

REVIEW ARTICLE

A Review on Polyherbal Formulations and Herbal Medicine for Management of Ulcer with Recent Trends

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*Department of Pharmacy, Adina College of Pharmacy, Sagar, Madhya Pradesh, India***Received: 12 July 2023; Revised: 05 August 2023; Accepted: 04 October 2023****ABSTRACT**

A peptic ulcer (PU) is common gastrointestinal disorder which is seen among many people. It is an erosion in a segment of the gastrointestinal mucosa, typically in the stomach (gastric ulcer) or first few centimeters of duodenum (duodenal ulcer) that penetrates through the muscularis mucosae. Ulceration occurs when there is a disturbance of the normal equilibrium caused by either enhanced aggression or diminished mucosal resistance. It may cause by *Helicobacter pylori* infection, regular usage of non-steroidal anti-inflammatory's, irregular food habits, stress, and gastric acid secretions. There are several synthetic medications available to treat ulcers. However, compared to herbal supplements, these medications are more expensive and likely to have more side effects. Various herbal medicines have traditionally been used to cure PU disease. The active phytochemical components of a single plant are insufficient to produce the desired therapeutic effects. Combination of two or more than two herbs is called polyherbal formulation. Polyherbal formulations are used to improve the therapeutic potential. The medicinal effect will be boosted and the toxicity will be reduced when various herbs are combined in appropriate ratios in the polyherbal formulation that this study is based on the herbs, polyherbal formulations (in treating PU), recent work, and patent on polyherbal formulations based on pharmacological activities.

Keywords: API, gastrointestinal tract, herbal formulation, peptic ulcer, polyherbal formulation, RES**INTRODUCTION**

Peptic ulcer (PU) is a popular disease all over the world. In clinical practice, it is the most prevalent condition of the gastrointestinal tract.^[1] The two most prevalent kinds of PU are duodenal ulcer and gastric ulcer. The term refers to the ulceration's location.^[2] Both stomach and duodenal ulcers can occur at the same time in a person. Older people are more likely to get ulcers than younger people. PUs occasionally have life-threatening symptoms, including bloody vomiting and having severe abdominal discomfort, weight loss, bloody stools, cramping, and feeling sick [Figure 1].^[3]

The pathophysiology of PUs involves an imbalance between offensive (acid, pepsin, and *Helicobacter pylori*) and defensive factors (mucin, prostaglandin, bicarbonate, nitric oxide, and growth factors) [Figure 2].^[4,5] *H. pylori* infection and non-steroidal anti-inflammatory are main culprit behind majority of PU. Studies reveal that 90% duodenal ulcer and more than 70% gastric ulcer are caused by *H. pylori*.^[6]

Duodenal ulcers are located at the start of the small intestine. They are characterized by intense discomfort and a burning feeling in the upper abdomen that cause patients to become awake. In most cases, discomfort appears when the stomach is empty and disappears after eating. The majority of males are affected by duodenal ulcers. Duodenum, ulcers may appear on both the anterior and posterior walls.^[3]

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Gastric ulcers are characterized by the formation of break in the mucosa of the stomach lining that penetrates through the muscularis mucosa and covers more than 5 mm in diameter. When variations arise to the defense mechanisms of the stomach, it will reveal changes in the gastric mucosa that will ultimately result in erosion and ulceration.^[7] Despite normal or decreased acid production in patients with gastric ulcers, ulcers can still develop even in the absence of any acid.^[8] If patient who is suffering from gastric ulcer is not heal in treatment of 24 weeks, than surgery is preferred.

The use of herbal medicines has increased dramatically over the past few decades. Approximately 80% of people in underdeveloped nations still rely on traditional medicine, which is mostly based on various plant species, for their primary healthcare today. Eight hundred plants have been utilized in indigenous systems of medicine, and approximately 500 plants with therapeutic benefits are documented in ancient literature. Numerous plant species are used by various indigenous medical systems, including Ayurveda, Siddha, and Unani, to treat various illnesses.^[9,10] Over the years, many ailments have been cured with herbal remedies. Humans have used herbal medicines since early civilization.

Herbal medicines are crude, plant-based pharmaceuticals used to treat illness states, often chronic disease states, or to achieve or maintain greater health. The present demand for herbal medications has generated a \$1.5 billion market each year and increased access. Traditional herbal medicine refers to the use of plants or plant material to cure injuries or diseases, whether in their raw or processed forms. The ethnomedicinal medicinal plants therapeutic potential is now being investigated.^[11] Due to the enormous range of secondary metabolites produced by microbial and plant species, natural products and related structures are crucial sources of novel medications.^[12]

The active constituents that are founded in the plants are taken up by extracting them with the help of series of protic and aprotic solvents. Plant extracts having the potential to treat many

pathological conditions. Extract can work like active pharmaceutical ingredient. For herbal formulation, they are incorporated like API. There is an efficient drug source available as an alternate treatment approach; today, using herbal medicine is seen as essential to leading a healthy lifestyle.^[13,14]

The natural herbs are used to treat ulcers naturally are given below [Table 1].

Demulcent Herbs

The mucous membranes that are irritated will be coated and soothed. These have the ability to immediately relieve symptoms.

Astringent Herbs

In addition to helping the wound by frightening and toning the mucous membrane, they can also prevent infection.

Antimicrobial Herbs

It can deal with wound infection. In the case of a PU, we want to use *H. pylori*-specific herbs such as goldenseal or garlic.

Vulnerary Herb

Promote wound healing

Bitter Herbs

It helps in stimulating digestive secretions (often a lack of digestive secretion is the underlining cause of the ulcer).^[15]

POLYHERBAL FORMULATION

Formulations restrain two or more than two herbs are called polyherbal formulation. A polyherbal formulation has been used for therapeutic purposes all over the world. It is also known as herb-herb combination therapy or polyherbal therapy. Drug combination often produces a

Table 1: Herbal drugs (herbs) use to treat peptic ulcer (PU)

S. No.	Plant name and Family	Common name	Part	Chemical constituents	References
1	<i>Alstonia scholaris</i> (Apocyanaceae)	Blackboard Tree	Bark	Echitamine, Echitamine chloride, Rhazine, Nareline, Pseudo Akuammigine, Scholarine, Scholaricine, Dihydrocondylocarpine, 19,20-Z-Vallesamine and 19, 20-E Vallesamine, Picrinine, Alschomine, Isoalschomine, Mataranine A and B, Isookanin-7-o-alpha-Irhamnopyranoside, agr-amyrin, bgr-amyrin, Rhazine, Venenative, Yohimbine, Lupeol acetate, Coumarins, and Phlobatannin.	[16,17]
2	<i>Asparagus racemosus</i> (Asparagaceae)	Shatavari	Roots	Steroidal saponins- Shatavarins I–IV, hyperoside, quercetin, quercetin-3 glucuronide, and rutin. Isoflavone- 8-methoxy-5, 6, 4'-trihydroxyisoflavone 7-O-β-d-glucopyranoside Alkaloid- asparagamine, racemosol, and kaempferol Other- Oligofurostanosides, asparagine, arginine, tyrosine, and resin	[16,18]
3	<i>Anacardium occidentale</i> (Anacardiaceae)		Leaves	Catechins	[16,19]
4	<i>Azadirachta indica</i> (Meliaceae)	Neem Tree	Leaves	Flavonoids, Tannins, Carbohydrates, Proteins, and Triterpenes. Tocopherol, Arachidic, Linoleic, Nimolicinol, Margosic, Myristic, Oleic, Palmitic, Stearic acids, Azadirone, Azadirachtin, Azadiradione, Epoxyazadiradione (nimbinin), Tetranortriterpenes, Margolone, Nimbonone, Nimbolone, Nimbolinin, Azadirachtanin, Isoazadirolide, Nimbin, Nimbocinoline, Isonimbocinoline, Nimbolide, Nimocinone, etc.	[16,20]
5	<i>Acacia arabica</i> (Mimosaceae)	Babul Tree	Gum, Seedless Pods	Arabic acid, gallic acid, malic acid, Phenolic compounds, tannins, flavonoids, catechin, epicatechin, dicatechin, quercetin, catechin-5-gallate, leucocyanidin gallate, and sucrose.	[5,21]
6	<i>Adansonia digitata</i> (Malvaceae)	Boabab Or Monkey-Bread Tree, Paparapuli.	Leaves, Seed, Fruit, Bark	Phobaphenes, mucilage, gum, glucose, vitamin C, tartrate, acetate of potash, linoleic acid, iron, zinc and calcium other salts, albuminoids, wax, glucoside adansonin. insoluble tannin, and Tannic acid.	[5,22]
7	<i>Aegle marmelos</i> (Rutaceae)	Bael Tree	Root, Fruit	Flavonoids, Tannins, Proteins, Saponins, Steroids, Carbohydrates, Alkaloids, Cardiac glycosides, Terpenoids, Phenolic compounds, Lignin, Luvangetin, Fat, Oil, and Inulin.	[5,23]
8	<i>Allium sativum</i> (Liliaceae)	Garlic		Volatile oil, Terpenoids, Flavonoids, Steroids, Phenols. Allicin, Alliin, Ajoene, Allylpropl, Diallyl, Vinylidithiines, Trisulfide, Sallylcysteine, S-allylmercaptocystein, Peptides, Arginine, Germanium, Oligosaccharides, Selenium, Tellurium, and Arginine.	[5,24]
9	<i>Aloe vera</i> (Liliaceae)	Kattalai, Aloe Gel	Leaves	Aloin, Isobarbaloin, Emodin, Barbalin, and Saponins.	[5]
10	<i>Annona squamosa</i> (Annonaceae)	Custard Apple, Sitapalam	Leaves	Alkaloids, Flavonoids, Saponins, Phytosterols, Amino acids, Resin, Tannins, Anonaine, Aporphine, Coryline, Isocorydine, Norcorydine, Glaucine, Anonaine, Benzyltetrahydroisoquinoline, Borneol, Camphene, Camphor, car-3-ene, Carvone, β-Caryphyllene, Eugenol, Farnesol, Geraniol, 16-Hetriacontanone, Hexacontanol, Higemamine, Isocorydine, Limonine, and Linalool acetate.	[5,25]
11	<i>Angelica sinensis</i> (Apiaceae)	Female Ginseng		Ligustilide, Ferulic acid, and Ferulic acid.	[26]
12	<i>Aerva persica</i> (Amaranthaceae)	Kapok Bush, Desert Cotton		β-sitosterol, 4-hydroxybenzaldehyde, 4-hydroxybenzoicacid, 5,7-dimethoxycoumarin, 5,8-dihydroxycoumarin, 5,6,7-trimethoxycoumarin, 4-hydroxy-3,5-dimethoxybenzaldehyde, 3,4'-dihydroxy-3',5'-dimethoxypropiofenone, Gallic acid, 5-hydroxy-3',4',6,7,8-pentamethoxyflavone, and β-sitosterol 3-O-β-D-glucopyranoside	[13,27]

(Contd...)

Table 1: (Continued)

S. No.	Plant name and Family	Common name	Part	Chemical constituents	References
13	<i>Althaea officinalis</i> (Malvaceae)	Marsh Mallow	Roots, Flowers, And Leaves	Hypolaetin-8-glucoside, Isoquercitrin, Caffeic, Pcoumaric acid, Ferulic acid, kaempferol, p-hydroxybenzoic acid, p-hydroxyphenylacetic acid, Vanillic acid, Salicylic acid, Coumarins, Scopoletin, Phytosterols, Tannins, Asparagine, Amino acids, Lrhamnose, D-galactose, D-glucuronic acid, and D-galacturonic acid.	[13,28]
14	<i>Anchusa strigosa</i> (Boraginaceae)	Bugloss, Alkanet	Roots, Seeds, Bark	Alpha-amyrin, Beta-amyrin, Sitosterol-3- O- beta-glucoside, Beta-sitosterol, 3-epi-oleanolic, and Crataegolic acid	[13,29]
15	<i>Angelica archangelica</i> (Apiacea)	Garden Angelica	Roots	Macrolides, α -Phellandrene, α -Thujene, β -Pinene, Limonene, δ -3-Carene, Camphene, β -Ocimene, Myrcene, p-cymene, Cadinol, α -Bisabolol, Cyclosativene, Cubenene, α -Copaene, β -Copaene, Cuparene, β -Elemene, α -Humulene, Trans-Caryophyllene, δ -Cadinene, β -Barbatene, Trans-Muurolo-4, 5-diene, α -Murolene, β -Gemacrene, β -Bisabolene, Spathulenol, β -Eudesmol, 13-tridecanolide, 15-pentadecanolide, 16-hexadecanolide, 17-heptadecanolide, Dillapiole, and Nothoapiole.	[13,30]
16	<i>Aralia elata</i> (Araliaceae)	Angelica Tree	Root	(6'-O-palmitoyl)-beta-sitosterol-3-O-beta-D-glucoside, Chikusetosaponin Ib, Silphioside A, Methyl-ester, 3-O-beta-D-glucopyranosyl [beta-D-glucopyranosyl]-beta-D-glucopyranosyl-oleanolic acid-28-O-beta-D-glucopyranoside, Araloside C, Araloside A, Acanthoside D, and Araloside G.	[13,31]
17	<i>Apis mellifera</i> (Apidae)	Honey	-	Glucose oxides, Glucose, Fructose, Sucrose, Maltose, Isomaltose, Nigerose, Turanose, Panose, Melezitose, Maltotriose, Meli-biose, Oligosaccharides, 5% Fructo-oligosaccharides, Gluconic acid, Nicotinic acid, Vitamin C, Vitamin B1 (thiamine), Vitamin B2 (riboflavin), Vitamin B3 (niacin), Vitamin B6, Pantothenic acid, and Nitrogenous Compounds.	[15,32]
18	<i>Bauhinia variegata</i> (Fabaceae)	Orchid Tree	Leaves, Bark and Roots	Flavonoids, Rutin, Apigenin, Apigenin 7-0-glucoside, Quercetin, Tannin (tannic acid), Flavonoids, Glucose, and a brownish gum.	[5,16]
19	<i>Boswellia serrata</i> (Burseraceae)	Indian Olibanum, Dhup, Salai	Bark	Sualene, Polyprenol, β - sitosterol, lutein, β - carotene, Lupane triterpene, Boswellic acids, d- α -thujene, α -Terpineol, P-Cymene, α -Pinene, Eucalyptol, Camphene, Cuminol, and Carvone.	[16,33]
20	<i>Butea foandosa</i> (Fabaceae)	Flame of the Forest, Bastard Teak	Leaves	Butrin and Flavonoids.	[16]
21	<i>Bidens pilosa</i> (Asteraceae)	Begger Tick , Bur Marigold	Whole Plant	Polyenes, Flavonoids, Phenylpropanoids, Fatty acids, Phenolics, Cardiac Glycosides, Saponins, Tannins, Alkaloids, and Steroids.	[34]
22	<i>Balsamodendron mukul</i> (Burseraceae)	Gum-Gugul, Gukkulu	Gum	Volatile oil consisting Myrecene, Dimyrecene, Polymyrecene, Resin (Z-Guggulsterone, E Guggulsterone, Z-Guggulsterol, Guggulsterol I-V), 20- α -Hydroxy-4-pregnen-3-one, 20- β -hydroxy-4-pregnen-3-one, 16- β -hydroxy-4,17 Z-pregnadien-3-one, 16- α -hydroxy-4-pregnen-3-one, Cembrene A, Quercetin, Mukulol, 3-O- α -L-arabinoside, 3-O- β -Dglucoronide, 3-O- α -L-rhamnoside, Ellagic acid, Pelargonidin-3, α camphorene, Cembrene, Chloestrol, and Guggulsterols.	[5,35]
23	<i>Barberis aristata</i> (Berberidaceae)	Indian Or Nepal Barberry, Kasturimanjal	Root And Bark	Alkaloid – Berberine, Berbamine, Oxycanthine, Epiberberine, Palmatine, Dehydrocaroline, Jatrorhizine, Karachine dihydrokarachine, Taximaline, Oxyberberine, Aromoline, and Columbamine.	[5,36]
24	<i>Beta vulgaris</i> (Chenopodiaceae)	Beetroot, Sugar-Beet	Roots	Betin, Betaxanthins, Betacyanins, Amylose, Amylopectin, Protein, Fat, And Carbohydrate	[5,37]

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Table 1: (Continued)

S. No.	Plant name and Family	Common name	Part	Chemical constituents	References
25	<i>Bupleurum falcatum</i> (Apiaceae)	Chinese Thoroughwax	Roots	Hexanoic acid, Hexanal, Heptanal (E)-2-nonenal (E, E)-2,4-decadienal, Heptanoic acid, Octanoic acid, Hexadecanoic acid, b-caryophyllene, b-caryophyllene oxide, Spathulenol, a/b-pinene, Limonene, 1,8-cineole, Saikosaponin triterpenes, b-sitosterol, Stigmasterol.	[13,38]
26	<i>Brassica oleracea</i> (Brassicaceae)	Cabbage	Leaves	Lactic acid, Amino acid, Vitamin-C, Vitamin K, Olate, Vitamin B6, Carotenoids, Tocopherols, Glucosinolates, Polyphenols, and Carotenoids.	[15,39]
27	<i>Cucurbita pepo</i> (Cucurbitaceae)	Pumpkin	Seed	Glycoside, Terpenoids, Fixed oils, Fat, Carbohydrates, Proteins, Sterols, Peptides, Cucurbitacin, Polysaccharides, Para-aminobenzoic acid, Palmitic, Palmitoleic, Stearic, Linolenic, p-aminobenzoic acid, γ -aminobutyric acid, α -carotene, β -carotene, Violaxanthin, Auroxanthin epimers, Flavoxanthin, Luteoxanthin, Chrysanthemaxanthin, α -cryptoxanthin, and β cryptoxanthin.	[16,40]
28	<i>Cynodon dactylon</i> (Poaceae)	Bermuda grass	Aerial Parts	Carbohydrates, Proteins, Minerals. Other compounds such as Vitamin C, Palmitic acid, Terpenoids, and Alkaloids. Flavonoids: Luteolin, Apigenin, Orientin, Vitexin carotenoids: Violaxanthin, Beta-carotene, D-mannose, Neoxanthin, Hexadecanoic acid, Ethyl ester, and Linolenic acid.	[16,41]
29	<i>Citrus aurantifolia</i> (Rutaceae)	Key Lime or Bitter Orange	Leaves	Alkaloids, Flavonoids, Tannins, Cardiac glycosides, Saponins, Steroids, and Reducing sugars.	[34]
30	<i>Cnestis ferruginea</i> (Cannaraceae)	Short Pod, Alum Plant	Leaves, Roots And Stem Bark	Stigmasterol, Oleanolic acid, Ursolic acid, Betulinic, Stigmasterol-3-O- α -Dglucopyranoside, Squalene, Myricyl alcohol, β -sitosterol, Cyanidin, Delphinidin, and Apigenidin.	[34]
31	<i>Carapa procera</i> (Meliaceae)		Leaves And Stem Bark	Glycosides, Alkaloids, Flavonoids, Triterpenoids, Tannins, Saponins, Coumarins, Anthocyanins, Astringents, and Phenolic acid.	[34]
32	<i>Cassia siebieriana</i> (Fabaceae)		Roots, Stem Bark	Flavonoid, Steroid, Cardiac glycoside, Terpenoids, Reducing sugars, Saponins, Tannins, Quercitrin, Isoquercitrin, Rhein, and Anthraquinones.	[34]
33	<i>Careya arborea</i> (Myrtaceae)	Slow Match Tree, Pailacputatammi.	Leaves and Bark	Quercetin 3-O-glucopyranoside, α - Spinasterol, α - Spinasterone, Barringtogenol C, Barringtogenol D, Maslinic acid, 2 α -hydroxy ursolic acid, Desacylescinn III, Ellagic acid, Taraxerol, and Quercitin.	[5,42]
34	<i>Carica papaya</i> (Caricaceae)	Papaya, Papali-Pazham.	Fruits and Seed	Papain, Chymopapain, Pectin, Carposide, Carpaine, Carotenoids, and Antheraxanthin.	[5]
35	<i>Calophyllum brasiliense</i> (Clusiaceae)	Jacareuba And Guanandi	Bark	Brasiliensic acid, Isobrasiliensic acid, Coumarins, Chromanone derivatives, and Brasimarins.	[26,43]
36	<i>Curcuma longa</i> (Zingiberaceae)	Turmeric	Rhizomes	Arabinose, Azulene, Ascorbic-acid, Ar-turmerone, Alpha-terpineol, Ash, Beta-pinene, Beta-carotene, Curcumin, Cinnamic-acid, Curcumene, Curcumenol, Curcumin, Turmerone.	[26,44]
37	<i>Camellia sinensis</i> (Theaceae)	Tea Plant	Leaves	Catechin, Rutin, and Epigallocatechin	[26]
38	<i>Centella asiatica</i> (Apiaceae)	Gotu Kola	Leaves	Asiaticosides, Aglycone, Apigenin, Astragaln, Bornyl acetate, Bicycloelemene, Galanolactone, Kaempferol, Luteolin, Madecassoside, Madasiatic acid, Naringin, Pentacyclic triterpenoids, Quercetin, α -copaene, α -terpinene, β -pinene, β -elemene, and 8-acetoxylfalcario.	[26,45]
39	<i>Cocos nucifera</i> (Arecaceae)	Coconut	Fruit	Alkaloids, Tannins, Saponins, Resins, Flavonoids, Steroid, Glycosides, Terpenoids, Fatty acid, and Lauric acid.	[15,46]
40	<i>Capsicum annum</i> (Solanaceae)	Cayenne Pepper	Fruit	Capsinoids, Capsaicin, Capsorubin, Capsidiol, Cucurbitachrome Capsaicin- β -D-glucopyranoside, Capsianosides I, Dihydrocapsaicin- β -D-glucopyranoside, Glucocerebroside, Lutein, β -sitosteryl, and Prenigroxanthin.	[15,47]

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Table 1: (Continued)

S. No.	Plant name and Family	Common name	Part	Chemical constituents	References
41	<i>Cichorium intybus</i> (Compositae)	Kasni, Gul, Kasani, Chicory	Whole plant	Proteins, Inulin, Sucrose, Cellulose, Kaempferol-3-O-1-d-glucopyranosyl -3-O-1-d-glucopyranoside, Coumarin, Caffeoylquinic acid, Dicafeoylquinic acid, and Chicoric acid.	[13,48]
42	<i>Combretum dolichopetalum</i> (Combretaceae)	Achicha Nza	Roots	Vitexin, Butyl gallate, Isovitexin, Alkaloids, Flavonoids, Glycosides, Tannins, and Saponins.	[13,49]
43	<i>Eucalyptus maculate</i> (Myrtaceae)	Spotted Gum	Leaves	Quercetin, Cyclofenchene, D-Sabinene, α -pinene, β -pinene, Eucalypto, α -Eudesmol, β -Eudesmol, Ethenyldimethylester Phosphoric acid, Aromadendrene, and Gallic acid.	[16,50]
44	<i>Ficus religiosa</i> (Moraceae)	Peepal Tree	Leaves and Bark	Flavonoids, Saponins, Tannins, Aspartic, Arginine, Alanine, α -amyrin, Campesterol, Glycine, Hexa-cosanol, Isofucosterol, Isoleucine, Lupeol, Leucine, Methionine, n-nonacosane, n-hentricontanen, n-octacosan, Proline, Stigmasterol, Serine acid, Tannic acid, Threonine, Tryptophan, Tryosine, and Valine.	[5,51]
45	<i>Genista rumelica</i> (Fabaceae)		Whole plant	Genistin, Luteolin-7- glycoside, Rutin, Quercetin, Liquiricigenin, Liquericin, Catechin, Methyl-3-catechin, Aesculin, Hypolaetin, Apigenin, Genistine, Luteoline, Genisteine, Naringenin, and Acacetin.	[16,52]
46	<i>Glycyrriza glabra</i> (Fabaceae)	Mulhatti, Jethimadh, Mithilakdi;	Dried Roots and Rhizomes	Proteins, Alkaloids, Glycosides, Steroids, Carbohydrates, Flavonoids, Starches, Saponins, Lipids, Tannins, Phenolic compounds, Pectin, Mucilage, Sterols, Glycyrrhizinic acid, Glabrolide, Liquiritin, Neoisoliquiritin Liquiritigenin, Hamnoliquiritin, Licuraside, Neoliquiritin, Chalcones isoliquiritin, Isoliquiritigenin, and Licoflavonol.	[16,53]
47	<i>Galega purpurea</i> (Papilionaceae)	Purple Tephrosia, Kolluk-Kay-Welai		Albumen, Manganese, Brown resin, Chlorophyll, Quercetin or querritrin, and Glucoside rutin.	[5]
48	<i>Gentiana lutea</i> (Gentianaceae)	Anujaa, Yellow Gentian	Dried Rhizomes and Roots	Gentisein, Gentiamarin, Gentsin, Bitter glycosides, Iso-gentisin, Gentianic acid, Gentiopicroside, Gentinin, Gentisin or Gentianin, Loganic acid, Sweroside, Swertiamarin, Amarogentin, and Isogentisin.	[13,54]
49	<i>Hibiscus rosa</i> (Malvaceae)	Queen of Tropics	Leaves, Flower	Anthocyanins, Phlobatannins, Glycosides, Saponins, Flavonoids, Terpenoids, Thiamine, Ethene, Riboflavin, Niacin, β -sitosterol, Teraxeryl acetate, Malvalic acids, Ethanimidic acid, Hexadecanoic acid, Ethyl ester, Propanal, Propanamide, Nethyl-, Ethylenediamine, 2,3dihydroxy, O-Methylisourea hydrogen sulfate, Ethoxy-, Methyl ester, N-Formyl β -alanine, 7-Formylbicyclo (4.1.0) heptanes, 2-Butanamine, (S)-, 1,3,5-Triazine-2,4,6-triamine, (Z) 6, (Z) 9-Pentadecadien-1-ol, and Butanedial.	[16,55]
50	<i>Hydrocotyle asiatica</i> (Umbelliferae)	Indian Penny-Wort, Vaellarai.	Leaves	Vellarin, Gum, Sugar, Tannin, Albuminous matter, Salts, and Alkaline sulfates.	[5]
51	<i>Hippocratea excels</i> (Hipocrateaceae)		Root and Bark	β -amyrin, Epicatechin, α -amyrin, β -sitosterol, and glycoside.	[13]
52	<i>Indigofera tinctoria</i> (Papilionaceae)	True Indigo, Neelum; Avari.	Leaves	Glucoside.	[5]
53	<i>Lantana camara</i> (Verbanaceae)	Wild Sage Or Red Sage	Leaves	Glycosides, Flavonoids, Phenols, Alkaloids, Saponins, Tannins, Cardiac glycosides, Steroids, Anthocyanins, Terpenoids, Quinones, Caumarins, Phlobatannins, Anthraquinones, Lentadenes, Germacrene, Phrllandrene, Sabinene, Theveside, and Lamiridoside.	[34,56]
54	<i>Lawsonia alba</i> (Lythraceae)	Henna, Maruthoni.		Hanno, Tannic acid, Olive green resin, Glucoside.	[5]
55	<i>Moringa oleifera</i> (Moringaceae)	Drumstick Tree, Horseradish Tree	Leaves	Alkaloids, Flavonoids, Saponin, Tannins, Zeatin, Quercetin, Kaempferol, Terpenoid, Linoleic acid, Isothiocyanatomethylbenzene, Benzyl isothiocyanate, Linoleic sitosteroate, Moringyne, Niazimicin, Niaziridin, Niazirin, Pterygospermin, Alanine, and Leucine.	[16,57]

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Table 1: (Continued)

S. No.	Plant name and Family	Common name	Part	Chemical constituents	References
56	<i>Murraya koenigii</i> (Rutaceae)	Curry Leaf Tree	Root Stem and Leaves	Monoterpenes.	[16]
57	<i>Momordica charantia</i> (Cucurbitaceae)	Bitter-Melon or Ampalaya	Dry Fruits	Glycosides, Flavonoids, Saponins, Sterols, Alkaloids, Charantin, Momordicilin, Momordenol, and Momordin.	[34]
58	<i>Maytenus senegalensis</i> (Celastraceae)	Spike Thorn	Leaves and Roots	Alkaloids, Flavonoids, Triterpenes, Saponins, Phenol, Tannins, Glycosides, Pristimerin, Epicatechin, 3-O-acetyloleanol acids, Pristimerin, β -sitosterol, Triacotano, Norephedrine, and Ephedrine.	[34]
59	<i>Mimosa pudica</i> (Fabaceae)	Touch Me Not or Thottal Sinungee.	Leaves	Flavonoids, Alkaloid, Saponins, Tannins, Quercetin, Naringin, Gums, Mimosine, Mucilage, d-xylose, and d-glucuronic acid.	[5]
60	<i>Mangifera indica</i> (Anacardiaceae)	Mango Tree Or Mangaai.	Leaves and Flower	Alkaloids, Sterols, Saponins, Tannins, Flavonoids, Mangiferin, Amino acids, Palmitic, Stearic, Lignoceric, Linoleic, Arachidic, Behenic acids, Linolenic, Vitamin C, Vitamin A, Vitamin B complex, Gallic acid, Vanillic, Syringic, Protocatechuic acid, p-hydroxybenzoic acids, Catechins, Quercetin, Kaempferol, Rhamnetin, Anthocyanins, and Tannic acid.	[5,58,59]
61	<i>Myrica nagi</i> (Myricaceae)	“Box Myrtle; Bay-Berry.” And “Marudam-Pattai.”	Bark and Fruits	Myricotin, Tannin, Saccharine matter, and Salts.	[5]
62	<i>Myrtus communis</i> (Myrtaceae)	Myrtle	Leaves and Fruits	Volatile oil (oil of Myrtle), Citric acid, Resin, Tannin, Malic acid, Sugar, Catechin, α -terpineol, Galloocatechin, Myricetin derivatives-a-pinene, Caryophyllene oxide, Linalool, 1,8-cineole, Geranyl butyrate, Geraniol, Neryl acetate, and Myrecitin-3-O-a-rhamnoside.	[5,60]
63	<i>Maytenus robusta</i> (Celastraceae)	Cafezinho Do Mato	Leaves	Phenolic compounds, 3,12-dioxofriedelane, α -hydroxylup-20-en-3-one, 3,7-dioxofriedelane, and mayteine.	[26]
64	<i>Muntingia calabura</i> (Muntingiaceae)	Jamaica Cherry	Leaves	Tannins, Squalene, Saponins, Flavonoids (quercetin, rutin, fisetin), Volatile oils, Gallic acid, Pinoembrin, Pinobanksin, Pinostrobin, Chrysin, Isokaemferide, Ermanin, Gnaphaliin, Cabreuvin, Lupenone, β -amyrenone, α -tocopherylquione, d-tocopherol, a-tocospiro A, a-tocospiro B, b-sitostenone, b-sitosterol, syringic acid, Vanillic acid, and Tetracosyl ferulate.	[26,61]
65	<i>Musa acuminata</i> (Liliaceae)	Banana Tree	Ripe Bananas	Tannins, Flavonoids, Saponins, Phenol, Alkaloids, Glucose, Fructose, Carotene (provitamin A), Vitamins B-complex, Pectin, Malic acid, Rich in potassium, and Magnesium.	[15,58]
66	<i>Morus alba</i> (Moraceae)	White Mulberry, Tutam, Tut	Leaves	Quercetin	[58]
67	<i>Mukia maderaspatana</i> (Cucurbitaceae)	Cucumis Maderaspatanus		Alkaloids, Glycoside, Flavonoids, Protein, Saponin, Phenols, and α -tocopherol.	[13]
68	<i>Ocimum sanctum</i> (Lamiaceae)	Tulsi, Holy Basil.	Leaves	Alkaloids, Tannins, Saponins, Flavonoids (Apigenin), Urosolic acid, Eugenol, Estragol, Carvacrol, Caryophylline, Linalool, Apigenin, Rosmarinic acid, and Cirsimaritin.	[5,16,58,62]
69	<i>Odina wodier</i> (Anacardiaceae)	Odiyamaram	Bark	Alkaloids, Flavonoids, Tannin, Steroids, Saponins, Reducing sugars, Phenolic group, Anthrone glucosides, and Ash (potassium carbonate).	[5,63]
70	<i>Oryza sativa</i> (Gramineae)	Rice; Paddy, Arshi; Nellu.		Starch, Fat, Proteins, Trace of mineral b-mercaptoethanol, d-tocopherols, Tocotrienols, and γ -oryzanol.	[5,64]
71	<i>Plumbago auriculata</i> (Plumbaginaceae)	Cape Leadwort, Blue Plumbago	Roots	Naphthoquinones: Diomuscinone, Plumbagin, and Epi-isoshinanolone. Steroids: Plumbagic, Sitosterol, 3-O-glucosylsitosterol, and Palmitic acids.	[13]
72	<i>Polygonum bistorta</i> (Polygonaceae)	Bistort Or Snakeroot	Roots	Catechol, Phloroglucinol, Gallic acid, Phlobaphene, Caffeic, Chlorogenic, Protocatechuic acid, Ascorbic acid, 5-glutinen-3-one (alhusenone), B-sitosterol, Friedelin, and b-friedelinol.	[13,65]

(Contd...)

Table 1: (Continued)

S. No.	Plant name and Family	Common name	Part	Chemical constituents	References
73	<i>Pongamia pinnata</i> (Polygonaceae)	Karanja	Seeds and Roots	Pongaflavanol, Tunicatachalcone, Furanoflavones, Furanoflavonols, Chromenoflavones, Furanochalcones, Pyranochalcones, Pongapinnol A–D, Coumestan, Pongacoumestan, Karanjin, Karangin, Pongamol, Pongagalabrone, Pongapin, Pinnatin, Kanjone, Glybanchalcone, and Isopongachromene.	[13,66]
74	<i>Panax ginseng</i> (Araliaceae)	Korean Ginseng		Ginsenosides and Triterpene glycosides.	[26]
75	<i>Phyllanthus emblica</i> (Phyllanthaceae)	Amla	Fruits	Phyllantine, Phyllantidine, Chebulinic acid, Chebulagic Acid (Tannins), Ascorbic acid (vitamin C), and Polyphenols (Gallic acid, Ellagic acid, Quercetin, Corilagin, Apeigenin, Leutolin, Chebulinic acid, Chebulagic acid, etc.)	[26]
76	<i>Picrorhiza kurroa</i> (Plantaginaceae)	Kutki, Kurro	Whole Plant	Picroside and Glycoside (Kutkin, Pikuroside, Kutkoside, Picroside V, Bartsioside, Mussaenosidic acid, and Boschnalioside).	[26]
77	<i>Peucedanum grande</i> (Umbelliferae)	Wild Carrot, “Baphali”		5-Hydroxy-6-isoprenyl coumarin and 7-Methoxy-5,6-furanocoumarin.	[5]
78	<i>Phyllanthus niruri</i> (Euphorbiaceae)	Stonebreaker Or Seed-Under-Leaf, Kizhkay Nelli.	Whole Plant	Alkaloids, Glycosides, Carbohydrates, Flavonoids, Saponins, Tannins, Alkaloids-4-methoxy-securinine, Gallic acid, Beta-sitosterol, Ellagic acid, and Hypophyllanthin.	[5]
79	<i>Pinus longifolia</i> (Coniferae)	Long-Leaved Pine, Shirsal	-	Turpentine (pinene), Limonene, Calophony, or Resin.	[5]
80	<i>Plantago ispagula</i> (Plantaginaceae)	Spogel Seeds, Ishappukolvirai		Mucilage, Fixed fatty oil, and Albuminous matter.	[5]
81	<i>Psidium guajava</i> (Myrtaceae)	Guava, Koyya.	Leaves	Volatile oil, Flavonoids, Fat, Tannin 27.4%, Resin, Cellulose, Crystals of calcium oxalate, Mineral, Salts, Chlorophyll, Quercetin, Guajaverin, and Galactose-specific lecithins.	[5,34]
82	<i>Pycnanthus angolensis</i> (Myristicaceae)	African Nutmeg, Cardboard	Bark	Flavanones-genkwainin, Hydroxykanzakiflavone-2, Liguiritigenin (-)-Epicatechin and (+)-Catechin.	[16]
83	<i>Persea americana mill.</i> (Lauraceae)	Avocado	Leaves	Alkaloids, Flavonoids, Saponins, Tanins Cellulose, Triterpenoids, Fatty alcohols, Polyphenols, Polyuronoids, β -galactoside, Glycosylated Abscisic acid, Peptone, and Cyanogenic Glycoside.	[34]
84	<i>Rhamnus procumbens</i> (Rhamnaceae)	Creeping Buckthorn	Whole Plants	Kaempferol, Chrysophanol, Nepodin, Frangulin A, Kaempferide, Ethyl acetate, Emodin, Physcion.	[16]
85	<i>Rhus coriaria</i> (Anacardiaceae)	Sumach	Fruit	Flavonoids, Tannins, Ellagic acid, Gallic acid, Isoquercitrin, Myricitrin, Tannic acid, α -pinene, α -terpineol, β -caryophyllene, Cembrene, Carvacrol, β -caryophyllene alcohol, n-tetracosane, n-pentacosane, Anise alcohol, Phydroxybenzyl alcohol, Delphinidin, Methyl lawson, 2-hydroxymethylene naphtaquinone, Myrtillin, and Crysanthemin.	[5,67]
86	<i>Rhizophora mangle</i> (Rhizophoraceae)	Red Mangrove	Whole plants	Flavonoids (Quercetin and Proanthocyanidins)	[26]
87	<i>Rumex patientia</i> (Polygonaceae)		Roots	5-methoxy-7-hydroxy-1 (3H)-benzofuranone, Non-adeconoic acid-2,3-dihydroxypropyl ester, 5, 7-dihydroxy-1 (3H)-benzofuranone, Torachryson-8-O-beta-D-glucopyranoside, Catechin, Beta-sitosterol-3-O-beta-D-glucopyranoside, Emodin-8-O-beta-D-glucopyranoside, Gallic acid, Beta-sitosterol, Chrysophanol, Chrysophanol-8-O-beta-D-glucopyranoside, Physcion, Emodin, Maackiain-3-O-beta-D-glucopyranoside, Maackiain, Quercetin-3-O-beta-D-glucuronide, 2-O-methylinositol, Torachryson-8-O-beta-D-glucopyranoside, Quercetin-3-O-beta-D-glucopyranoside, and Nepodin-8-O-beta-D-glucopyranoside .	[13,68]
88	<i>Spondia mombin</i> (Anacardiaceae)	Yellow Mombin, Hog Plum	Whole plants	Flavonoids, Glycosides, Saponins, Phenolics, Alkaloid, Tannins, Gallic acid, and Ellagic acid.	[34]

(Contd...)

Table 1: (Continued)

S. No.	Plant name and Family	Common name	Part	Chemical constituents	References
89	<i>Sesbania grandiflora</i> (Fabaceae)	Basna, Akathi.	Leaves	Saponins, Tannins, and Triterpenes.	[5]
90	<i>Shorea robusta</i> (Dipterocarpaceae)	Sal Tree, Taloor; Kungiliyam.		Alpha- and Beta-Amyrin, Tri and Tetrahydroxy Ursenoic acid, Ursolic acid, Asiatic acid, and Mangiferonic acid.	[5]
91	<i>Solanum nigrum</i> (Solanaceae)	Black Nightshade Berries and Manathakkali Keerai.	Leaves	Alkaloids, Saponins, Flavonoids, and Phytosterols.	[5]
92	<i>Stryphnodendron rotundifolium</i> (Leguminosae)			Flavonoids (catechin, rutin, gallic acid, and caffeic acid) and Gallic acid	[26]
93	<i>Trema orientalis</i> (Ulmaceae)	Charcoal Tree, Gunpowder Tree	Stem Bark, Leaves and Roots	β -sitosterol, Epicatechin, Catechin, Syringaresinol, Ampelopsin F, Octacosanoic acid, Simiarenone, Simiarenol, 3,4-dihydroxybenzoic acid, N-(trans-p-coumaroyl) tyramine, and Trans-4-hydroxycinnamic acid.	[34,69]
94	<i>Trichilia monadelphina</i> (Meliaceae)		Stem Bark	Stigmasterol, β -sitosterol, Ellagic acid, Monadelphins A&B, Trichins A.	[34]
95	<i>Tamarindus indica</i> (Caesalpinaceae)	Tamarind Tree, Puli; Puliyam-Pazham.	Leaves and Seeds	Carbohydrates 63.22%, Fat, Gum, Invert sugar 25–40%, Tartaric acid 5%, Malic, Citric acid 4%, Acetic acids, Oxalic acid, Tartaric of potassium 8%, Pectin, and Albuminoids.	[5]
96	<i>Terminalia chebula</i> (Combretaceae)	Myrobalan; Ink-Nut; Gullnut and Kaduk-Kai		Gallic acid, Tannin (tannic acid) 45%, Brownish yellow colouring matter, Chebulinic acid, and Lucilage.	[5]
97	<i>Trigonella foenum-graecum</i> (Fabaceae)	Fenugreek	Seeds	Alkaloid, Lipids, Protein, Steroid, Saponins, Mucilage, Calcium, Dietary fiber B Vitamins, Iron, Furostanol glycosides, and Steroidal peptide.	[15,70]
98	<i>Vernonia amygdalina</i> Del. (Asteraceae)	“Bitter Leaf”	Leaves	Vernolide, Vernodaline, Vernolepin, Vernomygdin, Vernodalol, Luteolin 7-O-glucuronide, Luteolin 7-O- β -glucoside, Hydroxyvernolide, Vernomenin4, 15-dihydrovernodaline, Ascorbic acid, Glycine, Pyridoxine, Casein hydrolysate, Thiamin, Cysteine, and Epiverodalol.	[34,71]
99	<i>Withania somnifera</i> (Solanaceae)	Asgandh, Punir, Ashvagandha	Roots	Alkaloids, Glycosides, Protein, Amino acids, Starch, Steroids, Reducing sugars, Olatile oil, Glycine, Glutamic acid, Hentriacontane, Dulcitol, Proline, Cysteine, Withanol, Aspartic acid, Valine, Tyrosine, Hydroxyproline, Alanine, Cystine, Calcium, and Phosphorous.	[13,72]
100	<i>Zingiber officinale</i> (Zingiberaceae)	Ginger, Adarakha	Rhizome	Alkaloids, Glycosides, Flavonoids, Carbohydrates, Essential oils, Proteins, Steroids, Saponins, Terpenoids, Tannin, Phenolic compounds, 6- shogaol, ar-curcumenone, 6-gingsulphonic acid, Gingerols, Gingerdione, Isovanillin, Beta-sitosterol palmitate, and Glycol monopalmitate.	[13,26,48,73]
101	<i>Zizyphus lotus</i> (Rhamnaceae)	Sedra	Root Bark	Tannins and Flavonoids.	[13]

Table 2: Patents on polyherbal formulation

S. No.	Patent no.	Content	Activity	References
1	W02020012447A1 (Year 2020)	Guava, Jamun, Amla, Bitter gourd.	Antidiabetic	[79]
2	EP1514555A1 (Year 2005)	Curcuma longa, Boerhavia diffusa, Picorrhiza kurroa, Tephrosia purpurea, Trigonella foenum	Hepato protective	[80]
3	US20060147555 (Year 2006)	Terminalia arjuna, strychnos nux vomica, Baswellia serrata, Commiphora mukul, semecarpus anacardium	Hyperlipidemia, atherosclerosis	[81]
4	US7250181B2 (Year 2007)	Withania somnifera, Mangifera indica, Shilajit	Immune modifiers	[82]
5	EP2896396A1	Comfrey symphytum officinale L. and commiphora molmol	Topical treatment of skin and oromucosal wounds	[83]

Table 3: Polyherbal formulations use to treat peptic ulcer (PU)

S. No.	Product	Composition of polyherbal formulation	References
1	Patoladi kasaya	<i>Zingiber officinale</i> , Patola, haritaki, <i>Piper nigrum</i> , <i>Piper longum</i> , kutaki, <i>Terminalia chebula</i> , bibhitaka, amrta, amalaki, cirayata, pittapapada, sunthi, and bhrngaraja.	[78]
2	Lucer 23	Pravala pishti, Sutashekhara rasa, Kamadudha rasa, Godanti bhasm, Muktaashukti pishti, Vacha, Svarnamakshika bhasma, Amalaki, Shankha bhasma, Guduchi satava, Jatamansi, Kiratatikta, Jyotishmati beeja, Parsika yavani.	[78]
3	Avipattikar churna	<i>Terminalia bellerica</i> , <i>Cinnamomum tamala</i> , <i>Amomum subulatu</i> , <i>Emblica officinalis</i> , <i>Syzygium aromaticum</i> , <i>Cyperus rotundus</i> , lavana, Operculina terpepethum, Vida, Embelia ribes, Sharkara.	[78]
4	Eumil	<i>Asparagus racemosus</i> , <i>Emblica officinalis</i> , <i>Centella asiatica</i> , <i>Ocimum sanctum</i> , <i>Convolvulus pluricaulis</i> , and <i>Withania somnifera</i> .	[78]
5	Kamishoyosan	<i>Bupleurum radix</i> , <i>Gardenia fructus</i> , <i>Angelica radix</i> , <i>Peony radix</i> , <i>Atractylodes racemata</i> , Ginger, hoelen, Moutan cortex, Glycyrrhiza, and Mentha.	[78]
6	UL-409	<i>Glycorhiza globra</i> , <i>Emblica officinalis</i> , <i>Tinospora cordifolia</i> , <i>Aegle marmelos</i> , <i>Jasad bhasma</i> , <i>Santalum album</i> , <i>Benincasa hispida</i> , <i>Zaharmohra bhasma</i> , <i>Saussurea lappa</i> , <i>Foeniculum vulgare</i> , <i>Aloe vera</i> , and <i>Rosa damascena</i> .	[78]
7	Rhinax	<i>Withania somnifera</i> , <i>Terminalia chebula</i> , <i>Myristica fragrance</i> , <i>Asparagus racemosus</i> , <i>Mucuna pruriencia</i> , <i>Glycyrrhiza glabra</i> , and <i>Phyllanthus Emblica</i> .	[78]
8	Trikatu	<i>Piper longum</i> , <i>Piper nigrum</i> , and <i>Zingiber officinale</i> .	[78]
+9	PHF	<i>Aegle marmelos</i> , <i>Saccharum officinarum</i> , <i>Cissus quadrangularis</i> , <i>Glycyrrhiza glabra</i> , <i>Elettaria cardamomum</i> , <i>Rosa damascene</i> , and <i>Citrus aurantifolia</i> .	[78]
10	PHF	<i>Glycyrrhiza glabra</i> , <i>Pandanus odoratissimus</i> , <i>Musa paradisiacal</i> , <i>Curcuma longa</i> , and <i>Cocos nucifera</i> .	[78]
11	Mystomate	Grounded charcoal, <i>Brassica juncea</i> , Czern seed, and sodium chloride (NaCl) suspended in edible oil.	[84]
12	PHF	<i>Moringaoleifera</i> , <i>Raphinus sativus</i> , and <i>Amaranthus tricolor</i> in 0.5% carboxy methyl cellulose in the 1:1: 1	[85]
13	Enterica	<i>Morinda lucida</i> L., <i>Cnestis ferruginea</i> Vahl ex D.C., <i>Momordica charantia</i> L., <i>Vernonia amygdalina</i> Del., <i>Lantana camara</i> L., <i>Psidium guajava</i> L., <i>Trema orientalis</i> L., <i>Persea americana</i> Mill., <i>Citrus aurantifolia</i> L., <i>Spondias mombin</i> L., and <i>Bidens pilosa</i> L.	[34]
14	Dyspepsia	<i>Carapa procera</i> , <i>Maytenus senegalensis</i> , and <i>Trichilia monadelpha</i>	[34]
15	NPK500 Capsules	<i>Cassia siebieriana</i> D.C	[34]
16	Gasteon Syrup	Ext. <i>Asparagus racemosus</i> , Ext. <i>Glycyrrhiza glabra</i> , Ext. <i>Hedychium spicatum</i> , Kapardika Bhasma, Kamadudha Rasa, Aqueous base, Shankha Bhasma, Sodium Propyl Paraben (IP), Sodium Benzoate (IP), Sodium Methyl Paraben (IP), Flavor Rose White, and Flavor Peppermint.	[86]
17	Livina	<i>Solanum nigrum</i> 20 mg, <i>Tephrosia purpurea</i> 40 mg, <i>Tinospora cordifolia</i> 10 mg, <i>Andrographis paniculata</i> 10 mg, <i>Phyllanthus niruri</i> 20 mg, <i>Holarrhena antidysenterica</i> 10 mg, <i>Terminalia chebula</i> 10 mg, <i>Berberis aristata</i> 40 mg, <i>Asteracantha longifolia</i> 20 mg, <i>Alstonia scholaris</i> 20 mg, <i>Picrorhizakurroa</i> 20 mg, and <i>Cichorium intybus</i> 10 mg.	[87]
18	kanchanara Guggula	Bark of <i>Bauhinia variegata</i> (10 parts), 3 Myrobalans, Cardamoms, Ginger, Blackpepper, Long-pepper, Cinnamon, Bark of <i>Crataeva nurvala</i> , and <i>Tejpatra</i> leaves, (each one part).	[5]
19	VRC/AS/014 syrup	<i>Emblica officinalis</i> (Amalaki) Fruit, <i>Glycyrrhiza glabra</i> (Yashthimadhu) Root, <i>Asparagus racemosus</i> (Shatavari) Root tuber, <i>Ipomoea turpethum</i> (Nishoth) Root, <i>Centella asiatica</i> (Mandukaparni) Whole Plant, <i>Terminalia chebula</i> (Haritaki) Fruit, <i>Hemidesmus indicus</i> (Sariva) Root, <i>Terminalia bellerica</i> (Bibhitak) Fruit, Powder of: <i>Sodii carbonas</i> (Sarjakshar) Salt, and Black Salt (Kala namak) Salt.	[88]
20	Qarahine	<i>Cochlospermum gossypium</i> DC, <i>Glycyrrhiza glabra</i> Linn, <i>Koalinum ponderosum</i> , <i>Lapis lazuli</i> , magnesium silicate, <i>Pistacia terebinthus</i> Linn, and silicate of magnesia ferrum.	[89]
21	Ulcerene	<i>Bambusa arundinacea</i> , <i>Coriandrum sativum</i> , <i>Elettaria cardamomum</i> , <i>Foeniculum vulgare</i> , <i>Rosa damascene</i> , Mineral bezoar triturated, and <i>Pistacia lentiscus</i> .	[90]
22	PHF	<i>Adansonia</i> (leaves juice) and <i>Ginger</i> (powder) <i>Salvadora indica</i> (root juice)	[5]
23	PHF	<i>Azadirachta indica</i> (leaves) and <i>Zingiber officinale</i> <i>Curcuma longa</i>	[91]
24	PHF	<i>Rhynchosia resinosa</i> ., <i>Maytenus senegalensis</i> , <i>Ozoroa insignis</i> , <i>Lannea schimperii</i> , and <i>Entada abyssinica</i> .	[92]
25	PHF	<i>Moringa oleifera</i> , <i>Raphinus sativus</i> , and <i>Amaranthus tricolor</i>	[92]

promising effect in treatment of diseases over a single drug. The use of combination of drug will show promising result and this idea of

combining active entity is well-established and it has seen remarkable success over the past 10 years. It has been demonstrated that both

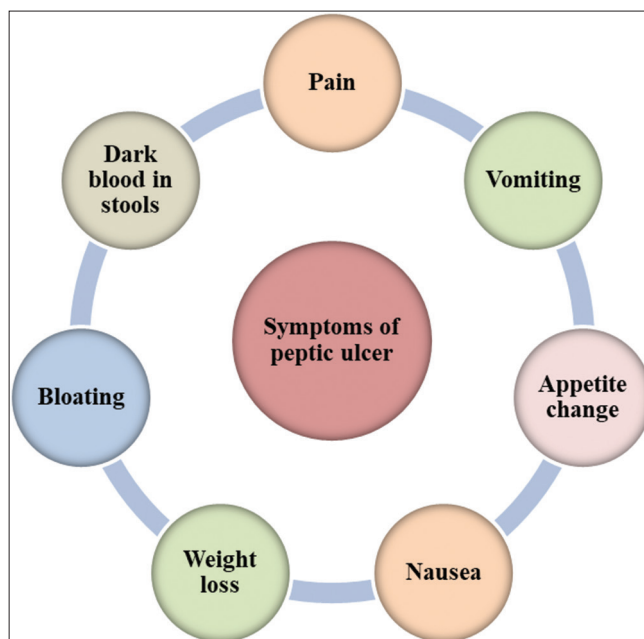
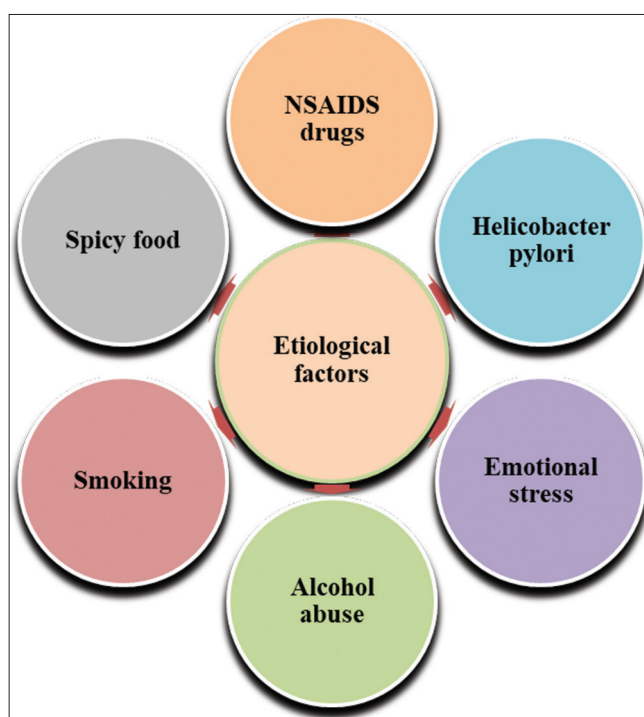
Table 4: Recent research on polyherbal formulation

S. No.	PHF name	Activity	References
1	F6SMONSECCE	Antioxidant, Hypoglycemic, and Antilipidemic	[103]
2	Qurs-e-Gol	Anti-inflammatory	[104]
3	NEERI-KFT	Nephroprotective	[105]
4	PHF syrup (<i>Curcuma and Moringa oleifera</i>)	Anthelmintic	[106]
5	Jeevanthyadi ghrita	Anti-inflammatory. Immunomodulation	[107]
6	PHF gel	Wound healing	[108]

naturally occurring herbs and herbal components combined into specific formulas may interact. These include antagonism, support, restraint, and mutually beneficial enhancement.^[74] The majority of polyherbal substances are utilized in the Ayurvedic medical system to treat a variety of pathological conditions. Various Patents and the polyherbal formulation which are used to treat PU are given below in the Tables 2 and 3.

ADVANTAGES OF MULTI-HERBAL COMPOSITION (POLYHERBAL) OVER SINGLE-HERB REMEDIES

Ayurvedic and herbal medications are made up of a variety of botanicals and each of these contains a number of chemical constituents that when combined may have the desired effect.^[75] They are frequently combined and derived from plant sources each of which has a unique variety of species, growing conditions, and biologically active ingredients. There are several advantages to polyherbalism that a single herbal preparation does not have. It is obvious that a multiple-constituent formulation can produce a more potential therapeutic effect. A smaller dose of the herbal product would be necessary to achieve the intended pharmacological activity. The use of smaller quantity will decrease the possibility of adverse effects. In addition, PHFs improve patient convenience by removing the need to take multiple herbal formulations at once, which, in turn, improves compliance and the therapeutic result. When compared to a single herbal formulation, PHF is more popular on the market as a result of all these advantages.^[76] Polyherbal formulation also having multiple types of molecules against a disease complication

**Figure 1:** Symptoms of peptic ulcer**Figure 2:** Etiological factors of peptic ulcer

so different molecules cure a disease by different mechanism so provide a complete therapy against a disease condition.^[77] The PHF is increasingly being used as a result of these benefits. The following Table 4 lists the most recent research on several polyherbal remedies for various chronic conditions.

LIMITATIONS OF POLYHERBAL FORMULATION

Combinations of plants containing these elements may exhibit more activity than separate extracts when combined. On the other hand, a large number of ingredients may also result in chemical incompatibility, which may lead to instability. Although the Drugs and Cosmetic Act was established to regulate the manufacture and quality control, the manufacturing of Ayurvedic herbal preparations is subject to somewhat less stringent regulations in India where the majority of Ayurvedic PHFs are manufactured and exported. Toxicology studies and clinical trials on herbal formulations are not necessary for the application of patents and the granting of manufacturing licenses to the manufacturer of Ayurvedic herbal formulations, according to good clinical practices.^[78]

NOVEL VASCULAR HERBAL FORMULATION

Liposome

These are small vesicles composed of unilamellar or multilamellar concentric phospholipid bilayers surrounding one or several aqueous compartments. The hydrophilic heads of the amphiphile are shown orienting toward the water compartment in a cross-section of a liposome, while the lipophilic tails are shown orienting away from the water toward the center of the vesicle, forming a bilayer. Consequently, water soluble compounds are entrapped in the water compartment and lipid soluble compounds aggregate in the lipid section. Hence, they can be amphiphilic in nature. They are usually formed from phospholipids. By increasing ingredient solubility, enhancing component

bioavailability, enhancing intracellular absorption, altering pharmacokinetics and biodistribution, and improving *in vitro* and *in vivo* stability, liposomes can improve the performance of products. Liposomes as a drug delivery system can improve the therapeutic activity and safety of drugs, mainly by delivering them to their site of action and by maintaining therapeutic drug levels for prolonged periods of time.^[93,94]

Phytosome

The term phytosome is made up of two words “Phyto” which means plant and “Some” means cell like. Phytosome is a patented technology developed by a leading manufacturer of drugs and nutraceuticals, to incorporate standardized plant extracts or water soluble phytoconstituents into phospholipids to produce lipid compatible molecular complexes, called as phytosomes and so vastly improve their absorption and bioavailability.^[95] However, herbs are used to formulate phytosomes; hence, they are also known as “Herbosomes.” The fundamental difference between liposome and phytosome is that liposome possesses lack of chemical bonding between phosphatidylcholine and the active secondary metabolite whereas phytosome has chemical bonding among them. The phosphatidylcholine and plant components, in contrast, actually form a 1:1 or a 2:1 molecular complex during the phytosome process, involving chemical bonding. Due to their improved ability to permeate the lipoidal biomembrane and eventually reach the systemic circulation, phytosomes are more accessible than traditional herbal extracts. An emerging trend in the delivery of nutraceuticals and herbal medicines is phytosomes.

Nanoparticles

Nanoparticles are submicron sized polymeric colloidal particles with a therapeutic agent encapsulated within their polymeric matrix or adsorbed/conjugated onto the surface. These are smaller (0.2–0.5 μm) than microspheres (30–200 μm) and may have a smaller loading capacity than the soluble polymers. These are used

for intracellular targeting by passive or ligand mediated targeting approaches. These are also rapidly opsonized and cleared by macrophages of RES thus useful for targeting drugs to macrophages and for chemotherapy of RES localized tumors.

Emulsions

Emulsion refers to a non-homogeneous dispersion system that is composed of two kinds of liquids unable to dissolve each other, and one of which disperse in the other one in a form of droplets. In general, emulsion is consisting of oil phase, water phase, surfactant, and sub-surfactant. Its appearance is translucent to transparent liquid. Emulsion can be classified into ordinary emulsion (0.1–100 μm), microemulsion (10–100 nm), sub-microemulsion (100–600 nm), etc. Among them, the microemulsion is also called nanoemulsions, and the sub-microemulsion is also called lipid emulsion. Due to its affinity for the lymph, emulsion delivers drugs *in vivo* in a targeted manner. In addition, the drug can be prolonged sustained release because the drug is bounded in the inner phase and kept off direct contact with the body and tissue fluid.^[96] Emulsion can be multiple type W/O/W and O/W/O.

OTHER NOVEL VESICULAR HERBAL FORMULATIONS

Transferosomes

Transferosomes are applied to the skin in a non-occluded manner, and they pass through the lipid membranes of the stratum corneum as a result of the osmotic or hydration force in the skin. It can be applicable as drug carriers for a variety of small molecules, peptides, proteins, and herbal ingredients. Transferosomes are able to penetrate the stratum corneum and deliver nutrients locally to maintain it functioning, maintaining the skin healthy.^[97]

Ethosome

As a novel drug delivery system Ethosome is especially suitable as a transdermal administration carrier.^[98,99] Ethosomes have an elevated level of

deformability and entrapment efficiency, may completely enter the skin, and enhance medication delivery through the skin. As compared to other liposomes, ethosomes' physical and chemical characteristics enable efficient medication delivery through the stratum corneum into deeper layers of the skin or even into the bloodstream.^[100] This property is very important as the topical drug carrier and transdermal delivery system. Moreover, the ethosomes carrier can also effectively carry hydrophilic and lipophilic drugs within the cells, increasing percutaneous absorption of the herbal anti-inflammatory drug matrine. It also makes it possible for the antibacterial peptide to penetrate the fibrocyte with ease.^[101]

Microspheres

Administration of medication through microparticulate systems is beneficial because microspheres can be ingested or injected and; they can be modified for desired release profiles and their usage in site-specific delivery of drugs and in some instances, they have potential to provide organ-targeted release.^[102] So far, a series of plant active ingredients, such as rutin, camptothecin, zedoary oil, tetrandrine, quercetin, and cynara scolymus extract has been made into microspheres. In addition, reports on immune microsphere and magnetic microsphere are also common in recent years. Immune microsphere possesses the immune competence as a result of the antibody and antigen was coated or adsorbed on the polymer microspheres.

CONCLUSION

There are various medicinal plants that include chemical components that are active, such as tannins and flavonoids, which have potent antiulcer properties. The current approach to treating ulcers focuses mostly on strengthening the immune system and reducing acid secretion. As an alternative to synthetic pharmaceuticals, herbal products are being used to treat a variety of diseases since they are believed to be safer. In a variety of preclinical investigations, these

polyherbal formulations showed a possible anti-ulcer effect; nevertheless, more research into their molecular mechanisms and toxicity studies are needed to demonstrate their usefulness in people. From this study, we concluded that the above plants and polyherbal formulations have efficacy to protect or treat PU, caused by a number of factors, including alcohol, *H. pylori*, aspirin, indomethacin, etc.

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