

HERBAL CARMINATIVES: NATURAL REMEDIES FOR RELIEF FROM EXCESSIVE GAS AND FLATULENCESumiya Bashir^{*1}, Nahida Tabassum¹ and Mohd. Umar Sofi¹Department of Pharmaceutical Sciences (Pharmacology Division), School of Applied Sciences and Technology,
University of Kashmir-J&K, India-190006.***Corresponding Author: Sumiya Bashir**Department of Pharmaceutical Sciences (Pharmacology Division), School of Applied Sciences and Technology, University of
Kashmir-J&K, India-190006.

Article Received on 24/06/2025

Article Revised on 14/07/2025

Article Accepted on 04/08/2025

ABSTRACT

Currently, several typically consumed drugs originate from herbs. Around 25% of the recommended drugs consist of at least one herbally originated active substance or synthetic constituent, which resembles a plant-extracted compound. More than 80,000 herbs are being used for their therapeutic uses throughout the globe. Typically, a particular plant part is utilised for medicinal preparations such as creams, extracts, tablets, tinctures, infusions or ointments. Carminatives prevent the collection of gas in the Gastrointestinal tract or assist in their elimination. Plant based preparations containing different phytoconstituents have been traditionally used to relieve gastrointestinal symptoms by enhancing digestion, relaxing the digestive tract and expel the trapped gas. Nowadays, people prefer herbal plants over allopathic drugs, as they provide safe and effective treatment for the discomforts. Some Plant families such as Apocynaceae, Cucurbitaceae, and Zingiberaceae etc, are recognised for their carminative activity, as they have been scientifically validated for the relief of digestive problems especially for flatulence and bloating.

KEYWORDS: Bloating; Flatulence, Belching; Carminative, Plants, Apocynaceae, Umbelliferaceae.**INTRODUCTION**

Carminatives are the agents which when ingested produce the sensation of warmth in the gut and are believed to reduce discomfort and swelling in the abdomen that occurs after eating a meal accompanied by symptoms like causing flatulence and belching or burping.^[1] The word "carminative" comes from a Latin word which translates as "carding wool," describing a smoothing or clearing out effect, reflecting the way that carminatives reduce gas in the stomach.^[2] When a carminative is consumed, it usually begins with a pleasant taste that encourages the production of saliva and is frequently followed by calming warmth in the digestive tract.^[3]

Burping, bloating, borborygmus, belching and gas are all common by-products of digestion that can occasionally be unpleasant or uncomfortable, but they are normal physiological responses to food breakdown. Flatulence, also known as passing gas, breaking wind, or farting, is a natural biological function that involves the rectal expulsion of a mixture of gases that are by products of digestion. In medicine, this is called flatus or informally as a fart or gas. Although flatulence is not a life-threatening condition, it can be humiliating.^[4] Belching is the term for the escape of gas through the

mouth from the stomach. The rumbling or gurgling sounds produced by gas passing through the intestines are referred to as borborygmus.^[5] The present review deals with the different parts of the plants, like seeds, bark, leaves, fruits etc, found useful in relieving flatulence, bloating, belching. The search engines like Medline, Pubmed, Science direct, and journals have been used in compiling this review.

Gases in digestive tract

Intestinal gases comprise about 99% of these odourless gases. In the human gut, nitrogen, oxygen, hydrogen, carbon dioxide, and methane are the main gases.^[5] The frequency of gas passage varies greatly among individuals. Humans typically produce 705 ml of rectal gas every day, with a range of 400 to 1500 ml. People who follow a normal diet pass gas eight to ten times a day, with up to twenty times is being considered normal. The quantity of gas in the intestines usually corresponds to the frequency of gas passage.^[6]

The main causes of formation of gas in the digestive tract are:

- Inhaling nitrogen- and oxygen-rich air

- ii. Intestinal bacteria fermenting unabsorbed carbohydrates to produce hydrogen, carbon dioxide, and methane
- iii. Gas passing from the gut into the bloodstream.

Intestinal gas is primarily characterized by excessive burping, flatulence (either more gas or foul-smelling gas), and abdominal bloating or distension.^[6]

Over 80% of those with constipation are reported to have significant bloating symptoms.^[7]

The fermentation of the contents in the stomach produces gas, which significantly increases the capacity of the abdomen. The most well-known dietary intolerance that causes gastrointestinal symptoms is lactose intolerance.^[8] Another cause of bloating is small intestinal distension. The slow absorption of short-chain carbohydrates, such as fructose and mannitol, causes the small intestine to become more watery due to their osmotic effects, as demonstrated by magnetic resonance imaging.^[9,10]

Underlying causes of excessive gas and bloating

Excess gas is frequently caused by either elevated gas levels or greater sensitivity to gas in the digestive tract. Gas passing, bloating, burping, and discomfort or pain in the abdomen is typical symptoms.

There are several reasons for people experiencing excessive gas and bloating after eating. Gastroesophageal reflux disease, irritable bowel syndrome (IBS), small intestinal bacterial overgrowth, and difficulties in digesting specific carbohydrates can all lead to gas accumulation in Gastrointestinal (GI) tract. Abdominal adhesions, GI tract masses, dumping syndrome, and abdominal hernias are some additional conditions that might impact the passage of gas through the intestines.^[11]

Bloating occurs due to different causes

Swallowed air

While drinking and eating air is swallowed. Air may enter the intestines through the anus if it is not expelled through belching. By using ultrafast computed tomographic studies, it has been revealed that 8–32 mL air bolus plus a 10-mL liquid bolus (averaging 17.7 mL) reach the oesophagus which causes more discomfort and gas may result from swallowing more air.^[12]

Overeating

Overeating is a major contributor to bloating, which is commonly described as a sensation of abdominal fullness or pressure. Consuming large quantities of food in one sitting stretches the stomach and slows down gastric emptying. This delay leads to prolonged digestion and often results in gas accumulation and bloating. Overeating can interfere with digestion, allowing undigested food to ferment in the intestines and resulting in gas accumulation and flatulence.^[13] It often causes increased production of gas in the digestive tract. This is because large meals may contain more fermentable

carbohydrates, fats, and proteins, which take longer to digest and can be fermented by gut bacteria. When bloating is caused by overeating, using carminatives can be especially effective because they support digestion, reduce gas production, and soothe the intestinal muscles.^[14]

Weight gain

Individuals who are overweight or obese are more likely to have delayed gastric emptying and impaired gut motility, both of which contribute to gas accumulation and bloating. Weight gain can cause bloating both directly and indirectly through poor eating habits and physical pressure on the GI tract, but natural carminatives provide a mild and efficient way to relieve symptoms.^[14]

Although fat is required for body functions, too much fat can lead to weight gain, bloating, and digestive problems. Bloating and abdominal pressure can be reduced by limiting greasy foods.^[15] Carminatives can indirectly help in relieving bloating.

Bacterial overgrowth in small intestine

Oligosaccharides and plant fibres are not completely absorbed in the small intestine which then reaches colon where bacteria ferment them. Proliferation of bacteria in the small intestine occurs due to abnormal fermentation of foodstuffs or bacteria in the colon are extra active, resulting in symptoms belching and bloating.^[16] Bacterial overgrowth in small intestine is associated with delayed gut motility and altered digestive function, contributing to bloating. While conventional treatment involves antibiotics such as rifaximin, natural remedies, particularly carminative herbs are increasingly used for relief of symptoms.^[17]

DISEASES

Celiac disease

Gluten, found in wheat, rye, and barley, causes the immune system to respond negatively, damaging the gut lining in celiac disease. This might cause symptoms like diarrhoea, bloating, gas, and pain in the abdomen.^[18]

Irritable bowel syndrome

Some patients experience bloating, although their gas levels are normal. In the absence of excessive gas, bloating could be a sign of IBS, which manifests as diarrhoea, constipation, or stomach pain.^[19]

FOODS AND DRINKS

Foods

Gas in the intestines is often caused by foods that include a lot of non-absorbable oligosaccharides, such as verbacose, stachyose, and raffinose. The ingestion of fatty foods is known to delay gastric emptying and may exacerbate the unpleasant symptoms associated with flatulence. Consuming foods that are fried, spicy, or cold should be avoided because they may cause stomach irritation.

Studies have shown that the inclusion of legume flours and fractions in the diet causes the production of considerable amounts of excessive gas over a period of hours.^[20]

Vegetables like onion, cabbage, Brussels sprouts, legumes like chickpeas, beans, soybeans, and fruits such as apricot, apple, pear can lead to bloating.^[21]

Drinks

Due to the introduction of gas bubbles into the digestive tract, carbonated beverages such as soda, sparkling water, and beer can exacerbate bloating, can be effectively managed using natural carminatives.^[22]

Rum and related beverages can also irritate a sensitive colon, which can result in bloating.

Treatment of flatulence or bloating

For the treatment of gastrointestinal problems, which lead to flatulence, bloating, burping and belching, different treatments are used. Allopathic drugs used include mainly antibiotics, some alpha-galactosidase, probiotics and antifoaming agent and lactase supplements. Besides, some probiotics have also been found to be helpful in relieving flatulence.

Allopathic drugs

Rifaximin

This recently approved non-absorbable antibiotic might be of great help in treating confirmed bacterial overgrowth. In one of the short term studies, it has proved successful in controlling intestinal gas and associated symptoms as well as minor intestine bacterial overgrowth.^[23]

Simethicone

FDA has approved Simethicone as a safe and efficient therapy for excessive gas. It is an antifoaming agent which reduces the surface tension of gas bubbles in the digestive system. This facilitates the merging or dissolution of gas bubbles, which leads to expulsion as flatulence or belches. Simethicone aids in removal of gas from the GI tract.^[24]

Activated charcoal

It is said that by binding gases, activated charcoal lowers the volume of intestinal gas. According to one of the studies, the majority of the major gases in the gut are not adsorbable by charcoal.^[25]

Alpha-galactosidase

This enzyme converts complex carbohydrates found in meals like vegetables and legumes into simpler sugars. Beano, one such example may help people in getting relief from excessive bloating after eating beans lessening discomfort in the digestive system and gas production.^[26]

Pancreatic enzyme preparations

Preparations of pancreatic enzymes have also been used extensively to treat human bloating and distention of the abdomen. In healthy people, microencapsulated pancreatic enzymes have been shown to reduce bloating and stomach swelling following a large, fatty meal.^[27]

Probiotics

Probiotics are live microorganisms that improve intestinal barrier function, regulate immune responses, and modify gut microbiota to provide health benefits to the host when given in sufficient amounts. Numerous strains, especially those belonging to the *Lactobacillus* and *Bifidobacterium* genera, have been thoroughly investigated for their functions in gastrointestinal health, including the treatment of bloating, constipation, antibiotic-associated diarrhea, inflammatory bowel disease and IBS.^[28] Probiotics help restore microbial balance, reduce pathogenic bacterial colonization, and produce beneficial metabolites such as short-chain fatty acids.^[29] Bloating and distension symptoms may be exacerbated by or caused by changes in the gut flora. Therefore, using probiotics to alter gut microbiota may help alleviate these gas-related symptoms. Some of the probiotics used include *Lactobacillus rhamnosus* and *Lactobacillus plantarum*.^[30]

Herbals

Herbal therapies as carminatives involve the use of specific plants and their derivatives to alleviate symptoms associated with flatulence, bloating, and abdominal discomfort. Since ancient times, natural herbs have been widely used to treat and prevent a wide range of illnesses. In recent decades, a number of herbal medicines that are affordable, safe for the environment, and organic have been developed as a result of extensive research in traditional medicine. Indian sub-continent has a good capability to tackle the task of meeting the worldwide demand for such products due to its rich wealth in case of herbal medicine.^[31] Herbs that mainly contain volatile compounds, have long been employed for their medicinal properties as carminatives. The phytoconstituents in these herbs are beneficial for both general health and intestinal health. These can be consumed or inhaled to assist lessen bloating, nausea, post-meal gas, and other discomfort.^[32]

Beyond symptomatic relief, many carminative herbs possess anti-inflammatory, antioxidant, and even mild sedative properties, which contribute to their effectiveness in functional gastrointestinal disorders. Studies have shown that herbal treatments also help in correcting gut microbiota imbalances and alleviating low-grade inflammation associated with functional bowel conditions. Essential oils, flavonoids, and polyphenolic compounds are frequently found in the pharmacognostic profile of herbal carminatives, which all contribute to their calming and spasmolytic effects on the digestive tract. Together, these ingredients improve gastrointestinal motility and reduce discomfort.^[33]

By bridging the gap between traditional herbal knowledge and contemporary pharmaceutical practices, these developments in polyherbal carminative powders and capsules lead to improve patient acceptability and ensure more reliable therapeutic results.^[34] Recent pharmacological investigations have focused on standardizing herbal formulations and identifying bioactive constituents that are responsible for carminative effects. Standardization helps ensure consistent therapeutic outcomes and supports the safe integration of traditional herbal therapies into evidence-based modern medicine.^[35]

The development of Good Agricultural and Collection Practices (GACP) and Good Manufacturing Practices (GMP) for medicinal plants further supports the safe use of herbal carminatives on a larger scale.^[36] When compared to synthetic antacids or antispasmodics, which can have unfavourable side effects like fatigue, constipation, or tolerance with prolonged use, the main benefit of herbal carminative treatments is their safety profile. For centuries, people have been using herbal carminatives, particularly those used in traditional systems such as Ayurveda, Unani, and Traditional Chinese Medicine (TCM), with little to no negative side effects, especially when taken in standardized dosages. Their acceptance in integrative medicine can be attributed to their long-standing empirical use. Moreover, herbal medicines tend to have multi-component and multi-target activity, offering broader therapeutic benefits compared to single-molecule drugs.^[37] Some herbs such as cumin, fennel, and caraway cleanse the stomach by eliminating foul humors and trapped gases, promote digestion, ease flatulence, and lessen abdominal pain.^[38] Some of these herbs reported as carminatives are listed in Table 1.

Ajwain

Ajwain consists of dried seeds of *Trachyspermum ammi* (Family: Umbelliferae). The major constituent (35% to 60%) is thymol and also contains essential oil, 17.1% protein, and 21.8 % fat.^[39] It has carminative, stimulant and antispasmodic properties.^[40]

Caraway

These are dried, ripe fruit of *Carum carvi* (Family: Umbelliferae), a biennial herb also known as caraway. Its composition includes 3-7% volatile oil, 8-20% fixed oil, plus protein, calcium oxalate, colouring matter, and resin.^[39] In addition to being flavouring ingredients, caraway fruits and oil have therapeutic carminative properties.^[41]

Cumin

These are dried ripe fruits of *Cuminum cyminum* (Family: Umbelliferae) containing 2.5–4.0% volatile oil, which comprises of 25–35% cuminaldehyde and other substances including alpha-pinene.^[41] It improves gastrointestinal function and lessens flatulence.^[42]

Dill

These are made up of the mature, dried fruits of *Anethum graveolens* (Family: Umbelliferae). Carvone and limonene are the main constituents of dill volatile oil. Its volatile oil has carminative properties which helps in digestion, lowers flatulence, avoids stomach weakness, eases stomach aches, and increases appetite.^[38]

Fennel

It is derived from the dried ripe fruits of *Foeniculum vulgare* Miller (Family :Umbelliferae), yields 4-5% volatile oil, primarily comprising anethole and fenchone, along with other compounds like beta-pinene, anisic acid, phellandrene, and anisic aldehyde. In fennel, anethole and fenchone, are believed to ease discomfort in the digestive tract by calming muscles and facilitating gas transit.^[3]

Ginger, cardamom and cinnamon

Ginger tea after meals or adding cardamom or cinnamon to beverages can significantly reduce bloating.^[43]

Fruits

Eating quince, apple, or citron jam in the morning enhances digestive function and gastrointestinal health, according to traditional Persian experts. Quince is a remedy for foul breath and helps the liver and stomach. Citron improves the health of the gastrointestinal tract; its jam facilitates digestion and lessens gas in the abdomen.^[44]

Table 1: Herbal drugs for carminatives.

I Family: Amaryllidaceae						
S.no	Plant Name	Common Name	Source	Main active Constituent	Pharmacological Action	References
1	<i>Allium cepa</i>	Vasal, Piaz, Onion	Seed and Bulb	Quercetin, phenolic acids, sulphur compounds (allicin), vitamins, and minerals.	carminative	[45, 46]
2	<i>Allium sativum</i>	Garlic, Ruhan	Tuber and Bulb	Allicin, diallyl disulfide (DADS)	Carminative, flatulence, bloating, dyspepsia	[45, 47]
II Family: Apocynaceae						
3	<i>Hemidesmus</i>	Indian	Stem and	Alkaloids, flavonoids,	Stomach ache and	[48]

	<i>indicus</i>	sarsaparilla or false sarsaparilla	Leaves	glycosides, hyperoside, phenols, rutin, saponins, steroids, sterols, desmicine, desinine, emidine, hemidine, hemidescine, hemisine, hexadecenoic acid, indicine	improper digestion	
4	<i>Holarrhena pubescens</i>	Andusurun, Kurchi	Seed	conessine, isoconessine, conessimine, conimine, conessidine, conkurchicine, holarrhimine	carminative, stomachic	[49]
5	<i>Wrightia tinctoria</i>	Sweet Indrajao	Barks, Leaves and Seeds	B amyrrin, ursolic acid and oleanolic acid along with β -sitosterol.	flatulence, stomachic, tonic, carminative	[50]
III	Family: Cucurbitaceae					
6	<i>Citrullus colocynthis</i>	Colocynth/ Bitter Apple	Fruit	Cucurbitacins, Cucurbitacin E	Indigestion, carminative	[51]
7	<i>Cucumis sativus</i>	Cucumber	Drug extract	Volatile and fixed oils, saponins, steroids, carotenes, flavones, amino acids, resins, tannins, proteins and proteolytic enzymes.	Carminative	[52, 53]
IV	Family: Leguminosae					
8	<i>Clitoria ternatea L.</i>	Butterfly Pea, Winged leaf Clitoria	Seed	Cinnamic acid, flavonol glycoside and kaempferol	indigestion	[54]
9	<i>Tamarindus indica Linn</i>	Imli, Tamarind	Leaves	Limonene, linalool, p-cymene procyanidins, procyanidin hexamer and anthranilate.	stomachic, carminative, digestive	[55, 56]
10	<i>Trigonella foenum graecum</i>	Fenugreek / methi	Seed	saponins (diosgenin), flavonoids (quercetin), kaempferol, luteolin, and rutin, alkaloids (trigonelline), coumarins, vitamins, soluble fibers, and carbohydrates like galactomannan	carminative, indigestion	[57, 58]
V	Family: Umbelliferae					
11	Angelica archangelica	Angelica	Roots	essential oil, tannins, sitosterol, furocoumarin, angelicin	carminative, dyspepsia	[59]
12	<i>Carum carvi</i>	Caraway	Fruit	carvon and limonene	Carminative	[59]
13	<i>Coriandrum sativum</i>	Dharian, dhania, Coriander	Seed, leaf, bark and Kernel	essential oil, tannins, terpenoids, p-cymene, camphene, limonene (dipentene), myrcene, Borneol, citronellol, geraniol, linalool, nerol	flatulence, stimulant, aromatic and carminative	[60, 61]
14	<i>Cuminum cyminum</i>	Jeera, cumin	Flower, fruits	alkaloid, coumarin, anthraquinone, flavonoid, glycoside, protein, resin, saponin, tannin and steroid.	Dyspepsia, stomachic, carminative, stimulant	[60]
15	<i>Daucus carota</i>	Queen Anne's Lace, Gazer, wild carrot	Seeds, roots	Chypsin, apigenin, luteolin, 5-methoxysoralen and 8-methoxysoralen, furanocoumins.	Carminative, flatulence,	[62]
16	<i>Ferula asafoetida</i>	Hing	gum resin	ferulic acid, umbelliferone, asaresinotannols,	carminative, flatulence, stomach-ache	[63, 64]
17	<i>Foeniculum vulgare</i>	Saunf, kalwo, Fennel	Seed	Anethole, fenchone, methyl chavicol	Carminative, digestive, flatulence	[65]
18	<i>Levisticum officinale</i>	Lovage	Root	Thujene	Carminative	[66]

19	<i>Pimpinella anisum L.</i>	Anise	Seed	trans-anethole and palmitic and oleic acids, methylchavicol, anisaldehyde, estragole, coumarins, scopoletin, umbelliferone, estrols	carminative, aromatic	[67]
20	<i>Trahypermum ammi</i>	Bishop's weed / Ajwain	Seed	essential oils and are thymol-based, para-cymene, γ -terpinene, α - and β -pinene, dipentene, α -terpinene, and carvacrol	carminative, stomachic, flatulence, tonic dyspepsia, stimulant and indigestion	[68, 69]
VI	Family: Zingiberaceae					
21	<i>Curcuma longa</i>	Turmeric, haldi	Tuber, Rhizome	Curcumin, α -phellandrene, sabinene, cineol, borneol, zingiberene, and sesquiterpenes	dyspepsia, indigestion, flatulence, carminative	[70, 71]
22	<i>Elettaria cardamomum</i>	green cardamom	Seed	1, 8-cineole, α -terpinyl acetate, α -terpineol, α -pinene, linalool, limonene	digestive, stomachic and carminative agent	[72, 73]
23	<i>Zingiber officinale</i>	Shonth, Adrak	Rhizome	Ethereal oil, gingerols, shogaols, zingiberene.	flatulence, indigestion, carminative	[74]

General Mechanism of Action of Carminatives

The carminative activity of volatile oils is commonly explained by their ability to relax and inhibit the movements of smooth muscle, also referred to as plain muscle, in the gastrointestinal tract. By promoting gas expulsion and lessening spasms, this activity can alleviate bloating and pain. Reflexes resulting from their local irritating action, or perhaps an acceleration of absorption, could account for the gastro-intestinal tract.^[75] Relaxation of the smooth muscles of the gastrointestinal tract helps in expulsion of gases. This allows trapped gas to pass more easily. Enhances gastric motility and accelerates gastric emptying, reducing bloating and gas.

Recent research has shown promising insights into the herbal based therapies in the treatment of celiac disease. These insights offer various prospects to manage the treatment, diagnosis and development of advanced therapies for this disease.

CONCLUSION

Carminatives are natural substances that encourage the ejection of gas from the digestive tract, hence reducing bloating and gas discomfort. Bloating and gas can be caused by a number of factors, including a poor diet, digestive diseases, an imbalance of gut bacteria, and food intolerances. While gasping is normal, too much flatulence can be uncomfortable and disrupt daily routines. This is a common complaint that can be challenging to resolve. While Simethicone and enzyme supplements can help with symptoms, they may not always address the underlying cause. Herbal carminatives improve digestion, reduce gas, and soothe the gut, providing a natural remedy. Regular use of carminatives in diet or as herbal teas not only helps prevent gas formation but also promotes overall gut health. Individuals prone to bloating, from drinks and

beverages, incorporating the natural carminative agents as preventive measures, such as drinking cinnamon, cardamom, ginger and fennel can prove beneficial.

REFERENCES

1. Virshette, S., M. Patil, and J.R.J.J.P.P. Shaikh, A review on pharmacological properties and phytoconstituents of indigenous carminative agents, 2020; **9**(3): 142-145.
2. Verma, R., N.J.I.P.S. Sharma, and d. 10.31531/, Development and Evaluation of Polyherbal Formulation with Carminative Effect, **5896**.
3. Kabiraj, A. and R.J.P.R.-M.C.M. Deshmukh, A review on chinese herbal medicine used as carminative, 2024; **11**: 100409.
4. Sharma, S., J. Dwivedi, and S.J.S.R.L.D.P.L. Paliwal, Evaluation of antacid and carminative properties of *Cucumis sativus* under simulated conditions, 2012; **4**(1): 234-239.
5. Hossain, D.S., et al., Gastrointestinal impact of flatulence-causing compounds in foods: A scientometric study, 2024; **14**(3): 110-114.
6. Fink, R.N. and A.J.J.C.T.O.i.G. Lembo, Intestinal gas, 2001; **4**(4): 333-337.
7. Chiotakakou-Faliakou, E., et al., Biofeedback provides long term benefit for patients with intractable, slow and normal transit constipation, 1998; **42**(4): 517-521.
8. Leichter, J.J.T.A.J.o.D.D., Lactose tolerance in a Slavic population, 1972; **17**(1): 73-76.
9. Marciani, L., et al., Postprandial changes in small bowel water content in healthy subjects and patients with irritable bowel syndrome, 2010; **138**(2): 469-477. e1.
10. Murray, K., et al., Differential effects of FODMAPs (fermentable oligo-, di-, mono-saccharides and polyols) on small and large intestinal contents in

- healthy subjects shown by MRI., 2014; **109**(1): 110-119.
11. Hasler, W.L., *Gas and Bloating*. Gastroenterol Hepatol (N Y), 2006; **2**(9): 654-662.
 12. Poudroux, P., et al., *Esophageal bolus transit imaged by ultrafast computerized tomography*, 1996; **110**(5): 1422-1428.
 13. Alvarez, W.C.J.J.o.t.A.M.A., *What causes flatulence?*, 1942; **120**(1): 21-24.
 14. Simrén, M., H. Abrahamsson, and E.S. Björnsson, *An exaggerated sensory component of the gastrocolonic response in patients with irritable bowel syndrome*. Gut, 2001; **48**(1): 20-7.
 15. Delgado-Aros, S., et al., *Obesity is associated with increased risk of gastrointestinal symptoms: a population-based study*, 2004; **99**(9): 1801-1806.
 16. Fernandez-Banares, F., et al., *Sugar malabsorption in functional bowel disease: clinical implications*, 1993; **88**(12).
 17. Pimentel, M., et al., *Methane, a gas produced by enteric bacteria, slows intestinal transit and augments small intestinal contractile activity*. Am J Physiol Gastrointest Liver Physiol, 2006; **290**(6): G1089-95.
 18. Van der Windt, D.A., et al., *Diagnostic testing for celiac disease among patients with abdominal symptoms: a systematic review*, 2010; **303**(17): 1738-1746.
 19. Iovino, P., et al., *Bloating and functional gastrointestinal disorders: where are we and where are we going?* World J Gastroenterol, 2014; **20**(39): 14407-19.
 20. Larijani, B., et al., *Prevention and treatment of flatulence from a traditional Persian medicine perspective*. Iranian Red Crescent Medical Journal, 2016; **18**(4): e23664.
 21. Suarez, F.L., et al., *Gas production in humans ingesting a soybean flour derived from beans naturally low in oligosaccharides*, 1999; **69**(1): 135-139.
 22. Feinle-Bisset, C., F.J.N.r.G. Azpiroz, and hepatology, *Dietary and lifestyle factors in functional dyspepsia*, 2013; **10**(3): 150-157.
 23. Sharara, A.I., et al., *A randomized double-blind placebo-controlled trial of rifaximin in patients with abdominal bloating and flatulence*, 2006; **101**(2): 326-333.
 24. Ingold, C.J. and H. Akhondi, *Simethicone*, in *StatPearls [Internet]*. 2023, StatPearls Publishing.
 25. Suarez, F.L. and M.D.J.C.g.r. Levitt, *An understanding of excessive intestinal gas*, 2000; **2**(5): 413-419.
 26. Di Stefano, M., et al., *The effect of oral α -galactosidase on intestinal gas production and gas-related symptoms*, 2007; **52**(1): 78-83.
 27. Shrikhande, S.V., et al., *In vitro Comparison of Pancreatic Enzyme Preparations Available in the Indian Market*. Drug Des Devel Ther., 2021; **15**: 3835-3843.
 28. Ouwehand, A.C., S. Salminen, and E. Isolauri, *Probiotics: an overview of beneficial effects*. Antonie Van Leeuwenhoek, 2002; **82**(1-4): 279-89.
 29. Didari, T., et al., *A systematic review of the safety of probiotics*. Expert Opin Drug Saf., 2014; **13**(2): 227-39.
 30. Di Stefano, M., et al., *Probiotics and functional abdominal bloating*, 2004; **38**: S102-S103.
 31. Saggar, S., et al., *Traditional and herbal medicines: opportunities and challenges*. Pharmacognosy Research, 2022; **14**(2).
 32. Virshette, S., M. Patil, and J.R. Shaikh, *A review on pharmacological properties and phytoconstituents of indigenous carminative agents*. J Pharmacogn Phytochem, 2020; **9**(3): 142-145.
 33. Hussain, Z. and E.M. Quigley, *Systematic review: Complementary and alternative medicine in the irritable bowel syndrome*. Aliment Pharmacol Ther., 2006; **23**(4): 465-71.
 34. Bahrami, H.R., et al., *Herbal Medicines for the Management of Irritable Bowel Syndrome: A Systematic Review*. Electron Physician, 2016; **8**(8): 2719-2725.
 35. Badnale, A.B., et al., *A review on potential medicinal herbs as health promoters*. Journal of Drug Delivery and Therapeutics, 2022; **12**(3-S): 225-229.
 36. Kim, H.-G., et al., *A Study on the Comparison of Korea Good Manufacturing Practice (KGMP) Evaluation Criteria with Certification Criteria of Extramural Herbal Dispensaries*. The Korea Journal of Herbology, 2023; **38**(6): 61-71.
 37. He, T.-T., et al., *Good manufacturing practice (GMP) regulation of herbal medicine in comparative research: China GMP, cGMP, WHO-GMP, PIC/S and EU-GMP*. European Journal of integrative Medicine, 2015; **7**(1): 55-66.
 38. Larijani, B., et al., *Prevention and treatment of flatulence from a traditional Persian medicine perspective*, 2016; **18**(4): e23664.
 39. Kokate, C. and A.J.V.p. Purohit, *A text book of Practical Pharmacognosy*, 2005; **5**: 107-111.
 40. Bairwa, R., R. Sodha, and B.J.P.r. Rajawat, *Trachyspermum ammi*, 2012; **6**(11): 56.
 41. Evans, W.C., *Trease and Evans' pharmacognosy*. 2009: Elsevier Health Sciences.
 42. Koppula, S. and D.K.J.P.b. Choi, *Cuminum cyminum extract attenuates scopolamine-induced memory loss and stress-induced urinary biochemical changes in rats: a noninvasive biochemical approach*, 2011; **49**(7): 702-708.
 43. Mao, Q.-Q., et al., *Bioactive compounds and bioactivities of ginger (Zingiber officinale Roscoe)*, 2019; **8**(6): 185.
 44. Aghili Khorasani, M.J.T.T.U.o.M.S., *Makhzan-ol-Adviyah [storehouse of medicaments]*, 2009.
 45. Lanzotti, V.J.J.o.c.A., *The analysis of onion and garlic*, 2006; **1112**(1-2): 3-22.

46. Al-Snafi, A.E.J.I.J.P.T.R., *The pharmaceutical importance of Althaea officinalis and Althaea rosea: A review*, 2013; **5**(3): 1387-1385.
47. El-Saber Batiha, G., et al., *Chemical constituents and pharmacological activities of garlic (Allium sativum L.): A review*, 2020; **12**(3): 872.
48. Moorthy, H. and V.J.P.A. Kumar, *Hemidesmus indicus (L.) R. BR.: an overview*, 2021; **21**(1): 2132-43.
49. Zahara, K., et al., *Metabolic diversity and therapeutic potential of Holarrhena pubescens: an important ethnomedicinal plant*, 2020; **10**(9): 1341.
50. Prasath, C.H., et al., *Pharmacological and traditional uses of Wrightia tinctorial*, 2019.
51. Hussain, A.I., et al., *Citrullus colocynthis (L.) Schrad (bitter apple fruit): A review of its phytochemistry, pharmacology, traditional uses and nutritional potential*, 2014; **155**(1): 54-66.
52. Sharma, S., et al., *Divergence studies for different horticultural traits in cucumber (Cucumis sativus L.)*, 2018; **7**(2): 1733-1741.
53. Kaur, M., P.J.T.J.o.H.S. Sharma, and Biotechnology, *Recent advances in cucumber (Cucumis sativus L.)*, 2022; **97**(1): 3-23.
54. Sankar, G., et al., *A Comparative Elemental Analysis and Pharmacological Evaluation of Clitoria Ternatea (Butterfly Pea) Flowers: Blue and White Varieties from Coastal Regions of Kerala, India*, 2024; **16**(3): 873-885.
55. Naem, N., et al., *Tamarindus indica—A review of explored potentials*, 2017; **12**(2017): 98-106.
56. Shibabrata Pattanayak, S.P., T.K. Mandal, and S.K. Bandyopadhyay, *Use of plants as digestive stimulator and tonic in three southern districts of West Bengal, India*, 2015.
57. Ahmad, A., et al., *Fenugreek a multipurpose crop: Potentialities and improvements*. Saudi J Biol Sci., 2016; **23**(2): 300-10.
58. Anitha, M.L., et al. *Facile green synthesis and characterisation of gold nanoparticles using Fenugreek seeds and honey*. in *Journal of Physics: Conference Series*, 2021. IOP Publishing.
59. Kelber, O., R. Bauer, and W.J.D.D. Kubelka, *Phytotherapy in functional gastrointestinal disorders*, 2018; **35**(1): 36-42.
60. Al-Snafi, A.E.J.I.J.o.P., *A review on chemical constituents and pharmacological activities of Coriandrum sativum*, 2016; **6**(7): 17-42.
61. Laribi, B., et al., *Coriander (Coriandrum sativum L.) and its bioactive constituents*, 2015; **103**: 9-26.
62. Ismail, J., et al., *The wild Carrot (Daucus carota): a phytochemical and pharmacological review*, 2023; **13**(1): 93.
63. Mahendra, P. and S.J.P.r. Bisht, *Ferula asafoetida: Traditional uses and pharmacological activity*, 2012; **6**(12): 141.
64. Sultana, A., et al., *Oleo-gum-resin of Ferula asafoetida: A traditional culinary spice with versatile pharmacological activities*, 2015; **2277**: 2502.
65. Rather, M.A., et al., *Foeniculum vulgare: A comprehensive review of its traditional use, phytochemistry, pharmacology, and safety*, 2016; **9**: S1574-S1583.
66. Moradalizadeh, M., et al., *Chemical composition of the essential oils of Levisticum officinale growing wild in Iran*, 2012; **47**(6): 1007-1009.
67. Shojaii, A. and M.J.I.s.r.n. Abdollahi Fard, *Review of pharmacological properties and chemical constituents of Pimpinella anisum*, 2012; **2012**(1): 510795.
68. Agarwal, U., A. Pannu, and R.K.J.C.F.F. Tonk, *Emerging Traditional and Pharmacological Health Benefits of Trachyspermum Ammi (Ajwain): Future Aspects*, 2025.
69. Debnath, S. and A.J.A.o.P. Sharma, *An insight of Trachyspermum ammi L.: A comprehensive review on its aromatic and medicinal potential*, 2022; **11**(2): 197-204.
70. Chew, Y.-L., et al., *Cassia alata, Coriandrum sativum, Curcuma longa and Azadirachta indica: food ingredients as complementary and alternative therapies for atopic dermatitis—a comprehensive review*, 2022; **27**(17): 5475.
71. Nisar, T., et al., *Turmeric: A promising spice for phytochemical and antimicrobial activities*, 2015; **15**(7): 1278-88.
72. Abdullah, et al., *Evaluating the antimicrobial potential of green cardamom essential oil focusing on quorum sensing inhibition of Chromobacterium violaceum*. J Food Sci Technol, 2017; **54**(8): 2306-2315.
73. Bano, S., et al., *Deciphering the Potentials of Cardamom in Cancer Prevention and Therapy: From Kitchen to Clinic*. Biomolecules, 2024; **14**(9).
74. Kairalla, M.A., A.A. Aburas, and M.I. Alshelmani, *Effect of Diet Supplemented with Graded Levels of Ginger (Zingiber officinale) Powder on Growth Performance, Hematological Parameters, and Serum Lipids of Broiler Chickens*. Arch Razi Inst, 2022; **77**(6): 2089-2095.
75. Gunn, J.J.T.J.o.P. and E. Therapeutics, *The carminative action of volatile oils*, 1920; **16**(1): 39-47.