Adoxaceae
31	Elecampane	*Inula helenium*	Asteraceae
32	Elephant Yam	*Amorphophallus campanulatus*	Araceae
33	English Ivy	*Hedera helix*	Araliaceae
34	Ephedra (Ma Huang)	*Ephedra sinica*	Ephedraceae
35	Eucalyptus	*Eucalyptus globulus*	Myrtaceae
36	Fennel	*Foeniculum vulgare*	Apiaceae
37	Garlic	*Allium sativum*	Amaryllidaceae
38	German Chamomile	*Matricaria recutita*	Asteraceae
39	Ginger	*Zingiber officinale*	Zingiberaceae
40	Ginkgo	*Ginkgo biloba*	Ginkgoaceae
41	Ginseng	*Panax ginseng*	Araliaceae

42	Goldenrod	*Solidago virgaurea*	Asteraceae
43	Greater Celandine	*Chelidonium majus*	Papaveraceae
44	Holy Basil (Tulsi)	*Ocimum sanctum*	Lamiaceae
45	Horehound	*Marrubium vulgare*	Lamiaceae
46	Hyssop	*Hyssopus officinalis*	Lamiaceae
47	Indian Acalypha	*Acalypha indica*	Euphorbiaceae
48	Indian Belladonna	*Atropa acuminata*	Solanaceae
49	Indian Borage	*Coleus amboinicus*	Lamiaceae
50	Indian Gooseberry	*Phyllanthus emblica*	Phyllanthaceae
51	Indian Gooseberry (Amla)	*Emblica officinalis*	Euphorbiaceae
52	Indian Olibanum	*Boswellia serrata*	Burseraceae
53	Ivy Leaf	*Hedera helix*	Araliaceae
54	Kantakari	*Solanum xanthocarpum*	Solanaceae
55	Licorice	*Glycyrrhiza glabra*	Fabaceae
56	Lobelia	*Lobelia inflata*	Campanulaceae
57	Long Pepper	*Piper longum*	Piperaceae
58	Maidenhair Fern	*Adiantum capillus-veneris*	Pteridaceae
59	Marshmallow	*Althaea officinalis*	Malvaceae
60	Marshmallow Root	*Althaea officinalis*	Malvaceae
61	Mint	*Mentha haplocalyx*	Lamiaceae
62	Mother Cloves	*Eugenia caryophyllata*	Myrtaceae
63	Mullein	*Verbascum thapsus*	Scrophulariaceae
64	Onion	*Allium cepa*	Amaryllidaceae
65	Oregano	*Origanum vulgare*	Lamiaceae
66	Orris Root	*Iris germanica*	Iridaceae
67	Pelargonium	*Pelargonium sidoides*	Geraniaceae
68	Peppermint	*Mentha piperita*	Lamiaceae
69	Plantain	*Plantago major*	Plantaginaceae
70	Purple Cone Flower	*Echinacea purpurea*	Asteraceae
71	Red Clover	*Trifolium pratense*	Fabaceae
72	Reishi Mushroom	*Ganoderma lucidum*	Ganodermataceae
73	Rosemary	*Salvia rosmarinus*	Lamiaceae
74	Saffron	*Crocus sativus*	Iridaceae
75	Sage	*Salvia officinalis*	Lamiaceae
76	Slippery Elm	*Ulmus rubra*	Ulmaceae
77	Sophera Senna	*Cassia sophera*	Fabaceae
78	Thorn Apple	*Datura stramonium*	Solanaceae
79	Thyme	*Thymus vulgaris*	Lamiaceae
80	Tree of Heaven	*Ailanthus excelsa*	Simaroubaceae
81	Turmeric	*Curcuma longa*	Zingiberaceae
82	Vasaka (Malabar Nut)	*Adhatoda vasica*	Acanthaceae
83	White Babul	*Acacia leucophloea*	Mimosaceae
84	White Pine Bark	*Pinus strobus*	Pinaceae
85	Wild Cherry Bark	*Prunus serotina*	Rosaceae
86	Wild Quinine	*Parthenium integrifolium*	Asteraceae
87	Yarrow	*Achillea millefolium*	Asteraceae

CONCLUSION

Herbal medicine provides a rich source of bioactive compounds that can alleviate the symptoms of COPD. Integrating these therapies should always be done under medical supervision to ensure they complement existing pharmacological treatments without adverse interactions. Herbal drugs present a promising frontier in the integrative treatment of COPD. Their ability to target multiple inflammatory pathways simultaneously provides a holistic advantage over some mono-targeted synthetic drugs. However, the lack of standardized dosing and large-scale clinical trials remains a hurdle. Future research should focus on the bioavailability of these compounds and potential herb-drug interactions to ensure patient safety in clinical settings.

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