



# Bloating: Avicenna's Perspective and Modern Medicine

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## Abstract

Bloating and abdominal distention are common complaints present in quite a number of organic and functional diseases. An important subject in traditional Persian medicine is digestive disorders, particularly bloating and its etiology. This is a literature review study conducted on *The Canon in Medicine* written by Avicenna and using the keywords: bloating, gas. In this article, causes for bloating, according to Avicenna, include diet causes, inappropriate lifestyle, gastrointestinal, and miscellaneous reasons. These were compared with causes suggested in modern medicine. Avicenna classifies causes based on the place of origin into upper part of the abdomen (stomach) and intestinal part of the abdomen. Also, 38 medicinal plants used as remedies were listed. Modern scientific data support all bloating causes that have been mentioned in the canon. Obviously, some causes such as uterine disorders and posterior nasal discharge need to be studied further.

## Keywords

bloating, traditional Persian medicine, Avicenna

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Bloating is a common complaint in society. Epidemiologic studies in America and Asia report an incidence rate of 15% to 30% for bloating.<sup>1,2</sup> Though frequent feeling of abdominal distension is referred to as bloating, its measurability cannot be any confirmation for the complaint.<sup>3,4</sup> Bloating affects patients' quality of life extensively. It also imposes high costs on community due to frequent absenteeism from work, endless visits to doctors, taking various medicines, and running different diagnostic tests.<sup>5</sup>

This irritating digestive complaint is present in quite a few organic and functional diseases of digestive system such as functional dyspepsia, functional bloating, irritable bowel syndrome, and functional constipation.<sup>4-6</sup>

A number of pathophysiological mechanisms have been suggested for bloating. These include excessive intestinal gas accumulation, small intestinal bacterial overgrowth, abnormal gut microbiota, altered gut motility, impaired gas handling, fluid retention, abnormal abdominal-diaphragmatic reflexes, visceral hypersensitivity, food intolerance, malabsorption of carbohydrates, constipation and hard stools, increased in lumbar lordosis, role of sex hormones, and psychological factors.<sup>1,2</sup>

Traditional Persian medicine, a several thousand years old medical practice, enjoys valuable experiences in the field of gastrointestinal tract, which have been recorded in manuscripts of prominent Iranian scientists and are being protected in world's renowned libraries.<sup>7</sup>

Abu Ali Alhussein-ebne-Abdullah-ebne-Sina (Avicenna) (AD 980-1037), was a famous Iranian philosopher and physician known all over the world. One of his greatest books *The Canon of Medicine* has been a medical reference book

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**Table 1.** Possible Underlying Mechanisms Behind Bloating: Avicenna's Perspective and Modern Medicine.

Different Mechanisms	Avicenna's Perspective	Modern Studies
Nutritional factors of bloating	Nutritional factors (eg, consumption of types of flatulent food, consumption of fruits with moisture content like cucumber, consumption of stale food, smoked food)	Food sensitivity/food intolerance
Association of lifestyle and bloating	Failure to observe the proper lifestyle (eg, air pollution, food and beverage management, sleep and wakefulness, rigorous exercise following a meal and psychological problems such as grief)	Dietary habit and lifestyle, psychological factors
Intra-abdominal mechanisms of bloating	Gastric diseases (eg, gastric maltemperaments, congenital disorders such as small stomach size, stomach cancers and inflammations), constipation, weakness of the abdominal wall, intestinal worms	Luminal etiology (eg, altered motility, visceral hypersensitivity), constipation/hard stools, altered intra-abdominal volume displacement, intestinal protozoa, excessive gas/focal or general gastrointestinal gas accumulation/abnormal gas handling
Miscellaneous factors	Individuals with underlying high moisture and low heat (eg, obesity), medications, posterior nasal discharge, liver diseases	Gender, sex hormones, medications, eating disorders, connective tissue diseases

for about 6 centuries and includes a variety of theoretical and practical medical topics.<sup>8,9</sup>

The aim of this comparative study was to review the causes, diagnosis, and treatment of bloating from Avicenna's perspective and modern medicine.

## Materials and Methods

In this comparative study, some main resources of traditional Persian medicine scholars, namely, *The Canon of Medicine* (by Avicenna)<sup>9</sup>, *Sharhol-Asbabval Alamat* (by Nafis-ebne-avaz-e-Kermani),<sup>10</sup> and *Kholasat Al-Hekmah* (by Mohammad Hosein Aghili Shirazi)<sup>11</sup> were first selected after consulting the team of authors. After selecting search references, various physiopathological aspects of bloating were searched by keywords such as bloating (*Nafkh*), gastric bloating (*Nafkh-e-Me'di*), and gas (*Reeh*) (Table 1).<sup>10,11</sup>

Also, we searched PubMed, Scopus, Google Scholar, Scientific Information Database, and Iranmedex from 2001 to November 2015 for bloating, abdominal distention, functional dyspepsia, Avicenna, and traditional Persian medicine.

Next, using the second book of *The Canon of Medicine*, in which properties of medicinal plants, animal and mineral medicines are elaborated, the aforementioned keywords were searched and simple medicinal plants (their names and temperaments) appropriate for the treatment of the disorder were elicited (Table 2). To find matches for old names in modern scientific names, 2 botany references and electronic databases, namely, the United States Department of Agriculture and the plantlist.org suggested by the research team were used.<sup>12,13</sup>

## Result and Discussion

An important issue extensively discussed in *The Canon of Medicine* is gas, which is called *Reeh*. *Reeh* means the smoky smell, which is defined to be cold and dense and creates bloating (*Nafkh*) in the abdomen.

Considering the production and movement of gas in the gastrointestinal tract, a number of terms are frequently mentioned in the literature. Examples are *Nafkh-e-Me'di* (gastric

bloating), *Nafkh-e-Tahali* (splenic bloating), *Nafkh-e-Kabedi* (hepatic bloating), *Nafkh-e-Batn* (intestinal bloating), *josh* (burping), *qaraqer* (bowel sound), and *Bagh-baghe* (borborygmus).

Naming is sometimes based on the anatomic site where the gas is produced and the organ involved such as gastric bloating (*Nafkh-e-Me'di*) occurs in the epigastric region. Some other names are based on the place of release and the type of sound produced by their movement such as burping (*josh*) refers to release of gas through the mouth.

According to Avicenna's viewpoint, gas production requires to both warmth and heat quality and the moisture and humidity quality of substance. Gas is produced in the case of heat deficiency and or cold quality excess but in the case of dryness and heat excess and/or very excess of coldness, the wind production is improbable.

As for the etiology, Avicenna classifies the causes for gas production and the subsequent effects in 4 groups: nutritional, lifestyle, intra-abdominal, and miscellaneous factors (Table 1).

The *Canon* makes explicit that presence of wind facilitates some physiologic functions such as defecation. Study of symptoms rendered that Avicenna thought there was an anatomical classification for bloating; he believed bloating in the upper abdomen caused burping, gastric bloating, hiccups, and stomachache and intestinal gas was responsible for bowel sound, borborygmus, anal evacuation, and sometimes severe abdominal pain.<sup>14</sup>

From the perspective of traditional Persian medicine, due to the accumulation and movement of the additional gas, a number of diseases such as various headaches, pains in the back and joints, stretching pain, and trembling may occur.<sup>8,14,15</sup>

As seen in the comparative table, several factors and causes of bloating according to Avicenna's view are consistent with recent studies.

### Nutritional Factors of Bloating

From Avicenna's viewpoint, bloating is the result of imperfect digestion (*Za'af-ol-Hazm*) and indigestion (*Su-ol-Hazm*) and

**Table 2.** Efficient Medicinal Plants for the Treatment of Bloating in *The Canon of Medicine*.

Name in <i>Canon</i>	Scientific Name	Mechanism of Action According to <i>Canon</i>
Aftimon	<i>Cuscuta epithimum</i> L	Detergent, phlegmagogue, melanagogue
Afsantin	<i>Artemisia absinthium</i> L	Astringent, cholagogue, melanagogue, stomachic
Anisun	<i>Pimpinella anisum</i> L	Resolvent, carminative, astringent
Basbâseh	<i>Myristica fragrans</i> Houtt.	Stomachic, digestive, desiccant
Bael	<i>Aegle marmelos</i> (L) Corrêa	Astringent, stomachic
Common	<i>Cuminum cyminum</i> L	Heat producing, desiccant, resolvent, astringent
Cara-weia	<i>Bunium persicum</i> (Boiss.) B Fedtsch	Astringent, heat producing, digestive, resolvent
Darcin	<i>Cinnamomum verum</i> J Presl	Heat producing, stomachic, desiccant
Felfel	<i>Piper nigrum</i> L	Digestive, resolvent, detergent
Felfelmoyeh	<i>Piper longum</i> L	Stomachic, digestive, resolvent
Fudanaj	<i>Mentha longifolia</i> L	Resolvent, detergent
Fojle	<i>Raphanus raphanistrum</i> subsp <i>sativus</i> (L) Domin	Resolvent, digestive
Hâsha	<i>Ziziphora clinopodioides</i> Lam.	Heat producing, stomachic, resolvent
Helyyon	<i>Asparagus officinalis</i> L	Detergent, resolvent
Kârafs	<i>Apium graveolens</i> L	Resolvent, heat producing
Kashem	<i>Ferulago angulata</i> (Schltdl) Boiss	Stomachic, resolvent, digestive
Khulanjan	<i>Alpinia officinarum</i> Hance	Resolvent, digestive
Marv	<i>Salvia macrosiphon</i> Boiss	Resolvent, stomachic
Mastaki	<i>Pistacia lentiscus</i> Desf	Astringent, heat producing, stomachic
Mor	<i>Commiphora myrrha</i> (Nees) Engl.	Resolvent, laxative, stomachic
NaAna	<i>Mentha spicata</i> L.	Heat producing, astringent, digestive
Nan-khah	<i>Trachyspermum ammi</i> (L) Sprague	Stomachic, heat producing, laxative, digestive
Nastaran	<i>Rosa canina</i> L	Stomachic, central nervous system tonic
Ar-ar	<i>Juniperus oxycedrus</i> L	Heat producing, resolvent, astringent
Qod	<i>Aquilaria agallocha</i> Roxb.	Carminative, stomachic, desiccant
Râzyânaj	<i>Foeniculum vulgare</i> Mill	Stomachic, resolvent, astringent
Râsen	<i>Inula helenium</i> L	Heat producing, detergent
Rihân	<i>Ocimum basilicum</i> L	Stomachic, resolvent
Salikhe	<i>Cinnamomum cassia</i> (L) J Presl	Resolvent, astringent
Sus	<i>Glycyrrhiza glabra</i> L	Purgative, calmative, resolvent
Sho-neze	<i>Nigella sativa</i> L	Digestive, resolvent, heat producing
Hel-tit	<i>Ferula assafotida</i> L	Carminative, resolvent
Tânabol	<i>Piper betle</i> L	Stomachic, digestive
Vâj	<i>Acorus calamus</i> L	Resolvent, detergent, desiccant
Zanjâbil	<i>Zingiber officinale</i> Roscoe	Heat producing, stomachic, resolvent laxative, digestive
Zarnab	<i>Taxus baccata</i> L	Heat producing, astringent, resolvent
Zofra	<i>Petroselinum crispum</i> (Mill.) Fuss	Heat producing, resolvent, digestive
Zorombad	<i>Curcuma zedoaria</i> (Christm.) Roscoe	Heat producing, resolvent, central nervous system tonic, stomachic

occurs mainly due to the individual's diet and eating habits. He believed that bloating complaint results from 4 eating habits: Consumption of types of flatulent food stuff such as beans and peas, consumption of fruits with moisture content like cucumber and watermelon, consumption of stale food, smoked food, salted food, rotten food, and finally overeating.

According to recent studies, nutritional factors, particularly type and amount of food, are related to a number of digestive disorders such as functional dyspepsia and bloating, though the relation is complicated and often bears contradicting results.<sup>4,16</sup>

In some patients, symptoms appear only after a big meal but not after a small one. Yet, some patients show symptoms even after a small meal. In a study conducted by Pilichiewicz et al<sup>17</sup> on the correlation between symptoms and diet in patients with functional dyspepsia, findings revealed that a feeling of fullness was directly correlated with the amount of fat and calories and inversely correlated with the amount of carbohydrate in foods consumed.

Consumption of certain foods such as onions, carbonated drinks, and beans is related to bloating. Also some foods like red meat, milk, cake, and fried foods can create a feeling of fullness.<sup>16</sup>

In recent studies, a physiopathological hypothesis proposed to be involved in functional dyspepsia, irritable bowel syndrome, and functional bloating is food intolerance and carbohydrate malabsorption. Overconsumption of fibrous food stuff, lactose intolerance, consumption of FODMAPs (fermentable oligo-, di- and mono- saccharides and polyols such as mushroom, peach) and also certain food stuff such as stale or salted meat that contains harmful chemical substances (salicylates, amines, glutamates, nitrates) that harm the digestive tract mucosa can, in the long run, aggravate symptoms of dyspepsia such as bloating.<sup>18</sup>

According to Avicenna, another cause for indigestion disorder is consumption of light food (easy to digest) stuff together with or quickly after a heavy (hard to digest) one. Some studies have shown that a low-viscosity meal, due to earlier entrance to

the duodenum compared with a high-viscosity meal, stimulates secretion of cholecystokinin. This, through a mechanism called “duodenal break” increases total gastric emptying leading to digestion disorder together with dyspepsia with rapid gastric emptying.<sup>19</sup>

### Association of Lifestyle and Bloating

In Avicenna’s idea, lifestyle is of great significance in preserving health and if not well-attended to for long, will cause a variety of health problems. Six necessary life principles (*Sete-y-Zarooriyeh*) include clean air, food and beverage management, sleep and wakefulness, motion and stillness, mental health, maintenance of the necessary materials, and removal of waste from the body.

Avicenna considers psychological problems such as grief and wrath as major causes of digestion disorders. He thinks problems such as long times of sadness can sap the heart and affect the brain, stomach, and liver negatively, although sadness affects the heart and causes palpitation and anxiety at first. Occasionally, digestion disorder—especially when the stomach tissue is very weak—may cause a brain condition named melancholia (*Malikhulia Maraghi*). Patients gain appetite, suffer from regurgitation, bloating, panic, and obsession sometimes accompanied by stomachache and headache near the forehead.<sup>20</sup>

Nowadays, we know that bloating is significantly correlated with psychological states such as severe depression, panic disorders, and sleep problems.<sup>1,4</sup>

Avicenna maintains that another cause for digestion problems and bloating is sleep disorders. Sleeplessness or insomnia referred to as *sahr* in *The Canon* can create symptom through heat reduction. Oversleeping can also result in digestion problems through humidity increase in the stomach. Recent studies have suggested that increased bed rest increases bloating and decreases evacuations, which could be due to inefficient defecation, feces overstay, rectum distension, and reduced bowel movement.<sup>4</sup>

Another cause for bloating according to Avicenna is rigorous exercise following a meal. Muscle demand for heat increases, and as the heat necessary for food digestion will not be available, digestion disorder will result. Physiologically, rigorous exercise reduces the splanchnic blood flow by 80% and increases heart blood output and thus affects digestion. These physiologic effects include inefficiency in gastric digestion, reduction in esophageal peristaltic activity, lower esophageal sphincter tone, antroduodenal motility impairment, and limited carbohydrate absorption, which cause symptoms such as regurgitation and a feeling of stomach fullness.<sup>21</sup>

### Intra-abdominal Mechanisms of Bloating

According to Avicenna, one major cause for bloating and gas disorders is disease in various organs in the abdomen. Gastric diseases stand on top of the list. These include superficial and deep ulcers both, stomach cancers and inflammations, stomach

tissue weakness, diet problems, congenital disorders such as small stomach size, and gastric maltemperaments (*Su’emezaj*).

Temperament is a quality common among all compound objects such as humans and plants. An organ’s temperament is the dominant quality in that organ that provides the conditions for the organ to function best. If the temperament is disturbed for any reason, the organ will not function properly. All gastric maltemperaments—cold, warm, wet, and dry maltemperaments—can cause digestive disorders in a variety of ways, but cold and wet maltemperaments cause the most common digestion disorders giving symptoms such as sour belch, gastric bloating, and dyspepsia, which get more severe after eating certain foods.<sup>14,22</sup> A major cause for functional dyspepsia related to the feeling of fullness after a meal, nausea, and vomiting is delayed gastric emptying.<sup>23</sup> The condition could be similar to slow gastric movements occurring in cold and wet maltemperaments suggested in traditional Persian medicine.<sup>22</sup>

One stomach disorder that plays a major role in causing abdominal bloating is weak stomach strength (*Quvey-e-Me’di*). Digestion in stomach needs 4 kinds of strengths—Attractive (*Quvey-e-Jaziba*), Retentive (*Quvey-e-Masekeh*), Digestive (*Quvey-e-Hazemeh*), Expulsive (*Quvey-e-Dafe-eh*).<sup>14</sup>

Different reasons, including gastric ulcers, presence of wet and slimy substance, spasticity in muscular tissue can upset the retentive strength, which, in turn, results in the entrance of undigested food to duodenum and causes disorder in digestion and absorption of food and bloating in small intestine. Unsuppressed postprandial phasic contractility of the proximal stomach, which results in severe bloating is similar to gastric trembling following weakness in retentive power of the stomach.<sup>23</sup>

According to Avicenna’s concept, major causes of intestinal gases are gastric problems, weakness of bowel tissues, intestinal worms (*Didan*) and constipation.

Constipation, a main cause of bloating, is called *Hasr* or *Etegal-e-batn* in traditional Persian medicine. This is a complaint of one-seventh of adults all over the world. Constipation and the subsequent distension reduce transit in the small intestine and colon and therefore bacterial fermentation and intraluminal bulking is enhanced.<sup>1,4</sup>

Avicenna believes a cause of digestion problems, and subsequent bloating is weakness of the abdominal wall. In addition to protecting the inner organs and helping defecation, the abdominal also maintain internal heat in the stomach necessary for food digestion. Though Avicenna believes that weakness of the abdominal wall is a cause for bloating through creating dyspepsia, recent studies do not see it as a cause for functional dyspepsia. Nowadays it is thought that the weakness of the abdominal wall can cause bloating and distension in bowels. studies show individuals with bloating complaint suffer from abdominophrenic dysynergia so that with the least increase in gas amount, diaphragm contract (downward) and a paradoxical relaxation of the internal oblique muscle occurs. Also, recent research has shown there is a paradoxical relaxation of the internal oblique muscles and obvious lumbar lordosis in patients with irritable bowel syndrome.<sup>1,4,24</sup>

### Miscellaneous Factors

In Avicenna's opinion, any decrease in the innate heat necessary (*Ha'rr-e-Gharizi*) for digestion may lead to creation of bloating. Accordingly, various digestion disorder symptoms may be present in patients with heart diseases, liver-spleen problems, or uterine diseases such as hypermenorrhea.

Also, individuals with underlying high moisture and low heat in gastrointestinal tract are more likely to show bloating symptoms. This is also true of females, obese people, the elderly, individuals with cold and wet (phlegm) and cold and dry (black bile) temperaments. According to traditional Persian medicine viewpoint, posterior nasal discharge (*Nazle-ye-Demaqi*) can also enter alimentary tract and cause digestion problems such as gastric bloating.

### Avicenna's Diagnostic and Therapeutic Approach to Bloating

History taking is of significant importance in Avicenna's diagnostic approach to digestion disorders, particularly bloating. Above all points stand diet and lifestyle issues, medication, psychological and sleep disorders. Avicenna also focused on differentiation between gastrointestinal ulcers and gastrointestinal nonulcerative dysfunction.

After considering lifestyle causes and attempting to improve them and if there is no dangerous organ symptom such as stomachache and fever, Avicenna suggests paying attention to gastric maltemperaments; he recommends noticing various symptoms such as a feeling of fullness in the stomach, epigastric heavy sensation, bloating, belching, nausea, appetite, thirst, dryness in the mouth, pain and burn in the stomach, severe pain following eating or hunger periods; feces shape, and psychological symptoms.

Maltemperaments of the stomach could often be the result of the presence of humors (material maltemperaments) or sometimes the lack of humors (simple maltemperaments) in the stomach. Major symptoms of the first case are a feeling of stomach heaviness and severe nausea.<sup>14</sup>

According to Avicenna's viewpoint, *treatment* of bloating includes modification of lifestyle, medication, and nonmedicinal techniques. The most important treatment for digestion disorders such as bloating is never to let the gas be produced by following an appropriate lifestyle. Not drinking water while eating, avoiding pickles and flatulent foods, managing sleep and exercises, preventing psychological problems, and appropriate defecation, are used to cure bloating.

Appropriate exercise (by reducing additional body wetness), fomentation with salt and warm barley and combustible cupping, constipation relief, and herbal medication use are other treatments recommended for the complaint.

Searching for medicinal plants for bloating in *The Canon*, 38 plants were found. All were among plants with warm temperament. Today, some of these plants like mint and caraway are used to treat bloating.<sup>25</sup>

Based on pathophysiological considerations of bloating from Avicenna's perspective, these medicinal plants work differently; increase stomach temperature *necessary for digestion*, facilitate gastric motility, remove of excess wetness, antispasmodic features, and sedative and tonic agents for central nervous system.<sup>26</sup>

### Conclusions

The comparative study of Avicenna's approach to bloating and its causes discloses his vast knowledge and comprehensive approach. In Avicenna's perspective, various dietary, psychological, and organic causes are likely to cause bloating. Some of these factors such as food allergies are the focus of quite a number of current studies and some like the effect of posterior nasal discharge, uterine problems, and congenital stomach problems need to be studied further. According to Avicenna, lifestyle, including its various aspects such as exercise, diet, regular sleep, enlivening environment, is the most significant factor in treatment of bloating.

### Authors' Note

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### Author Contributions

All authors contributed to the design and writing of the article.

### Declaration of Conflicting Interests

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### Ethical Approval

The study approved by the ethics committee of Shahed University of Medical Sciences, Tehran, Iran.

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