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Medicinal flora of Melghat for Bronchitis: A Review

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Abstract

Bronchitis is among the top 10 conditions for which patients look for medication. The expanding burden of chronic infections is a specific risk in developing countries. The current review focus on medicinal plants from the Melghat region used to cure Bronchitis. A total of 118 medicinal plant species from Melghat flora distributed among 104 genera and 53 families have complied for Bronchitis. The most frequently reported plant families were Asteraceae (14), followed by Euphorbiaceae (07), Malvaceae (07), Cucurbitaceae (06), Solanaceae (05), Verbenaceae (05), Asclepiadaceae (04), Asteraceae (04), etc. in this study. Out of 118 species reviewed, Herbs represented 31% of species, followed by Trees (30%), Shrubs (26%), Climbers (10%), and Orchids (3%). The most commonly used plant part in ailments was Leaves (24%), followed by Whole plant (19%), Bark (14%), Roots (13%), Fruits (8%), Seeds (8%), Flowers (3%), etc. Curated data presented as plant's botanical name, plant's family, habit, ailments, and part in use with relevant traditional, folk, and ethnobotanical uses patterns with cross citations. This review offers scope for the researchers engaged in drug discovery and development.

Keywords: Bronchitis, respiratory infections, herbal medicine, Melghat flora, ethnomedicine.

1. Introduction

Melghat means "meeting of ghats" which is the region that lies in the south-western Satpura mountain ranges in the compact block of Amravati district in the state of Maharashtra, India, and it is best known for Melghat Tiger Reserve (MTR). Melghat forest has a unique ecological niche^[1], mostly of the dry mixed deciduous type vegetation^[2], and is conserved due to MTR. It has always been an area of interest for nature researchers. Many botanist^[3, 4] and other researchers contributed to identifying the plant species and strengthening the "*Flora of Melghat*"^[5, 6]. During the past several decades, various ethnobotanical surveys^[7-22] have been conducted on an individual and institutional basis to collect traditionally used plant information for various ailments. Recently, "Checklist of Flora of Melghat"^[23] and "*Digitization of Flora of Melghat*"^[24, 25, 26, 27] was published.

Respiratory infections continue to be ordinary human illnesses like colds, coughs, viral pharyngitis, bronchitis, and influenza^[28]. Bronchitis occurs when the bronchi (bronchial tubes) that carry air in your lungs become inflamed^[29]. Bronchitis can be acute (short-lived) or chronic (long-lived). Acute Bronchitis is usually due to a viral infection (e.g., Respiratory syncytial virus, Para-influenza & Influenza virus, Adenovirus, Measles virus, etc.). The common symptoms are a cough that produces yellow or green mucus, wheezing, a burning sensation in the chest, chest congestion, breathlessness, sore throat, fatigue, and fever. Acute Bronchitis usually lasts for a few days, but you may have a cough for weeks afterward^[29, 30]. An interaction between noxious inhaled agents causes chronic Bronchitis (occurs most often in people who smoke) and host factors (e.g. genetic and respiratory infections) that result in chronic inflammation and are known as Chronic Obstructive Pulmonary Disease (COPD)^[31, 32]. Chronic Bronchitis is characterized by a productive (wet) cough that produces mucus (persistent), wheezing, shortness of breath, blue-tinged lips, ankle, feet, and leg swelling^[33]. Worldwide, 40% of smokers during their lifetime develop chronic Bronchitis.

Herbal medicine is a time-honored approach, to treating disease and strengthening the body. In the History of medicine, folk, traditional, and ethnic practices to cure different ailments, back practically to human civilization^[34]. Ayurveda remains dominant compared to modern medicine, particularly for treating a variety of chronic disease conditions^[35]. In Ayurvedic medicine, leaves of *Andrographis paniculata* Wall (Family: *Acanthaceae*) are reported in various herbal formulations for the common cold, cough, sore throat, and bronchitis^[36]. Kantakari (*Solanum surattense* Burm. f. (Family: Solanaceae)), Shirisha (*Albizia lebbek* (L.) Benth. (Family: Asteraceae), Amalaki (*Embllica officinalis* Gaertn (Family: *Euphorbiaceae*), etc. are the well-known ayurvedic formulation against chronic infections^[34].

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The present review has been undertaken to generate scientific baseline data to provide traditional and complementary remedies for Bronchitis.

2. Methods

2.1 Data Retrieval

Data presented in this review encompasses plant species found in Melghat used to treat Bronchitis. It also includes information about botanical names, plant families, plant categories, and parts used for Bronchitis with the related reference(s) cited. Pre-defined criteria [27] were taken into consideration for selecting the research articles. The published literature and information obtained from international scientific databases such as PubMed, PubMed Central, Medline, Science Direct, Scopus, Google Scholar, Research Gate, and Web of Science were reviewed. The plant's botanical name, synonyms, and families were verified using books, research articles, and publicly available online sources. The identity of the used herbal preparations was considered, including the used plant parts.

2.2 Data Analysis

The literature was reviewed; qualitative and quantitative data were analyzed through statistical tools and presented in graphs and tables. The findings offer the reasons for pharmacological screenings, future conservations, and scope for researchers to explore further drug discovery and development.

3. Results

The present outcomes are extensive literature findings for medicinal plants from Melghat flora used for Bronchitis, folk, traditional, and ethnobotanical-related citations (Table 1). Both published and unpublished research articles were used to systematize the review.

A total of 118 medicinal plants from Melghat flora used for Bronchitis belong to 104 genera, and 53 plant families are found in cross-references. The most dominant genus was *Acacia*, and *Solanum* contains three species each, followed by *Albizia*, *Barleria*, *Calotropis*, *Desmodium*, *Euphorbia*, *Ficus*,

Leucas, *Polygala*, *Terminalia*, and *Urena* each containing two species, and the rest 92 genus contain single species. The most commonly used plants for Bronchitis were the member of Asteraceae (14 sp. i.e. 12%) followed by Euphorbiaceae (07 sp. i.e. 6%), Malvaceae (07 sp. i.e. 6%), Cucurbitaceae (06 sp. i.e. 5%), Solanaceae (05 sp. i.e. 4%), Verbenaceae (05 sp. i.e. 4%), Asclepiadaceae (04 sp. i.e. 3%) Asteraceae (04 sp. i.e. 3%), 5 plant families contain 3 species each, 11 plant families contain two species each and 29 plant families contain one species.

The distribution of the species used for Bronchitis is as herbs (31.35%), followed by trees (29.67%), shrubs (26.28%), climbers (10.17%), and orchids (2.54%) represented in figure 1. Reviewed data for 18 reported plant parts to prepare herbal remedies for Bronchitis are presented in figure 2. The presented data shows leaves (38) are mostly used to prepare herbal remedies for Bronchitis traditionally, followed by the whole plant (30), bark (22), roots (21), fruits (13), seeds (13), fruits (4), gum, rhizomes, root bark, stem, tubers used twice and aerial parts, berries, oil, sap (leaf), stem bark and wood used once respectively in herbal preparation as remedies for Bronchitis. Whereas two plants are reported as used against Bronchitis but which part used is unspecified.

4. Discussion

Melghat region is a unique ecological niche and is enriched with huge medicinal flora. This literature review revealed 118 medicinal plants from this biodiversity-rich part of Maharashtra in India. More specifically, it has a significant number of plant species used as herbal remedies for Bronchitis. The authors intended to document the ethnobotanical, indigenous practices, and traditionally used remedies, and it serves as scientific baseline findings for researchers engaged in herbal drug discovery and development. All the plants reviewed exhibited potent activity confirming their various traditional, folk, and ethnobotanical uses and their ability to treat Bronchitis. Further, pharmacological screening, isolating active compounds, herbal formulations, and their action mechanisms need to be studied.

Table 1: Melghat medicinal plants used for bronchitis

Sr. No.	Medicinal plant's name	Plant's family	Category	Part Used	References
1	<i>Abelmoschus manihot</i> (L.) Medik.	Malvaceae	Shrubs	Flowers, Leaves	[37, 38, 39]
2	<i>Abrus precatorius</i> L.	Asteraceae	Shrubs	Leaves	[40, 41]
3	<i>Abutilon hirtum</i> (Lam.) Sweet	Malvaceae	Shrubs	Leaves	[42]
4	<i>Acacia nilotica</i> (L.) Delile	Mimosoideae	Tree	Bark	[43, 44, 45]
5	<i>Acacia pennata</i> (L.) Willd.	Asteraceae	Shrubs	Bark	[46]
6	<i>Acacia torta</i> (Roxb.) Craib	Asteraceae	Climbers	Leaves	[44]
7	<i>Acalypha indica</i> L.	Euphorbiaceae	Herbs	Leaves	[44, 46, 47, 48]
8	<i>Achyranthes aspera</i> L.	Amaranthaceae	Herbs	Whole plant, Roots	[43, 49]
9	<i>Aegle marmelos</i> L.	Rutaceae	Tree	Leaves	[46]
10	<i>Agave americana</i> L.	Agavaceae	Herbs	Sap(Leaf)	[50]
11	<i>Ailanthus excelsa</i> Roxb.	Simaroubaceae	Tree	Bark	[44, 45]
12	<i>Albizia lebeck</i> (L.) Benth.	Asteraceae	Tree	Bark, Roots	[51]
13	<i>Albizia odoratissima</i> (L. F.) Benth.	Asteraceae	Tree	Bark	[52]
14	<i>Astonia scholaris</i> (L.) R. Br.	Apocynaceae	Tree	Bark	[46]
15	<i>Amaranthus spinosus</i> L.	Amaranthaceae	Herbs	Whole plant	[40, 53]
16	<i>Amorphophallus paeoniifolius</i> (Dennst.) Nicolson	Araceae	Herbs	Roots	[54, 55]
17	<i>Andrographis paniculata</i> (Burm. F.)	Acanthaceae	Herbs	Whole plant, Leaves	[56, 57]
18	<i>Apium graveolens</i> Linn.	Apiaceae	Herbs	Leaves, Seed, Roots	[44, 53]
19	<i>Azanza lampas</i> (Cav.) Alef.	Malvaceae	Shrubs	Stem	[58]
20	<i>Baliospermum montanum</i> (Willd.)	Euphorbiaceae	Shrubs	Leaves	[48]
21	<i>Barleria cristata</i> L.	Acanthaceae	Shrubs	Roots, Whole plant	[43, 45, 59]
22	<i>Barleria prionitis</i> L.	Acanthaceae	Shrubs	Leaves, Roots, Whole plant	[42, 45, 46]
23	<i>Biophytum sensitivum</i> (L.) DC.	Oxalidaceae	Herbs	Leaves	[48]
24	<i>Blumea lacera</i> (Burm. F.) DC.	Asteraceae	Herbs	Leaves, Whole plant	[59]
25	<i>Boerhavia diffusa</i> L.	Nyctaginaceae	Herbs	Whole plant, Leaves, Roots	[43, 45, 48, 59, 60]
26	<i>Bombax ceiba</i> L.	Malvaceae	Tree	Bark	[43]
27	<i>Boswellia serrata</i> Roxb.	Bursaraceae	Tree	Oil, Bark, Fruit, Gum	[44, 45]

28	<i>Calotropis gigantea</i> (L.) W.t. Aiton	Asclepiadaceae	Shrubs	Whole plant	[44]
29	<i>Calotropis procera</i> (Aiton) W.t.Aiton	Asclepiadaceae	Shrubs	Roots	[56]
30	<i>Cardiospermum halicacabum</i> L.	Sapindaceae	Climbers	Leaves	[46]
31	<i>Careya arborea</i> Roxb.	Lecythidaceae	Tree	Bark	[52]
32	<i>Cassia fistula</i> L.	Leguminosae	Tree	Fruit	[43]
33	<i>Celastrus paniculatus</i> Willd.	Celastraceae	Shrubs	Seeds	[43, 48]
34	<i>Cissampelos pareira</i> L.	Menispermaceae	Climbers	Roots	[48]
35	<i>Cleome viscosa</i> L.	Cleomaceae	Herbs	Whole plant	[61, 62]
36	<i>Clerodendrum serratum</i> (L.) Moon	Verbenaceae	Shrubs	Leaves, Roots	[42, 48, 59]
37	<i>Coccinia grandis</i> (L.) Voigt	Cucurbitaceae	Climbers	Fruits	[46]
38	<i>Commiphora wightii</i> (Arn.) Bhandari	Burseraceae	Shrubs	Gum	[45]
39	<i>Corallocarpus epigaeus</i> (Rottl.) C.B.Clark	Cucurbitaceae	Herbs	Tubers	[42]
40	<i>Costus speciosus</i> (J. Koenig.) Sm.	Costaceae	Herbs	Rhizome, Leaves, Roots	[48, 50, 59]
41	<i>Cucumis melo</i> L.	Cucurbitaceae	Herbs	Fruits	[63]
42	<i>Curculigo orchioides</i> Gaertn.	Hypoxidaceae	Herbs	Rhizome	[48]
43	<i>Cynoglossum zeylanicum</i> (Lehm.) Brand	Boraginaceae	Herbs	Leaves, Roots	[59]
44	<i>Datura metel</i> L.	Solanaceae	Shrubs	Stem	[64]
45	<i>Desmodium gangeticum</i> (L.) DC.	Asteraceae	Shrubs	Roots, Whole plant	[43, 48, 59, 65]
46	<i>Desmodium triflorum</i> (L.) DC.	Asteraceae	Herbs	Roots	[65]
47	<i>Dregea volubilis</i> (L.f.) Benth. Ex hook. f.	Apocynaceae	Shrubs	Whole plant	[48]
48	<i>Eclipta prostrata</i> L.	Asteraceae	Herbs	Whole plant	[59]
49	<i>Elephantopus scaber</i> L.	Asteraceae	Herbs	Leaves, Whole plant	[66]
50	<i>Emblica officinalis</i> Gaertn. Syn. <i>Phyllanthus emblica</i> L.	Euphorbiaceae	Tree	Fruits, Seeds, Leaves, Bark	[44, 46, 59, 60]
51	<i>Eucalyptus globulus</i> Labill.	Myrtaceae	Tree	Leaves	[46]
52	<i>Eugenia jambolana</i> Lam.	Myrtaceae	Tree	Bark	[53]
53	<i>Eulophia ochreata</i> Lindl.	Orchidaceae	Orchid	Roots	[67]
54	<i>Euphorbia hirta</i> L.	Euphorbiaceae	Herbs	Whole plant, Aerial parts	[43, 44, 46, 48, 68]
55	<i>Euphorbia nerifolia</i> L.	Euphorbiaceae	Herbs	Whole plant	[43, 48]
56	<i>Evolvulus alsinoides</i> (L.) L.	Convolvulaceae	Herbs	Whole plant, Leaves	[45, 46, 48, 53, 59]
57	<i>Ficus racemosa</i> L.	Moraceae	Tree	Fruits	[52]
58	<i>Ficus religiosa</i> L.	Moraceae	Tree	Fruits, Bark, Stem bark	[46, 59]
59	<i>Gmelina arborea</i> Roxb.	Verbenaceae	Tree	Bark	[46]
60	<i>Holarrhena antidysenterica</i> (L.)	Apocynaceae	Tree	Bark	[48]
61	<i>Indigofera tinctoria</i> L.	Asteraceae	Shrubs	Whole plant	[43, 48]
62	<i>Jatropha curcas</i> L.	Euphorbiaceae	Shrubs	-	[40, 53]
63	<i>Lantana camara</i> L.	Verbenaceae	Shrubs	Whole plant	[43]
64	<i>Leucas aspera</i> (Willd.) Link	Lamiaceae	Herbs	Whole plant	[69]
65	<i>Leucas cephalotes</i> (Roth) Spreng.	Lamiaceae	Lamiaceae	Whole plant	[45, 46]
66	<i>Limonia acidissima</i> Linn.	Rutaceae	Tree	Roots	[46]
67	<i>Macrotyloma uniflorum</i> (Lam.) Verdc.	Asteraceae	Climbers	Seeds	[70]
68	<i>Madhuca indica</i> J.F. Gmel.	Sapotaceae	Tree	Bark	[48]
69	<i>Magnolia champaca</i> (L.) Baill. Ex Pierre.	Magnoliaceae	Tree	Whole plant	[71]
70	<i>Mallotus philippensis</i> (Lam.) Müll. Arg.	Euphorbiaceae	Tree	Fruits, Leaves	[48, 52]
71	<i>Mangifera indica</i> L.	Anacardiaceae	Tree	Bark, Leaves, Seeds	[72]
72	<i>Melia azedarach</i> Linn.	Meliaceae	Tree	Leaves	[42]
73	<i>Melilotus indica</i> (L.) All.	Asteraceae	Herbs	Seeds	[44]
74	<i>Merremia turpethum</i> (L.) Rendle	Convolvulaceae	Climbers	Roots	[59]
75	<i>Momordica dioica</i> Roxb. Ex Willd.	Cucurbitaceae	Climbers	Leaves	[73]
76	<i>Moringa oleifera</i> Lam	Moringaceae	Tree	Seeds	[47, 60]
77	<i>Morus alba</i> L.	Moraceae	Tree	Root bark	[74]
78	<i>Mukia maderaspatana</i> (L.) M. Roem.	Cucurbitaceae	Climbers	-	[75]
79	<i>Nyctanthes arbor-tristis</i> L.	Oleaceae	Shrubs	Bark	[46]
80	<i>Oberonia falconeri</i> Hook.f.	Orchidaceae	Orchid	Whole Plant	[43]
81	<i>Operculina turpethum</i> (L.) Silva manso	Convolvulaceae	Climbers	Root	[48]
82	<i>Oroxylum indicum</i> (L.) Kurz	Bignoniaceae	Tree	Bark, Root bark	[43, 46, 48, 52]
83	<i>Oxalis corniculata</i> L.	Oxalidaceae	Herbs	Leaves	[53]
84	<i>Oxystelma esculentum</i> (L.Fil.) R. Br.	Asclepiadaceae	Shrubs	Whole plant	[45]
85	<i>Passiflora foetida</i> L.	Passifloraceae	Climbers	Leaves, Fruit	[48]
86	<i>Pergularia daemia</i> (Forssk.) Chiov.	Asclepiadaceae	Climbers	Leaves	[41, 48]
87	<i>Phyllanthus maderaspatensis</i> L.	Phyllanthaceae	Shrubs	Leaves, Seed	[45]
88	<i>Plumbago zeylanica</i> L.	Plumbaginaceae	Shrubs	Roots, Bark	[45]
89	<i>Polygala arvensis</i> Willd.	Polygalaceae	Herbs	Leaves, Roots, Whole plant	[59]
90	<i>Polygala elongata</i> Klein ex Willd.	Polygalaceae	Herbs	Roots	[47, 76]
91	<i>Pongamia pinnata</i> (L.) Pierre	Asteraceae	Tree	Seeds	[77]
92	<i>Portulaca oleracea</i> L.	Portulacaceae	Herbs	Leaves	[48]
93	<i>Prunus persica</i> (L.) Stokes	Rosaceae	Tree	Leaves	[78, 79]
94	<i>Pseudarthria viscida</i> (L.) Wight & Arn.	Asteraceae	Herbs	Whole plant	[80]
95	<i>Psoralea corylifolia</i> L.	Asteraceae	Herbs	Leaves	[48]
96	<i>Rubia cordifolia</i> L.	Rubiaceae	Herbs	Roots	[81]
97	<i>Santalum album</i> L.	Santalaceae	Tree	Wood	[68]
98	<i>Scoparia dulcis</i> L.	Plantaginaceae	Herbs	Whole plant	[46, 68]
99	<i>Semecarpus anacardium</i> L.	Anacardiaceae	Tree	Fruits	[82]
100	<i>Sida cordifolia</i> L.	Malvaceae	Shrubs	Roots, Leaves	[44]
101	<i>Solanum incanum</i> L.	Solanaceae	Shrubs	Leaves, Seeds	[53]
102	<i>Solanum nigrum</i> L.	Solanaceae	Herbs	Leaves, Berries, Flowers, Roots, Whole plant	[45, 48, 53]
103	<i>Solanum surattense</i> Burm. F.	Solanaceae	Herbs	Roots	[48]
104	<i>Sphaeranthus indicus</i> L.	Asteraceae	Herbs	Whole plant	[83]

105	<i>Tectona grandis</i> L.f.	Verbenaceae	Tree	Flower, Bark, Leaves	[48, 68]
106	<i>Tephrosia purpurea</i> (L.) Pers.	Asteraceae	Shrubs	Roots, Whole plant	[45, 46, 48]
107	<i>Terminalia bellirica</i> (Gaertn.) Roxb.	Combretaceae	Tree	Fruits, Seeds	[52, 59]
108	<i>Terminalia chebula</i> Retz.	Combretaceae	Tree	Fruits, Seeds	[43, 59]
109	<i>Trema orientalis</i> (L.) Blume	Ulmaceae	Tree	Bark, Leaves	[52]
110	<i>Tribulus terrestris</i> L.	Zygophyllaceae	Herbs	Whole plant	[45]
111	<i>Trichosanthes cucumerina</i> L.	Cucurbitaceae	Climbers	Roots	[84]
112	<i>Urena lobata</i> L.	Malvaceae	Shrubs	Roots	[46]
113	<i>Urena sinuata</i> L.	Malvaceae	Shrubs	Flowers	[85]
114	<i>Vanda tessellata</i> (Roxb.) Hook. ex G.Don	Orchidaceae	Orchid	Roots	[48]
115	<i>Vitex negundo</i> L.	Verbenaceae	Shrubs	Roots	[86]
116	<i>Withania somnifera</i> (L.) Dunal	Solanaceae	Shrubs	Roots, Tubers, Seed,Leaves	[44, 45]
117	<i>Xeromphis spinosa</i> (Thunb.) Keay	Rubiaceae	Tree	Bark	[87]
118	<i>Ziziphus nummularia</i> (Burm. f.)	Rhamnaceae	Shrubs	Fruits	[53]

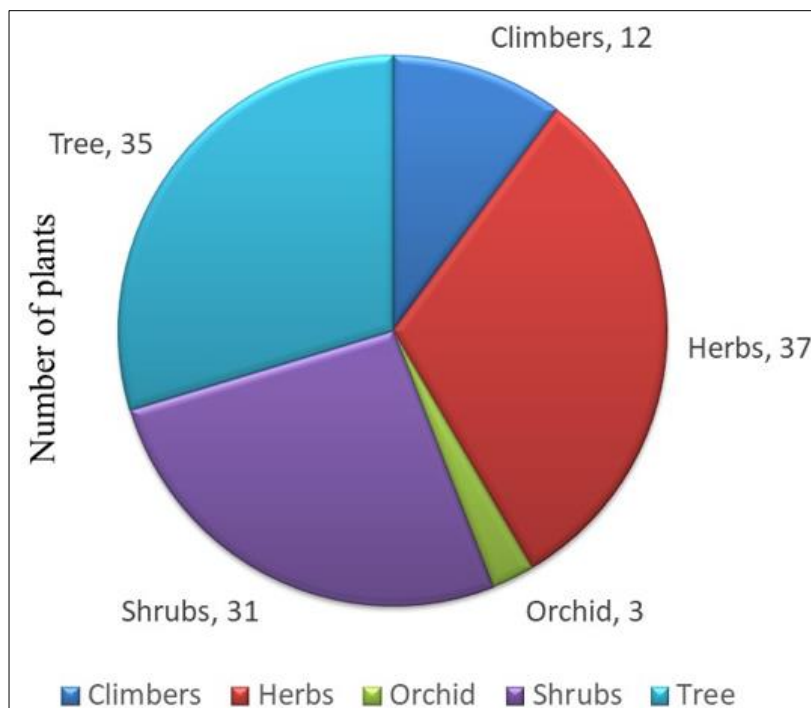


Fig 1: Number of plants and categories used for bronchitis

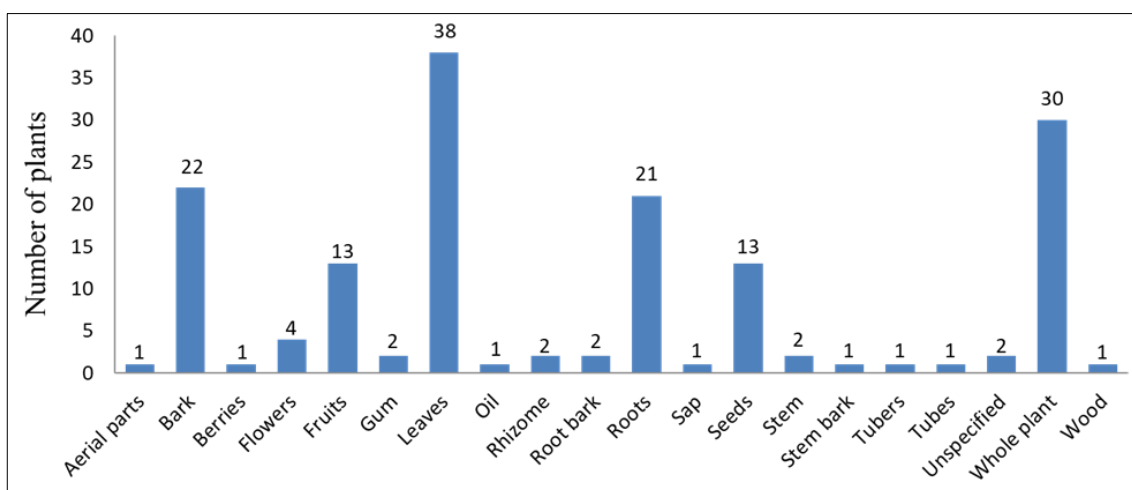


Fig 2: Plant parts that are used for bronchitis

5. Authors' Contributions

All the authors have contributed equally in conducting research work and in writing a research paper. All authors read and approved the final manuscript.

6. Competing interests

The authors declare that they have no competing interests.

7. Consent for publication

Not applicable.

8. Ethics approval and consent to participate

Not applicable.

9. Funding

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