

# Demulcent Herbs and Natural Compounds to Support Digestive Health

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## Discussion

Gastrointestinal disease affects about 60 to 70 million Americans annually and accounts for substantial morbidity and mortality. Gastrointestinal (GI) disease and its attendant symptoms can significantly impair quality of life; affecting work and activity.<sup>1</sup>

Abdominal pain is the main GI symptom that brings people to doctors. Almost half of these patients are diagnosed with gastroesophageal reflux (GERD), the most common GI diagnosis.<sup>1</sup> GERD is a spectrum of disorders from non-erosive reflux disease (NERD) to erosive esophagitis, Barrett's esophagus, and esophageal adenocarcinoma. A significant increase in GERD has been noted since 1970.<sup>2</sup> Incidence of Barrett's esophagus is rising, with about 3.3 million Americans receiving this diagnosis. Approximately 90% of these patients have nondysplastic Barrett's and are checked every three to five years.<sup>1</sup> In a 2012 report, colorectal cancer was cited as the leading cause of GI-related death and accounted for more than half of all GI cancers.<sup>1</sup>

## VAGUS NERVE, GASTRIC ACID, AND DIGESTION

The connection between the nervous and digestive systems is widely recognized. Traditional herbalists include herbs such as Chamomile and Lemon Balm in digestive formulas to calm the nervous system and facilitate digestion.

The anticipation of food, activated by smell or other senses, triggers the vagus nerve, which influences multiple aspects of digestion. The vagus nerve links the brain, brainstem, and GI system. It activates digestive salivary secretions in the mouth and activates the stomach, pancreas, and gall bladder. It also innervates regions of the GI tract that influence digestion, satiety, and caloric intake.<sup>2-4</sup>

The vagus nerve promotes the expansion and contraction of the stomach and the release of gastric acid for digestion. Most gastric acid secretion occurs in the stomach during digestion.<sup>2,3</sup> These acidic secretions also function as part of the immune system because the strong acids are a first line of

defense that eliminate food-borne pathogens or microbes.<sup>2,3</sup>

*Dysfunctional HCl secretion can result in:*<sup>2</sup>

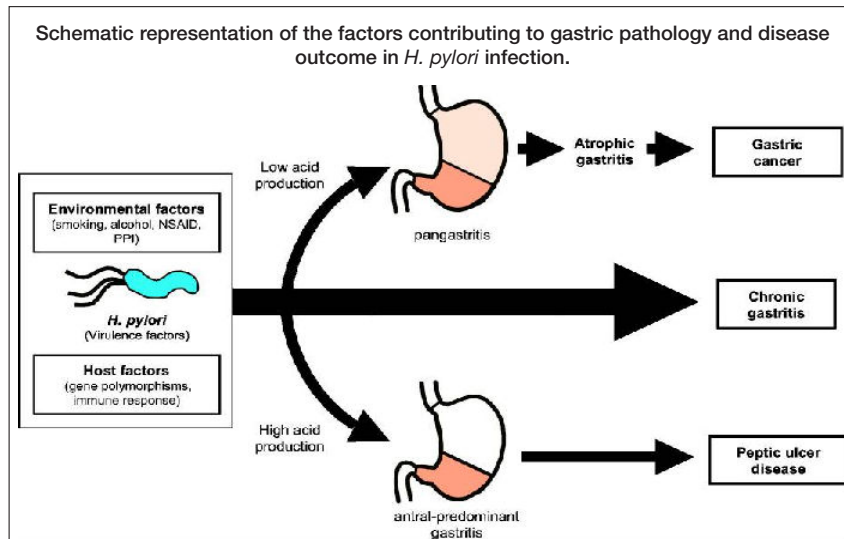
1. Decreased acid secretion: chronic gastritis, dyspepsia, intestinal bacterial overgrowth, gastric cancer
2. Increased acid secretion: GERD with epigastric pain, reflux, heartburn
3. Abnormal acid secretion: GERD, peptic ulcer, gastric cancer

Reduced gastric acid secretion increases the risk of bacterial overgrowth and influences the microbiome of the stomach and the small and large intestines. This plays a determining factor in the development of health or disease.<sup>2-4</sup> There is a strong correlation between low levels of stomach acid with precancerous gastric conditions and with chronic atrophic gastritis.<sup>2</sup> Long-term decreased acid (hypochlorhydria) is associated with increased risk of gastric cancer.<sup>3</sup> Chronic low-grade inflammation and decreased acid secretion in the stomach leads to the slow development of gastric cancer over many years.<sup>2</sup>

## HEALTHY STOMACH MICROBIOME

The constant interplay of factors in the host, the microbiome constituents, gastric acid levels, and other factors all contribute to health and disease processes.<sup>2-4</sup> Numerous bacterial populations colonize the stomach, which contains a large bacterial community with hundreds of phenotypes.<sup>3</sup> Scientists are particularly interested in the bacteria *Helicobacter pylori*, which is associated with the etiology of multiple disease conditions. *H. pylori* is the only bacteria formally recognized as a carcinogen as it is a direct causative factor for gastric cancer.<sup>3,4</sup> It causes numerous infections, is associated with chronic inflammation, and can contribute to hyperproliferation of epithelial cells.

*H. pylori* infection is the main etiological agent in numerous GI conditions including chronic active gastritis, peptic ulcers,



Source: See reference #4.

gastric adenocarcinoma, and gastric mucosa-associated lymphoid tissue lymphoma. Gastric and duodenal ulcers are highly correlated with *H. pylori* infection. It is estimated that 95% of duodenal ulcers and 85% of gastric ulcers occur in relation to *H. pylori* infection.<sup>4</sup>

There is an inverse relationship between *H. pylori* and GERD. While being overweight or obese are risk factors for development of GERD, the dietary component is considered secondary.<sup>2</sup> *H. pylori* disrupts gastric acid secretion and disrupts normal gastric physiology.<sup>3</sup> Long-term *H. pylori* infection is correlated with lower acid output.<sup>2</sup>

### HOLISTIC APPROACH TO DIGESTIVE ISSUES

A holistic approach to digestive issues is clearly the best long-term solution, especially when identified in the early stages to help prevent progression to more serious conditions. Dietary adjustments, lifestyle recommendations, nutritional considerations, and select botanical formulations offer a supportive approach to restore healthy digestive function.

Nutritional and botanical medicine provide anti-inflammatory, antioxidant, antimicrobial, and anti-adhesive activity. They

also provide a strong positive influence to support healthy digestive function, promote tissue healing, and support immune response.<sup>5-7</sup>

Most of the herbs outlined below are known to be protective of mucous and epithelial tissues found in the mouth, stomach lining, and intestines. They are found to enhance tissue healing and to promote tissue integrity in the GI system, which benefits conditions of intestinal permeability.

Also included in this paper is research on sodium alginate. Alginate naturally precipitates to form a thick gel when it contacts stomach acids and liquids. This thick gel expands to become a floating foam that sits in the stomach like a raft, forming a protective, pH-neutral barrier that absorbs excess acid. This also protects the sensitive esophageal tissues because the gel foam prevents the stomach's contents from backing up into the esophagus.

Alginate-based, raft-forming formulations have been used for over 30 years for their ability to offer relief from reflux. The raft action of alginate is noted to extend protective benefits for several hours as it is retained in the stomach, holding the other ingredients there as well.<sup>8-11</sup>

## Demulcent Herbs and Natural Compounds to Support Digestive Health



### Licorice Root (*Glycyrrhiza glabra*)

Licorice has a long history of use in Chinese, Ayurvedic, and European traditional medicines.

Chinese herbalists use Licorice to harmonize the botanicals in a formula and to carry the herbs throughout the body. Licorice is valued as a demulcent that soothes the mucus membranes of the body.

Research notes Licorice for its anti-inflammatory and immunomodulatory influence.<sup>12-15</sup> Licorice extract is shown to increase immune function including production of interferon and NK (natural killer) cells.<sup>16</sup> Multiple flavonoids have been isolated from licorice, many of which show broad-spectrum antibacterial effects.<sup>17-21</sup> Licorice root demonstrates activity against *H. pylori in vitro*.<sup>21</sup>

Licorice exerts antimicrobial and protective influence on oral mucosa.<sup>22,23</sup> Studies using a Licorice mouthwash report significant improvement of aphthous ulcers within one day and healing of the ulcers by day three.<sup>24</sup>

Deglycyrrhinated Licorice (DGL) is a form of Licorice with the steroid-like component glycyrrhizin removed. DGL is known for its soothing effects on tissues of the esophagus and stomach. It is widely used to calm inflammation and soothe tissues irritated by acid reflux. Studies find DGL to exert a protective influence on gastric mucosa against aspirin-induced damage.<sup>25,26</sup>

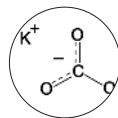


### Marshmallow Root (*Althaea officinalis*)

Marshmallow root is an excellent demulcent herb traditionally used to soothe and promote healing of mucous membrane tissues of the gastrointestinal and urinary tracts. Studies confirm it is highly beneficial for irritated mucosa.<sup>27</sup>

Marshmallow extract is found to be protective against ethanol-induced gastric ulcers. The flavonoid-containing mucilage soothes and covers the inflamed tissues and mucosa. This helps facilitate tissue healing. Marshmallow root exerts significant anti-inflammatory activity.<sup>28</sup> A study found that a combination of Ginger and Marshmallow showed protective effects on rats with indomethacin-induced gastric ulcers.<sup>29</sup>

### Potassium Bicarbonate



Potassium is essential for healthy muscular and digestive function. The potassium bicarbonate form is an electrolyte that is found equal to or significantly

better than antacids traditionally used to relieve heartburn symptoms. It is often combined with sodium alginate formulations to relieve heartburn and acid reflux. Bicarbonate has a very high buffering capacity.<sup>30-33</sup>

### Sodium Alginate

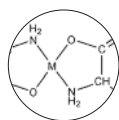


Alginates are long-chain carbohydrates that naturally occur in brown seaweeds. These alginates form a thick gel when they come in contact with liquid and acids in the stomach. This natural seaweed gel forms a pH-neutral barrier in the stomach lining that blocks stomach contents from refluxing up into the esophagus. It neutralizes any excess acid and helps calm the symptoms of acid reflux and its various manifestations.

Formulations utilizing alginates have been used worldwide for over 30 years to relieve the symptoms of heartburn and esophagitis. Because of their unique actions, alginates offer relief that is rapid, often within a few seconds, and long-lasting – usually for several hours.<sup>8-11</sup> Because of its local influence and symptomatic relief, alginate-based formulations are used to relieve reflux symptoms in adults, children, and during pregnancy.<sup>8</sup>

Sodium alginate is found to help eradicate of *H. pylori* when combined with drug therapy.<sup>9,11,34</sup> Sodium alginate alleviates the pain of oral mucositis and reduces oral mucosa erosion due to radiotherapy.<sup>35</sup>

### Magnesium Glycyl Glutamine Chelate



Magnesium glycyl glutamine (MGG) is a patented, chelated form of glutamine, magnesium, and glycine made by Albion Labs. It offers a stabilized form of glutamine, which is the most abundant amino acid in the blood. Although glutamine is not an essential amino acid, it is considered conditionally essential because it becomes essential during times of stress and during the healing process. Levels decline markedly during periods of injury, illness, trauma, radiation therapy, and stress.<sup>36</sup>

Glutamine supplementation is found to enhance immune function. It reduces the rate of infection and degree of inflammation. It regulates intestinal barrier function and health and is protective of the intestinal mucosa.<sup>37-39</sup> Dysfunction of the intestinal mucosal barrier is associated with gut permeability and progression of multiple gastrointestinal diseases. Glutamine is found to promote intestinal mucosal cell differentiation and proliferation.<sup>40-46</sup>

Glutamine is utilized as a source of energy and for nucleotide synthesis by rapidly dividing cells, such as those of the intestinal lining and certain immune cells (thymocytes, lymphocytes, and macrophages). Glutamine supports intestinal function and is found to enhance healing from gastric and peptic ulcers. It is a vital nutrient used by both the intestinal immune cells (the lymphocyte-rich Peyer's patches) and mucosal cells.<sup>36</sup>

Glutamine exerts immunomodulatory activity. It demonstrates antioxidant activity and is a precursor amino acid for the production of glutathione.<sup>45,46</sup> Glutamine is also found to relieve radiation-induced oral mucositis.<sup>47-50</sup>



#### Mastic Gum (*Pistacia lentiscus*)

For centuries, Mastic gum has been highly valued for intestinal and digestive issues. Mastic gum is the exudate of *Pistacia lentiscus*, the mastic tree, which is native to the Greek Island Chios in the Aegean Sea. Mastic has been used in the Mediterranean region to treat gastrointestinal issues for several thousand years.<sup>51,52</sup> A shipwreck from the Bronze age was discovered in 1982 with cargo containing 100 jars of Mastic gum. Mastic gum was prized by the Egyptians and Arabs for medicinal use. The 13th century Arab physician, Ibn Al-Baytar, used Mastic gum to treat upper abdominal pain, heartburn, gastric ulcers, and intestinal ulcers.<sup>51-53</sup>

Studies show that Mastic exerts antibacterial activity and is highly effective against *H. pylori* both *in vivo* and *in vitro*.<sup>53-59</sup> It is found to be beneficial as a treatment for duodenal ulcers.<sup>60,61</sup> Mastic gum is found to reduce harmful bacteria in the mouth and is included in oral care products to help prevent periodontitis and gingivitis.<sup>62</sup>



#### D-Limonene from Orange Peel Oil

D-limonene is a monocyclic monoterpene with a lemony odor. It is a major constituent of numerous citrus oils including orange, lemon, mandarin, and lime. It is found to dissolve cholesterol and is used clinically to help dissolve cholesterol-containing gallstones. Limonene calms gastric acid, can help relieve heartburn, and supports healthy peristalsis.<sup>63-66</sup>

Limonene is found to calm inflammation in the intestinal walls.<sup>67</sup> An *in vitro* study suggests it may neutralize the effect of gastric acid by coating the stomach wall and protecting the mucosal lining from gastric acid exposure. It has a protective influence on epithelial tissues.<sup>65-67</sup> Limonene demonstrates significant anti-inflammatory activity *in vivo* and *in vitro*.<sup>67</sup>



#### Chamomile Flower (*Matricaria recutita*)

Chamomile is a beloved garden flower and home remedy. Its small yellow flowers brighten the garden and Chamomile is a traditional herbal known for its relaxing influence and ability to calm stomach upsets. It is noted for its anti-inflammatory, antiseptic, carminative, sedative, and spasmolytic activity. Chamomile also helps calm gastrointestinal muscle spasms. It is often used along with other herbs to treat colic in children.<sup>68,69</sup>

Active ingredients of Chamomile flowers include terpenoids, azulenes, flavonoids (including quercetin and apigenin), coumarins, and mucilage.<sup>70,71</sup> Chamomile is found to be protective of gut mucosa.<sup>72</sup>

Chamomile is also known as a mild sedative with its ability to calm the nervous system and reduce anxiety. It is often used along with other herbs to facilitate sleep. Studies suggest that it has the ability to inhibit cortisol production.<sup>73</sup>



#### Aloe Vera Gel (*Aloe barbadensis*)

Aloe Vera belongs to the Lily family (*Liliaceae*). Used in ancient Egypt, Aloe is represented in temple engravings dating to 4000 BC.<sup>74</sup> It is well-known for its healing benefits in many traditions including Ayurveda, Chinese medicine, and in areas where it grows including Africa and the tropics.

Ayurvedic medicine reveres Aloe as a Rasayana, or restorative herb. Traditional herbal medicine finds Aloe beneficial to clear heat, soothe inflamed tissue membranes, and promote healing. It is widely used to alleviate the pain, redness, and heat of sunburn and it will enhance skin healing from sunburn and other conditions.

Aloe gel demonstrates antibacterial, antiviral, antifungal, antioxidant, anti-inflammatory, and immunomodulatory capacity. It is known to enhance wound healing.<sup>75</sup> For these reasons, Aloe is found beneficial for oral health care as a mouthwash.<sup>76,77</sup>

Acemannan is considered the primary polysaccharide in the inner leaf. It is found beneficial to enhance cellular immunity and humoral immune response.<sup>78-80</sup>

Aloe gel exerts a soothing, alkalinizing effect on the stomach. It helps to calm stomach acidity and normalize stomach pH. Aloe functions as a probiotic and promotes the growth of healthy intestinal flora that metabolize polysaccharides.<sup>81</sup>

The gel is effective to soothe an inflamed esophagus, where it will promote tissue healing as it calms inflammation. Aloe



benefits acute and chronic gastric ulcers for the same reason.<sup>82,83</sup> It is found to calm GERD symptoms including heartburn and food regurgitation.<sup>84</sup>



### Papaya Leaf (*Carica papaya*)

Papaya is widely grown and enjoyed in tropical and subtropical countries around the world. Papaya leaves contain multiple compounds including papain, flavonoids, ascorbic acid, and others with notable antioxidative influence. Papain is an enzyme found in the bark, leaves, and fruit.<sup>85-87</sup>

Papaya leaf is used to treat indigestion and abdominal disorders. It is used for dyspepsia, hyperacidity, bloating, nausea, and flatulence.<sup>86,88</sup> Studies find Papaya leaf benefits those with gastric ulcers. It shows strong antioxidant activity and decreases oxidized lipids.<sup>88</sup> Papaya leaf is found to be beneficial to treat oral gingivitis.<sup>89</sup>



### Bee Propolis

Propolis is a unique, somewhat waxy compound made by bees from plant material they collect and use as a sealant to protect the hive. The color and chemical composition of propolis varies widely and is influenced by geographical location, the botanical species collected, and even by the bee species itself. Crude propolis contains around 50% resin, 30% wax, 10% essential and aromatic oils, 5% pollen, and 5% other organic materials, such as wood fragments.

Over 300 compounds have been found in propolis including flavonoids, aldehydes, amino acids, ketones, vitamins, fatty acids, and vitamins. The flavonoids are among the most researched compounds.<sup>90,91</sup> The main flavonoid constituents include quercetin, baicalin, and chrysin.<sup>90,91</sup>

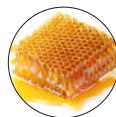
The word propolis is from Greek origin and means “defender of the city”. The powerful medicinal attributes of propolis were well-known by the ancient Greeks, Persians, and Romans. They valued it as a powerful antiseptic that enhanced wound healing. In modern times, propolis is recognized to offer powerful antimicrobial, anti-inflammatory, and immunomodulatory influence.<sup>92</sup> Propolis has a regenerative influence on tissues with wound-healing capacity. Studies find it beneficial for skin healing where it supports re-epithelization.<sup>93,94</sup>

Propolis is found to help prevent canker sores and to speed healing of the ulcers. Because of its antimicrobial action, propolis is used in a mouth spray or mouthwash to encourage tissue healing after gum surgery or other dental work. In dentistry, propolis is found effective as an

antibacterial to help address mouth ulcers and gingivitis.<sup>95</sup> It delays the growth and progression of skin changes in *Herpes simplex*. Propolis is found beneficial to support oral health in periodontal treatment as it helps prevent loss of alveolar process bone.<sup>96,97</sup>

Mucositis is a serious, acute complication of radiotherapy, which can cause oral mucosa ulceration. This induces severe pain and discomfort and can affect normal oral function. Propolis, rich in flavonoids, exerts antiulcer, antibacterial, antifungal, healing, and anti-inflammatory influence. A study with a water-based propolis extract found it prevents and heals radiotherapy-induced mucositis.<sup>98-100</sup>

The polyphenol CAPE (caffeic acid phenethyl ester) is a bioactive compound found in propolis that demonstrates antimicrobial, antioxidant, anti-inflammatory, and cytotoxic properties. It also exerts antiseptic, antibacterial, antifungal, astringent, and antiulcer qualities. Studies find that both propolis and CAPE inhibit the growth of *H. pylori*.<sup>101-106</sup>



### Manuka Honey

Manuka honey is a unique, unifloral honey derived from the Manuka tree, *Leptospermum scoparium*.

The Manuka tree belongs to the family Myrtaceae in New Zealand and the Eastern region of Australia. Manuka is a dark honey that has attracted a lot of attention especially in regards to its potential role in wound healing.<sup>107</sup>

Rich in flavonoids, Manuka exerts anti-inflammatory, antimicrobial, and antioxidant activity. It is also found to be gastroprotective.<sup>108,109</sup> Manuka is antimicrobial against a wide range of organisms including some antibiotic-resistant strains.<sup>111</sup> Through these mechanisms, it helps prevent gastric ulcer formation.<sup>112,113</sup>

Manuka honey is rich in methylglyoxal (MGO), a compound formed in the Manuka flower nectar and transferred into the honey by the bee. This compound, unique to Manuka honey, is found to help prevent gastric damage in rats exposed to caustic agents.<sup>110</sup> In animal studies it is found to significantly promote healing of gastric ulcer lesions and to preserve gastric mucosal glycoprotein.<sup>114</sup> Manuka honey is also found to be beneficial in those with mucositis.<sup>114,115</sup>



### Ginger Root (*Zingiber officinale*)

Ginger, a world-renowned and well-loved herb, has been used as a cooking spice, herbal remedy, and revered medicine for centuries. It is a valued household remedy for digestive upset, sore throat, colds, and flu. Traditionally, Ginger is found to warm chills, alleviate infection, reduce pain and fever, and to exert a mild

sedative influence.<sup>116</sup> Eclectic and Physiomedical physicians knew it as a stimulating tonic, stomachic, carminative, and antispasmodic agent. They used Ginger to treat nausea, GI cramping, and loss of appetite.<sup>117,118</sup> Modern studies find it to be beneficial for many types of nausea.<sup>119,120</sup> Ginger is found to be helpful in stress-induced IBS and animal studies report it is gastroprotective.<sup>121-123</sup>

Ginger demonstrates impressive antioxidant and anti-inflammatory activity.<sup>124-127</sup> Herbalists use Ginger to enhance the effectiveness of other herbs in a formula by supporting digestion and circulating the herbs.<sup>128</sup> Ginger's active ingredients include its many volatile oils.<sup>129-131</sup>



#### Lemon Balm Leaf (*Melissa officinalis*)

This popular home remedy is a member of the Mint family that is easily grown in the garden. It is valued as a calmative, often combined with other herbs. Lemon Balm is used to calm anxiety, soothe the nervous system, and promote sleep. It is beneficial to calm nervous digestive disorders and to ease indigestion.

Lemon balm works as a mild, relaxing antispasmodic. It is often used to calm colic, irritable bowel disease, and gastritis. It is rich in phenolic acids, especially rosmarinic acid. Rosmarinic acid is found to calm smooth muscle spasms. It also exerts antioxidant and anti-inflammatory influence.<sup>132-135</sup> Lemon Balm is also known as an antiviral<sup>134</sup> and is found to increase alertness, improve mood and cognition, and to be calming.<sup>136,137</sup>



#### Zinc Carnosine

Zinc, a non-toxic, biologically-essential trace mineral, is vital for almost all physiological processes. The only metal that is a coenzyme to all classes of enzymes, zinc is a key component of over 300 metalloenzymes. Zinc is essential for over 2000 transcription factors involved with gene transcription and regulation of lipid, protein, and nucleic acid metabolism.<sup>138-144</sup> About 10% of the human genome encodes for proteins that can bind to zinc.<sup>145</sup>

Necessary to maintain the structural integrity of DNA, zinc also plays a role in cellular metabolism, immune function, wound healing, and acts as a messenger in signal transduction. Because of the far-reaching influence of zinc, even mild zinc deficiency is deleterious to numerous biochemical and immunological functions.<sup>146</sup>

Serum zinc status is indicative of the protective ability of the gastric membrane from damage by *H. pylori*.<sup>147</sup> A meta-analysis of 19 studies involving an estimated 400,000 participants found zinc intake levels to be inversely associated with digestive tract cancers, especially colorectal cancer.<sup>148</sup>

Zinc carnosine, considered an antiulcer compound, is found beneficial for gastric ulcers.<sup>149</sup> It consists of a zinc ion, L-carnosine, a beta-alanine dipeptide, and L-histidine.<sup>150</sup> Zinc carnosine possess antioxidant action, which contributes to its gastric protective effect.<sup>147,151</sup> Zinc is found to enhance gastrointestinal epithelial barrier function and is protective of mucosal cells.<sup>149</sup> Zinc supplementation is found to benefit the treatment of oral mucosal diseases.<sup>152,153</sup>

*For more information on any of the ingredients listed here, including extensive research or individual monographs compiled by Donnie Yance, please email [info@naturaedu.com](mailto:info@naturaedu.com).*

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