

## A Potential of Some Medicinal Plants as A Digestive Disorder Preventing Agents – A Review

Azizul Islam M<sup>2</sup>, Murshida Begum M<sup>1\*</sup>, Sarker M K<sup>1</sup>, Akter A<sup>1</sup>, Ahmed S U<sup>1</sup>

<sup>1</sup>Department of Pharmacy, Primeasia University, 9, HBR Tower, Banani, Dhaka1213, Bangladesh.

<sup>2</sup>Department of Electrical and Electronic Engineering (Chemistry), Northern University Bangladesh, Holding no. 13, Road no. 17, Banani C/A, Dhaka-1213.

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### ABSTRACT

Digestive disorders are the disorders of the digestive tract or the gastrointestinal tract (GIT). It is one of the common health problems spreading all over the world. It is estimated that some form of digestive disorder affects more than 100 million people only in America. For some people, digestive disorders are a source of irritation and discomfort that may cause them to drastically limit their life styles and frequently miss work. For others, the disorders may be extremely crippling and even fatal. A large number of plants are used as a source of drugs for the treatment of digestive disorders that may grow naturally or harvested. There have been considerable pharmacological investigations into the digestive disorders preventing the activity of some compounds. The present study was aimed at reviewing data about some plants that are commonly used as a preferable solution of different digestive problems. In this study we review those plants that have strong potential to cure not only common symptoms of digestive disorders like diarrhea, constipation, flatulence, but also serious digestive complications like Gastritis, Pancreatitis, Hepatitis A etc. with their active chemical constituents, their parts for use as well as their other common uses. The experimental parameters used for digestive disorder preventing activity were fasting-induced digestive disorder model, Diclofenac-induced gastric acidity model in rats and food-induced indigestion in rats. The ideal aims of treatment of digestive disorders are to relieve indigestion, enhance metabolism and provide comfort feelings. This article reviews drugs derived from medicinal plant more commonly used in the world for digestive disorders and, if reported, the digestive disorder preventing activity.

**Keywords:** Digestive disorders, gastrointestinal tract (GIT), indigestion, flavonoids, terpenoids, tannins, saponin.

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### INTRODUCTION

Disorders that affect the gastrointestinal tract (GIT) or digestive (gastrointestinal) system are called digestive disorders. Some disorders simultaneously affect several parts of the digestive system, whereas others affect only one part or organ. Some symptoms such as diarrhea, constipation, bleeding from the digestive tract, regurgitation, and difficulty swallowing usually suggest a digestive disorder. More general symptoms, such as abdominal pain, passing of gas (flatulence), loss of appetite, hiccups, and nausea may suggest a digestive disorder or another type of disorder. Chest or back pain usually suggests another type of disorder but sometimes is caused by a digestive disorder. Indigestion is an imprecise term that is used by different people to mean different things. The term covers a wide range of symptoms, including dyspepsia, nausea and vomiting, regurgitation, and the sensation of having a lump in the throat (Globus sensation). Bowel (intestinal) function varies greatly not only from one person to another but also for any one person at different times. Most people find it easiest to move their bowels in the morning. The urge tends to be strongest about 30 to 60 minutes after first eating in the morning. Bowel function can be affected by age, diet, stress, drugs,

disease, and even social and cultural patterns. Changes in the frequency, consistency, or volume of bowel movements or the presence of blood, mucus, pus, or excess fatty material (oil or grease) in the stool may indicate a disorder. Sometimes people lose the ability to control their bowels.<sup>[1]</sup> Medicinal plants are an indispensable source of medicinal preparation, both preventive and curative. Many plants have pharmacological properties against various kinds of disease, but they are not well known to the common people. A large number of medicinal plants are commonly used for relieving different types of digestive disorders such as *Allium sativum*, *Carica papaya*, *Brassica nigra* etc. Careful and planned investigations of these plants are needed in order to develop new drugs that will meet the criteria of modern treatment.

#### *Types of Digestive Disorders*

It's helpful to classify diseases and conditions of the digestive system, according to their type or cause as shown below. Such pigeonholing is never precise, of course, and the categories in this list sometimes overlap. Appendicitis, for instance, might be classified as either an acute infectious condition or an inflammatory disorder. Similarly, chronic infections — those that recur often or progress slowly — might at first cause sudden, severe

Table 1: Different types of digestive disorders.

Common Cancers	Infections (Acute and Chronic)	Inflammatory and Autoimmune Conditions	Anatomic, Functional or Structural Problems	Food Intolerance
Mouth/oral cavity	Appendicitis	Gastritis	Adhesions (scar tissue)	Celiac disease
Esophagus	Foodborne illness (food poisoning)	Hemorrhoids	Anal fissure	Lactose intolerance
Stomach	Peritonitis	Inflammatory bowel disease (IBD) - Crohn's disease and Ulcerative colitis (UC)	Anorectal fistula	-
Liver (hepatocellular carcinoma)	Viral gastroenteritis	Irritable bowel syndrome (IBS)	Cirrhosis of the liver	-
Bile ducts	Cholangitis	Ischemic colitis	Constipation	-
Pancreas (islet cell carcinoma and adenocarcinoma)	Hepatitis A	Pancreatitis	Diarrhea	-
Colon and rectum (colorectal cancer)	-	Primary biliary cirrhosis	Dysphagia (difficult or painful swallowing)	-
-	-	Primary sclerosing cholangitis	Fecal incontinence	-
-	-	Proctitis	Diverticular disease (diverticulitis and diverticulosis)	-
-	-	Pruritus ani (anal itching)	Flatulence (gas)	-
-	-	Gastritis	Gallstones	-
-	-	-	Gastroparesis (delayed gastric emptying)	-
-	-	-	Gastrointestinal tract (GIT) bleeding	-
-	-	-	Hiatal (diaphragmatic) hernia	-
-	-	-	Indigestion/heartburn/dyspepsia/acid reflux/gastroesophageal reflux disease (GERD)	-
-	-	-	Abdominal Hernia	-
-	-	-	Intestinal obstruction	-
-	-	-	Jaundice	-
-	-	-	Gallstones	-

illness. Finally, some entries may be other diseases in their own right or symptoms of another disorder. Cirrhosis of the liver, for example, is a secondary condition resulting from other diseases and conditions such as hepatitis B, cystic fibrosis, and primary biliary cirrhosis, among others<sup>2</sup>.

*The potential medicinal plants used in digestive disorders*  
Though many plants are used for different medicinal purposes, but the plants that are mostly used for the treatment of different digestive disorders are not reviewed earlier. We studied some medicinal plants that are mainly used for curing digestive system complications. Our investigation showed that these investigated medicinal plants could prevent digestive disorders in rats in a dose-dependent manner. Moreover, histological studies revealed that these medicinal plants did not show any acute toxicity. Previous studies for phytochemical screening of these medicinal plants identified the presence of important

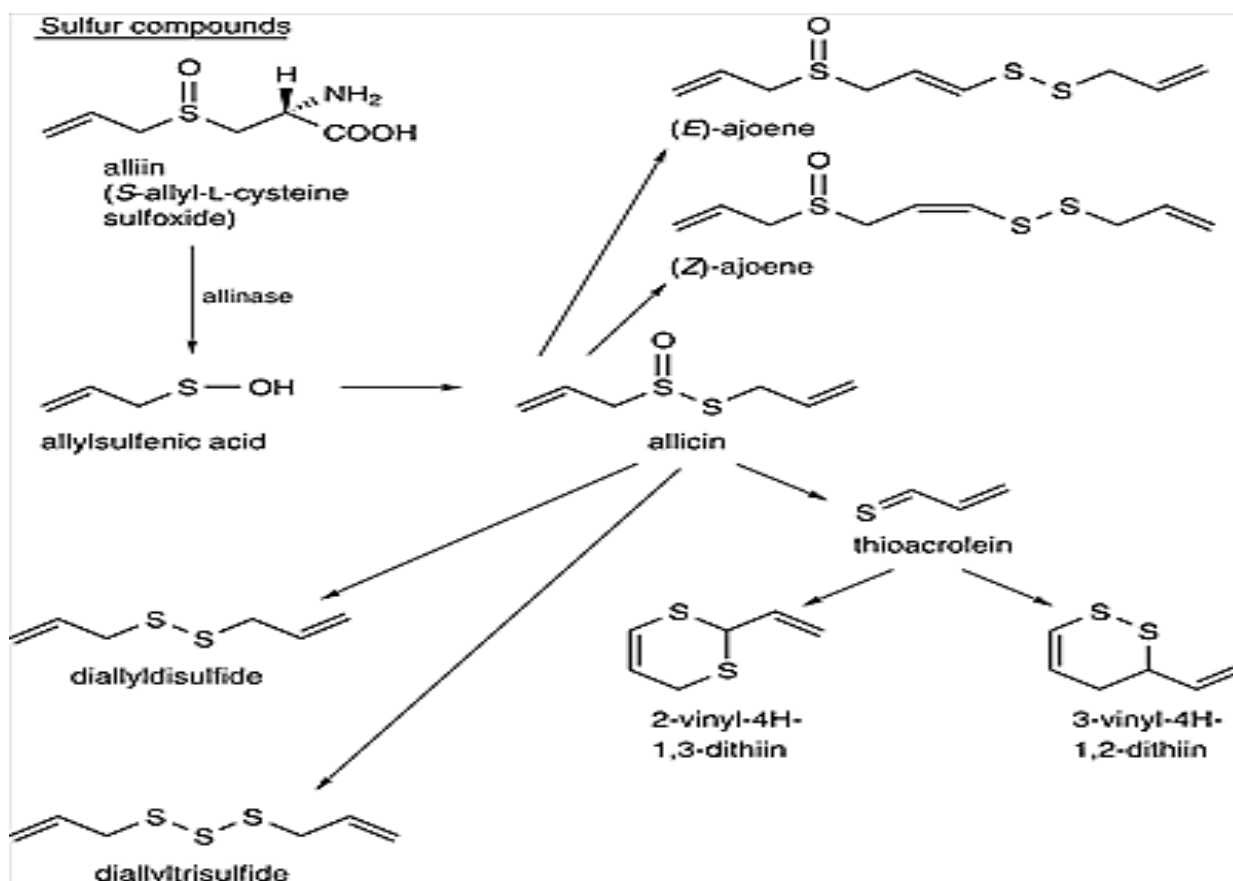
secondary metabolites like flavonoids, tannins, saponins etc. A variety of plant products have been reported to treat digestive disorders, but the documented literature has centered primarily on the pharmacological action in experimental animals. Only a limited clinical data are available to support the use of herbs as relieving digestive disorders, so the data on efficacy and safety are limited. Besides this, there are several botanical products with potential therapeutic applications because of their high efficacy and low toxicity. Finally, it should be noted that substances such as flavonoids, volatile oils, resins, tannins and many others, that have acted as curing digestive disorders are of particular therapeutic importance.

Some medicinal plants used in the treatment of digestive disorders:

*Allium sativum*

Common name: Rashun (Beng), Garlic (Eng).

Parts used: Bulb

Figure 1: Active chemical constituents of *Allium sativum*

#### Description

*Allium sativum* is commonly known as garlic. It is a species in the onion genus, *Allium*. It was first known to Ancient Egyptians, and has been used for both culinary and medicinal purposes<sup>3</sup>. Garlic contains at least 33 sulfur compounds like aliin, allicin, ajoene, allylpropl, diallyl, trisulfide, sallylcysteine, vinylthiines, S-allylmercaptocystein, and others. Garlic also contains 17 amino acids and their glycosides, arginine and others. Minerals such as selenium and enzymes like allinase, peroxidases, myrosinase, and others. Garlic contains a higher concentration of sulfur compounds than any other *Allium* species. The sulfur compounds are responsible both for garlic's pungent odor and many of its medicinal effects. The odor is formed by the action of the enzyme allinase on the sulfur compound aliin<sup>4,5</sup>.

#### Active chemical constituents

aliin, allicin, ajoene, allylpropl, diallyl, trisulfide, sallylcysteine, vinylthiines, S-allylmercaptocystein.<sup>[4,5]</sup>

#### Uses<sup>6</sup>

Hardening of the arteries (atherosclerosis), Coloncancer, rectal cancer, Stomach cancer, High blood pressure, Tick bites, Ringworm, Athlete's foot.

#### *Andrographis paniculata*

Common name: Kalmegh (Beng), Creat (Eng)

Parts used: Whole plant

#### Description

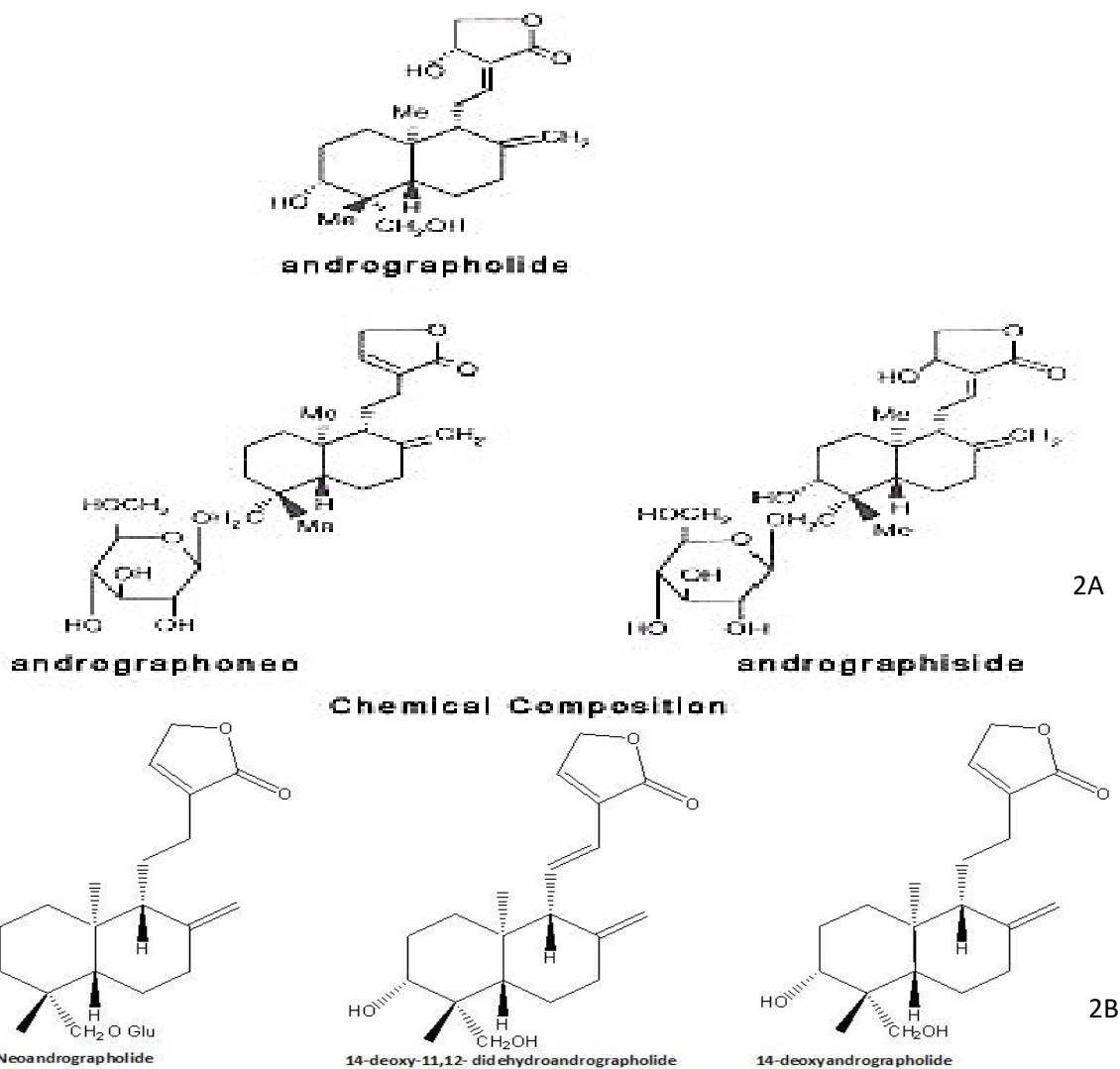
*Andrographis paniculata* is an annual herbaceous plant of Acanthaceae family. It is native to India and Sri Lanka. It is widely cultivated in Southern and Southeastern Asia,

where it has been traditionally used to treat infections and some diseases. Mostly the leaves and roots were used for medicinal purposes<sup>7</sup>. The plant contains principally a resinous bitter substance named kalmeghin, the diterpenes, andrographolide, andrographiside & neoandrographolide. Plant extract also contains 14-deoxy-11-oxoandrographolide, 14-deoxyandrogra-pholide, 14-deoxy-11, 12-didehydroandrographolide & 14-deoxy-11, 14- didehydro-andrographolide, epigenin ethers & other flavonoids, phenols & stigmasterol. Leaves contain beta-sitosterol glucoside, andrographolide & panicolide, polyphenols, caffeic & chlorogenic acids & a mixture of dicaffeoylquinic acid. Roots contain the flavones, andrographin & panicolin, 5-hydroxy-7, 8, 2; 3'-tetramethoxyflavone, apigenin 4, 7-dimethyl-ethers & mono-methoxywightin, & alpha-sitosterol. The flavonoid glycoside, 2', 5-dihydroxy-7, 8-dimethoxy-flavone-2' -0-beta-(D)-glucoside & 3-beta-hydroxy-5-stigmasta-9(11), 22(23)-diene have also been isolated from the roots. The ash contains considerable quantities of sodium chloride & potassium salts<sup>8</sup>.

*Active chemical constituents of Andrographis paniculata* kalmeghin, andrographolide, andrographiside & neoandrographolide. 14-deoxy-11-oxoandrographolide, 14-deoxyandrogra-pholide, 14-deoxy-11, 12-didehydroandrographolide & 14-deoxy-11, 14- didehydro-andrographolide, epigenin ethers & other flavonoids, phenols & stigmasterol<sup>8</sup>.

#### Uses

The leaf and underground stem are mainly used to make

Figure 2A and 2B: Active chemical constituents of *Andrographis paniculata*

medicine. The plant is frequently used for preventing and treating the common cold and flu (influenza). It has a great role on digestive complaints including diarrhea, constipation, intestinal gas, colic, and stomach pain; for liver conditions including an enlarged liver, jaundice, and liver damage due to medications; for infections including leprosy, pneumonia, tuberculosis, gonorrhoea, syphilis, malaria, cholera, leptospirosis, rabies, sinusitis, and HIV/AIDS; and for skin conditions including wounds, ulcers and itchiness<sup>8</sup>.

#### *Azadirachta indica*

Common name: Neem (Beng), Indian lilac (Eng)

Parts used: Leaves, root, bark.

#### Description

*Azadirachta indica* is also known as Neem, Nimtree, and Indian Lilac<sup>9</sup>. It is a tree in the mahogany family Meliaceae. It is one of two species in the genus *Azadirachta*, and is native to India and the Indian subcontinent including Nepal, Pakistan, Bangladesh and Sri Lanka. Its fruits and seeds are the source of neem oil<sup>10</sup>. Various parts of the plants & the Nim oil contain triterpenoid bitter principles, saponins, flavonoids, tannins, & alkaloids. The bitter principles include nimbidin,

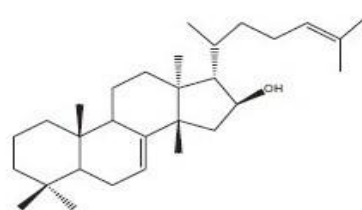
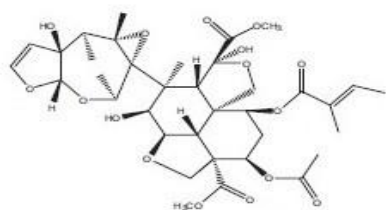
nimbin, nimbinine, 6-desacetylnimbinine, nimbidol, nimbolide, 7-bakayanin. In addition to these, the leaves contain azadirachtin, salanin, meliantriol, margosopicrin, paraisine, azadinine, nimbinene, nimbolide, quercetin & its glycosides, beta-sitosterol, ascorbic acid & amino acids. Braks contain nimbolins A, B, organic acids, tannin, margosin & azadrin. Flowers contain essential oil, kaempferol, kaempferol glucoside, nimbosterin & N-nonacosane<sup>11</sup>.

#### Active chemical constituents

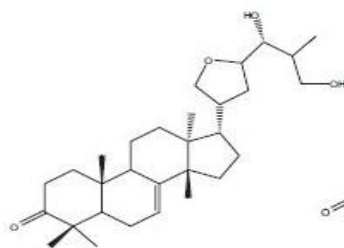
Nimbidin, nimbin, nimbinine, 6-desacetylnimbinine, nimbidol, nimbolide, 7 bakayanin, azadirachtin, salanin, meliantriol, margosopicrin, paraisine, azadinine, nimbinene, nimbolide<sup>11</sup>.

#### Uses

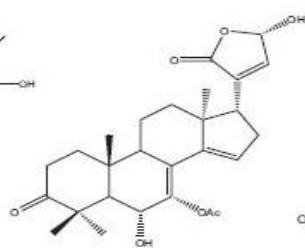
The barks, leaves and seeds are used to make medicine. Besides the root, flower, and fruit are also used less frequently, Neem leaf is used for leprosy, eye disorders, bloody nose, intestinal worms, stomach upset, loss of appetite, skin ulcers, diseases of the heart and blood vessels (cardiovascular disease), fever, diabetes, gum disease (gingivitis), and liver problems. The leaf is also used for birth control and to cause abortions. The bark is

Azadirachtin: C<sub>35</sub>H<sub>44</sub>O<sub>16</sub> [14-16]

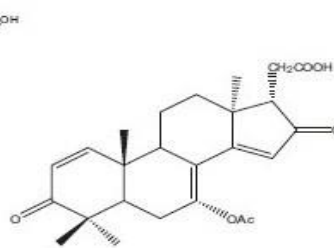
Limocinol



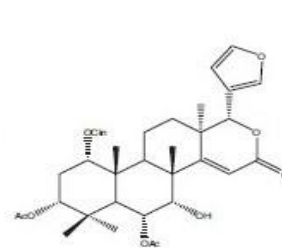
Nimboicinone



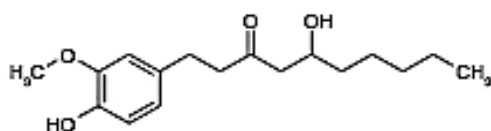
Nimocinolide



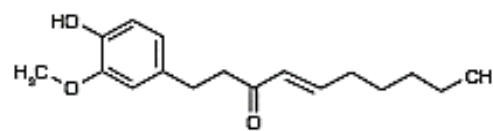
Nimolicinoic Acid



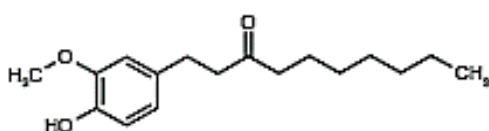
Azadirinin

Figure 3: Active chemical constituents of *Azadirachta indica*

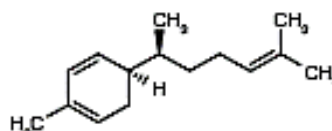
[6]-Gingerol



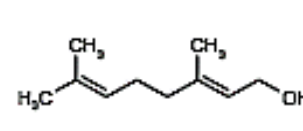
[6]-Shogaol



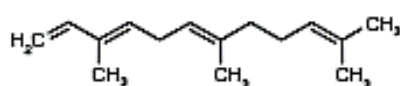
[6]-Paradol



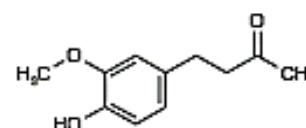
Zingiberene



Geraniol



Farnesene



Zingerone

Figure 4: Active chemical constituents of *Zingiber officinale*

used for malaria, stomach and intestinal ulcers, skin diseases, pain, and fever. The flower is used for reducing bile, controlling phlegm, and treating intestinal worms. The fruit is used for hemorrhoids, intestinal worms, urinary tract disorders, bloody nose, phlegm, eye disorders, diabetes, wounds, and leprosy. Neem twigs are used for cough, asthma, hemorrhoids, intestinal worms, low sperm levels, urinary disorders, and diabetes<sup>11</sup>.

#### **ZINGIBER OFFICINALE**

Common name: Ada, Shuth (Beng), Ginger (Eng).

Parts used: Rhizome

#### *Description*

Ginger or ginger root is the rhizome of the plant *Zingiber officinale*. It is mainly consumed as a delicacy, medicine or spice. It is from Zingiberaceae family.<sup>[12]</sup> Rhizome

contains acrid oleoresin, essential oil, starch, protein, lipids & sugars. Resin contains a pungent principle, gingerol, shogaols, gingeodiols & gingediacetates. Essential oil of ginger is a mixture of more than 25 different monoterpene & sesquiterpene compounds, various pungent principles, & atomic ketones known collectively as gingerols, the principle one of which is zingerone. Five new diarylheptanoids have been isolated from the rhizome.<sup>[13]</sup>

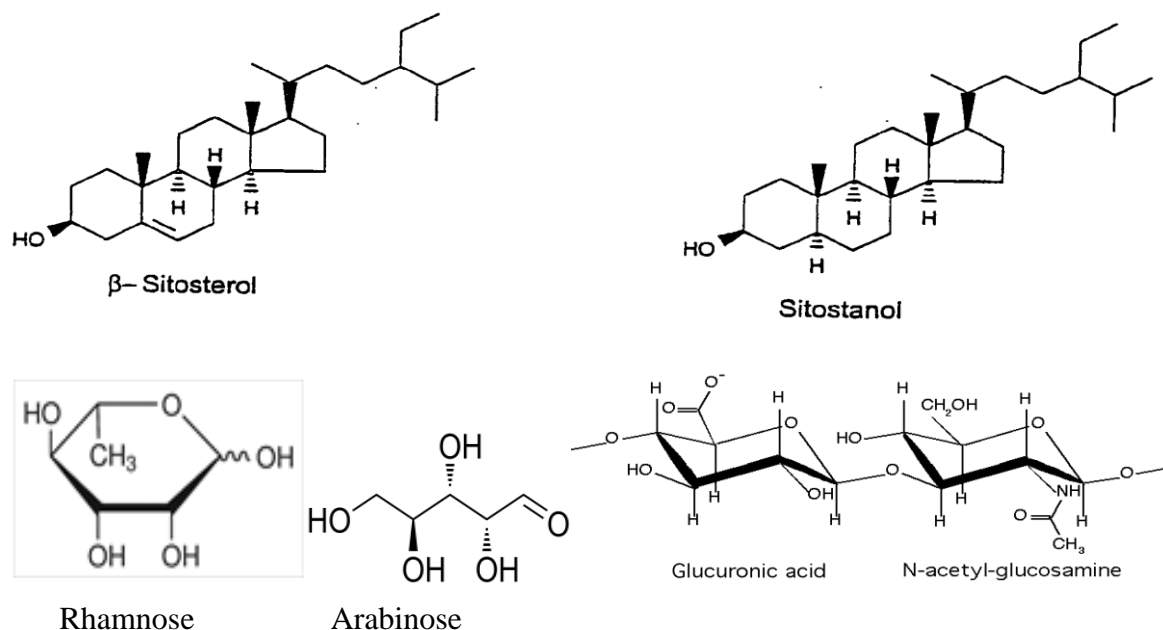
#### *Active chemical constituents*

Oleoresin, essential oil, starch, protein, lipids & sugars.

Resin contains a pungent principle, gingerol, shogaols, gingeodiols & gingediacetates.<sup>[13]</sup>

#### *Uses*

The rhizome is used as a spice and also as a medicine. It can be used in different forms like fresh, dried and

Figure 5: Active chemical constituents of *Moringa oleifera*

powdered, or as a juice or oil. Ginger is commonly used to treat various types of “stomach problems,” including motion sickness, morning sickness, colic, upset stomach, gas, diarrhea, nausea caused by cancer treatment, nausea and vomiting after surgery as well as loss of appetite. Other uses of Ginger include pain relief from arthritis or muscle soreness, menstrual pain, upper respiratory tract infections, cough, and bronchitis. Ginger is also sometimes used for chest pain, low back pain, and stomach pain.<sup>[13]</sup>

#### MORINGA OLEIFERA.

Common name: Sojne (Beng), Horse-Radish tree (Eng).

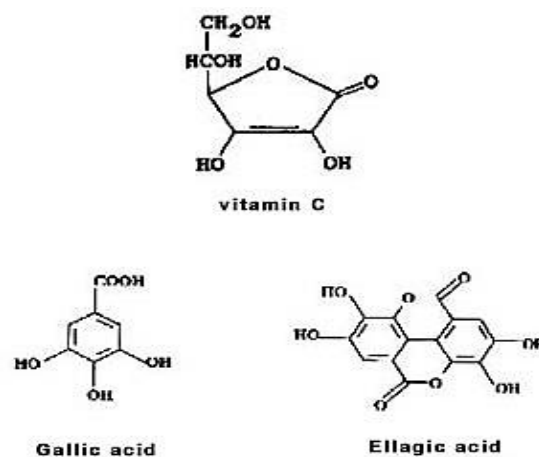
Parts used: Root, Bark

#### Description

*Moringa oleifera* is the most widely cultivated species of the genus *Moringa* and this is the only genus in the family Moringaceae.<sup>[14]</sup> It is a fast-growing, drought-resistant tree, native to the southern foothills of the Himalayas in northwestern India, and widely cultivated in tropical and subtropical areas where its young seed pods and leaves are used as vegetables. It can also be used for water purification and hand washing, and is sometimes used in herbal medicine.<sup>[15]</sup> Its bark of the trunk yields a tragacanth-like gum which contains bassorin, beta-sitosterol & enzyme & sugars, arabinose, galactose, dextrose, glucuronic acid & also traces of rhamnose. Root bark contains two alkaloids, moringine & moringinine, also benil, moringinic acid, athonin & spirochin. A glycoside also has been isolated from the leaves. They also contain squalene. Flowers contain an antibiotic principle, perygospermin & an amorphous base. Leaf is rich in protein, vitamins, & minerals. Seeds contain fixed oil & fatty acids, such as palmitic, stearic, behenic & oleic acids, & 4 benzyl isothiocyanate, an antibiotic principle<sup>16</sup>.

#### Active chemical constituents

Tragacanth-like gum which contains bassorin, beta-sitosterol, enzyme & sugars, arabinose, galactose,

Figure 6: Active chemical constituents of *Phyllanthus emblica*

dextrose, glucuronic acid & also traces of rhamnose. Root bark contains two alkaloids, moringine & moringinine.<sup>[16]</sup>

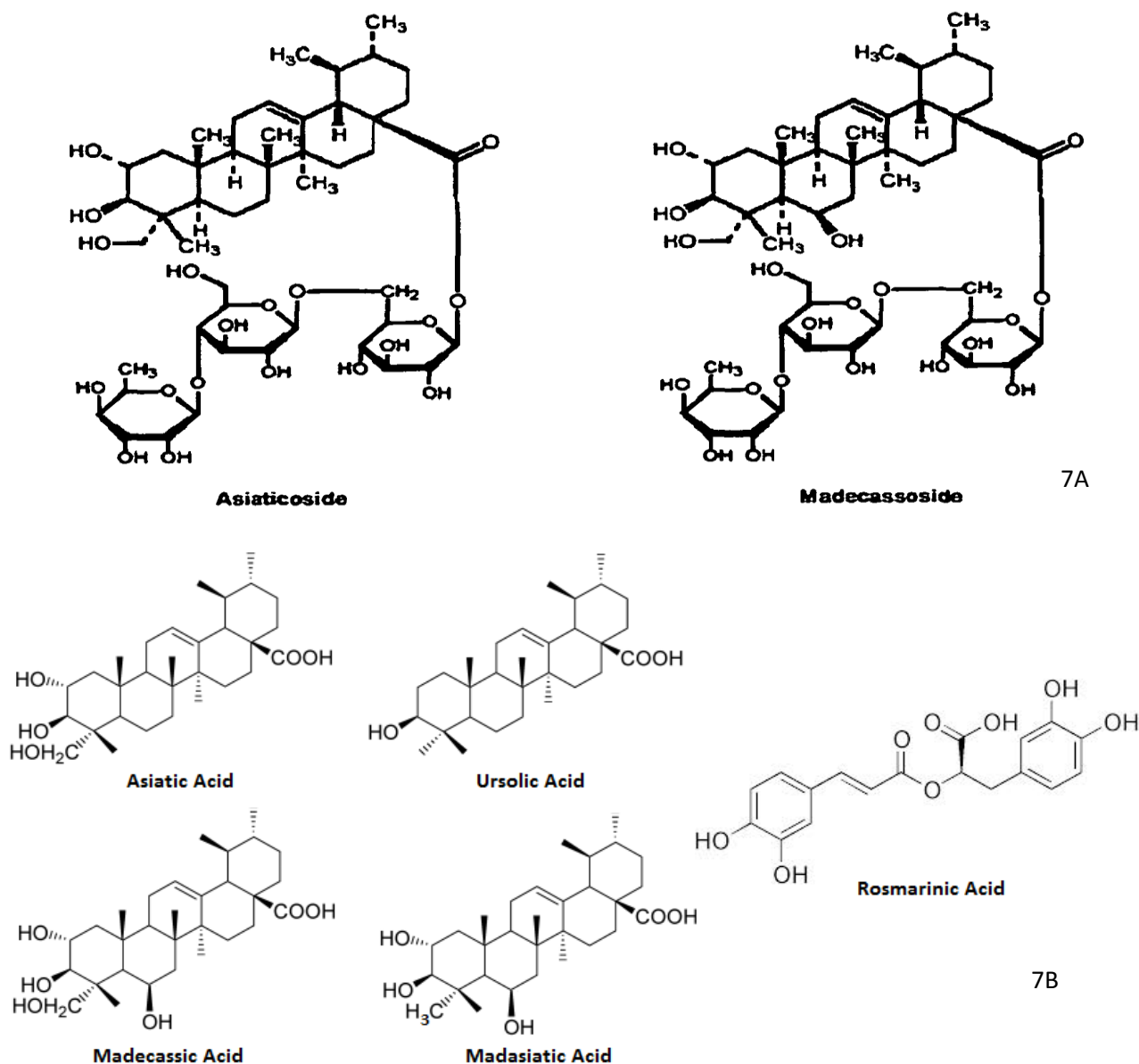
**Uses**  
Moringa is used for “tired blood” (anemia); arthritis and other joint pain (rheumatism); asthma; cancer; constipation; diabetes; diarrhea; epilepsy; stomach pain; stomach and intestinal ulcers; intestinal spasms; headache; heart problems; high blood pressure; kidney stones; fluid retention; thyroid disorders; and bacterial, fungal, viral, and parasitic infections. Moringa is also used to reduce swelling, increase sex drive (as an aphrodisiac), prevent pregnancy, boost the immune system, and increase breast milk production. Some people use it as a nutritional supplement or tonic<sup>17</sup>.

#### *Phyllanthus emblica*

Synonyms<sup>21</sup>

*Cicca emblica* (L.) Kurz



Fig. 7A and 7B: Active chemical constituents of *Centella asiatica*

*Diasperus emblica* (L.)Kuntze

*Dichelactina nodicaulis* Hance.

#### Description

*Phyllanthus emblica* is also known as emblic, emblic myrobalan, myrobalan, Indian gooseberry, Malacca tree, or amla from Sanskrit amalika<sup>17,18</sup>. It is a deciduous tree of the family Phyllanthaceae. It is known for its edible fruit of the same name<sup>19</sup>. Fruit is a natural source of vitamin c. It also contains tannins & colloidal substances, phyllemblic acid, lipids, gallic acid, ellagic acid & emblicol. Phyllembin & mucic acid have been isolated from the fruit pulp. Seeds contain fixed oil, phosphatides, tannins, & essential oil. Bark, fruits & leaves are rich in tannin. They also contain lupeol, beta-sitosterol & ellagic acid. The bark also contains leucodelphinidin<sup>20</sup>.

#### Active chemical constituents

Ascorbic acid or vitamin C, phyllemblic acid, lipids, gallic acid, ellagic acid & emblicol. Phyllembin & mucic acid.<sup>[20]</sup>

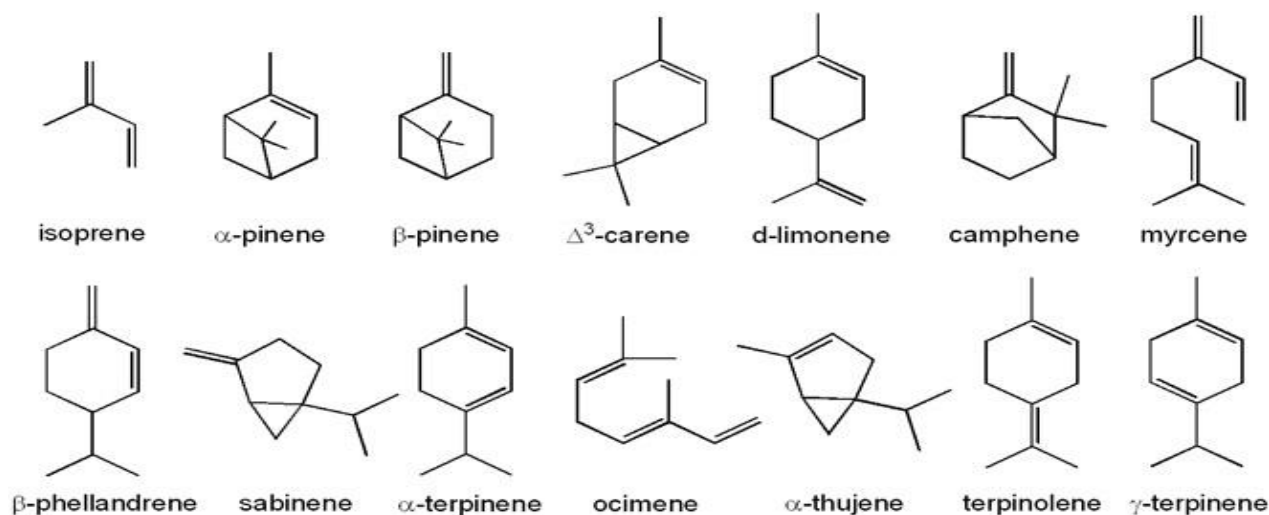
#### Uses

Embllica exhibits strong antioxidant activity. It is one of the most important plants in the traditional Ayurvedic medical system as well as in other traditional health systems for immunomodulatory, anti-inflammatory, antiulcer, hepatoprotective, and anticancer actions. However, there is very limited clinical evidence to support the use of emblica for any indication. Indian gooseberry is used for high cholesterol, "hardening of the arteries" (atherosclerosis), diabetes, pain and swelling of the pancreas (pancreatitis), cancer, upset stomach, eye problems, joint pain, diarrhea, dysentery, obesity, and "organ restoration." It is also used to kill germs and reduce pain and swelling caused by the body's reaction to injury or illness (inflammation)<sup>20</sup>.

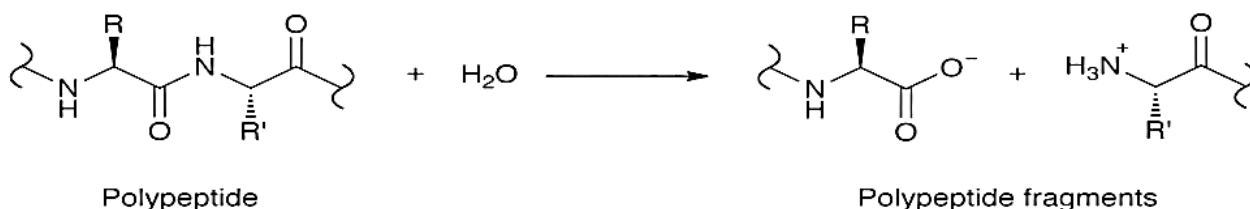
#### *Centella asiatica*

##### Description

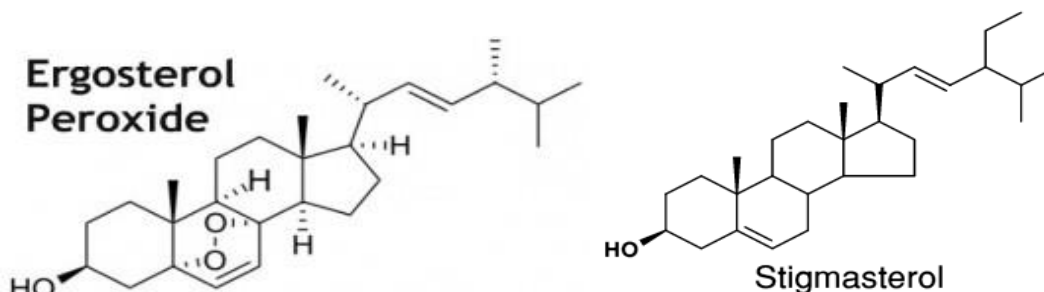
*Centella asiatica* is commonly known as centella and gotu kola. It is a small, herbaceous, annual plant of the family

Figure 8: Active chemical constituents of *Piper nigrum*

## Papain



Broad specificity; R' ≠ Val

Figure 9: chemical constituent of *Carica papaya*Figure 10: Active chemical constituents of *Ananas comosus*

Mackinlayaceae or subfamily Mackinlayoideae of family Apiaceae, and is native to wetlands in Asia<sup>22,23</sup>. It is considered as a medicinal herb in Ayurvedic medicine, traditional African medicine, and traditional Chinese medicine. Centella grows in tropical swampy areas<sup>24</sup>.

### Active Chemical constituents

*Centella asiatica* contains large amounts of pentacyclic triterpenoids including asiaticoside, brahmoside, asiatic acid, and brahmic acid also known as madecassic acid. Other products include centellose, centelloside, and madecassoside<sup>25</sup>.

### Uses

Gotu kola is commonly used in Traditional Chinese and Ayurvedic medicine. The above-ground parts are mainly used to make medicine. Gotu kola is used to treat bacterial, viral, or parasitic infections such as urinary tract infection (UTI), shingles, leprosy, cholera, dysentery, syphilis, the

common cold, influenza, H1N1 (swine) flu, elephantiasis, tuberculosis, and schistosomiasis. Gotu kola is also used for fatigue, anxiety, depression, psychiatric disorders, Alzheimer's disease, and improving memory and intelligence<sup>25</sup>.

### *Piper nigrum*

#### Common name

White pepper, green pepper, peppercorn black pepper, Madagascar pepper (English), pippali (Sanskrit).<sup>[27]</sup>

#### Description

Black pepper (*Piper nigrum*) is a flowering vine in the family Piperaceae. It is basically cultivated for its fruit, which is usually dried and used as a spice and seasoning. The fruit, known as a peppercorn when dried, is approximately 5 mm in diameter, dark red when fully mature, and, like all drupes, contains a single seed. Peppercorns, and the ground pepper derived from them,



may be described simply as pepper, or more precisely as black pepper (cooked and dried unripe fruit), green pepper (dried unripe fruit) and white pepper (unripe fruit seeds)<sup>26</sup>.

#### Active chemical constituents

The essential oil which is composed of thujone,  $\alpha$ -pinene, camphene, sabinene,  $\beta$ -pinene,  $\alpha$ -phellandrene, myrcene, limonene, caryophyllene,  $\beta$ -farnesene,  $\beta$ -bisabolene, linalool and terpinen-4-ol<sup>28</sup>.

#### Uses

Aromatic, stimulant, carminative and is said to possess febrifuge properties. It has a stimulant action on the mucous membrane of the rectum, and so is good for constipation, also on the urinary organs; externally it is a rubefacient, useful in relaxed conditions of the rectum when prolapsed; sometimes used in place of cubebs for gonorrhoea; given in combination with aperients to facilitate their action, and to prevent griping. As a gargle it is valued for relaxed uvula, paralysis of the tongue. On account of its stimulant action it aids digestion and is especially useful in atonic dyspepsia and turbid condition of the stomach. It will correct flatulence and nausea. It has also been used in vertigo, paralytic and arthritic disorders<sup>29</sup>.

#### *Carica papaya*

##### Description

The papaya is the fruit of the plant *Carica papaya*, the sole species in the genus *Carica* of the plant family Caricaceae. It is native to the tropics of the Americas, perhaps from southern Mexico and neighbouring Central America<sup>30</sup>.

*Carica papaya* was the first transgenic fruit tree to have its genome deciphered<sup>31</sup>. Young fruits & leaves are very rich in a colourless, turning milky white on drying, latex, which contains a mixture of a number of digestive enzymes, called papain. Latex also contains a blood anticoagulant factor, an immunosuppressive enzyme, chymopapain, & a number of medicinal enzymes. Leaves & roots contain a number of alkaloids, which include nicotine, nicotinine, myosmine, bis-piperidine, carpaine & dehydro-carpaine 1 & 2. Leaves also contain glucoside, Carposide & vitamins C & E. Fruits is a source of vitamins, pectins & carotenoids. Seeds contain sulphur-containing basic substance, carpasemine, carposide & carpaine. Roots & bark also contain carposide & carpaine<sup>32</sup>.

#### Active chemical constituents

Papain, chymopapain<sup>32</sup>.

#### Uses

Papaya contains many biologically active compounds. Two important compounds are chymopapain and papain, which are supposed to aid in digestion. The level of the compounds varies in the fruit, latex, leaves and roots. It has been used for treating digestive problems and intestinal worms. The softening qualities of papain have been taken advantage of, in the treatment of warts, corns, sinuses, and chronic forms of scaly eczema, cutaneous tubercles, and other hardness of the skin, produced by irritation. Papain also is used to treat arthritis<sup>33</sup>.

#### *Ananas comosus*

##### Synonyms

*Ananas acostae* C. Commelijn, *Ananas ananas* (L.) H.Karst. ex Voss nom. Inval, *Ananas argentata*

J.C.Wendl. ex Schult. & Schult.f, *Ananas aurata* J.C.Wendl. ex Schult. & Schult.F.<sup>39</sup>

#### Description

The pineapple (*Ananas comosus*) is a tropical plant with edible multiple fruit consisting of coalesced berries<sup>[34,35]</sup> and the most economically significant plant in the Bromeliaceae family<sup>36</sup>. Pineapples are consumed fresh, cooked, juiced, and preserved, and are found in a wide array of cuisines. In addition to consumption, the pineapple leaves are used to produce the textile fiber piña in the Philippines, commonly used as the material for the men's Barong Tagalog and women's Baro't saya formal wear in the country. The fiber is also used as a component for wallpaper and other furnishings<sup>37</sup>. Leaves & unripe fruit contain sterols & triterpenes, ergosterol peroxide, stigmastene-diol, beta-sitosterol, campesterol, stigmasterol & campestanol. Leaves of crown of fruits contain 5-hydroxytryptamine & a steroid triterpene. Stems contain a proteolytic enzyme, bromelain, starch, a trihydroxy terpenoid carboxylic acid, ananasic acid & glyceryl esters of caffeic & coumaric acids. Fruits also contain polyphenols, phenolic acid, ascorbic & other fruit acids, vitamin A & C & volatile flavouring constituents.<sup>[38]</sup>

#### Active chemical constituents

Sterols, triterpenes, bromelain, ergosterol peroxide, stigmasterol<sup>38</sup>.

#### Uses

Leaves are used as anthelmintic, cholagogue; fresh juice taken to treat hiccough and constipation. Fruits are used as digestive, diuretic, laxative, diaphoretic and antiscorbutic; used to treat gastric irritability, jaundice. Green fruits are used as abortifacient, anthelmintic, emmenagogue and styptic. Bromelain is an enzyme found in pineapple juice and in the pineapple stem. People use it for medicine. Bromelain is used for reducing swelling (inflammation), especially of the nose and sinuses, after surgery or injury. It is also used for hay fever, treating a bowel condition that includes swelling and ulcers (ulcerative colitis), removing dead and damaged tissue after a burn (debridement), preventing the collection of water in the lung (pulmonary edema), relaxing muscles, stimulating muscle contractions, slowing clotting, improving the absorption of antibiotics, preventing cancer, shortening labor, and helping the body get rid of fat<sup>40</sup>.

## CONCLUSION

Different medicinal plants play a great role against different diseases. Different herbal plants, herbal products, and extracts obtained from different parts of the plant have remarkable activity against digestive disorders in animal models. These extracts can reduce indigestion, flatulence, gastritis, and pancreatitis; enhance gastric secretion etc. when compared with that of reference drugs. The extracts are non-toxic even at relatively high concentrations. The digestive disorder preventing activity of these plants is probably due to the presence of flavonoids, volatile oils, resins, tannins and terpenes in all these plants. Our results showed that above-mentioned medicinal plants could prevent digestive disorders in rats in a dose-dependent manner. A variety of botanical products have been

reported to prevent digestive disorders; therefore, it should be noted that substances such as flavonoids, volatile oils, resins, tannins and terpenes that possess digestive disorder preventing activity are of particular therapeutic importance. The results of this study indicate that extracts of leaves, roots, barks and plant extracts of some medicinal plant have good potentials for use in digestive disorders. The present study was designed to explore the mechanism of action of medicinal plants against experimentally induced digestive disorder. From this study it is concluded that the plants showing remarkable activity against different digestive disorders can be a potential source of new lead compounds that can prevent different digestive disorders on the basis of different mechanism of action which will diverse our treatment strategies.

#### CONFLICT OF INTEREST

There is no conflict of interest in this study.

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