

Integrative Approach to Gastrointestinal Wellness: Efficacy of a Traditional Chinese Herbal Tea Formula Containing Hemp Seed

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Abstract: This review delves into the escalating prevalence of intestinal diseases and the limitations of contemporary medical interventions, emphasizing the necessity for alternative, holistic approaches. Traditional Chinese Medicine, with its rich heritage in utilizing natural remedies, presents a compelling solution through a unique herbal tea formula. Central to this formula is the hemp seed, known in TCM for its capabilities to nourish and moisturize the intestines, alongside a blend of mulberry leaves, *Polygonatum odoratum*, *chrysanthemum*, and *Lycium barbarum*. This concoction is not only steeped in ancient wisdom but is also supported by scientific research elucidating the nutritional and pharmacological properties of its components. The article explores how this herbal tea formula contribute to intestinal health through anti-inflammatory, prebiotic, laxative, and antioxidant actions, offering a comprehensive approach to tackling gastrointestinal disorders.

Keywords: traditional Chinese medicine, intestinal diseases, hemp seed

1. Introduction

In recent years, the global landscape of health has seen a noticeable increase in the prevalence of intestinal diseases, including diseases such as irritable bowel syndrome (IBS), Crohn's disease, colorectal cancer, and widespread issues of constipation and digestive discomfort. These conditions significantly impact the quality of life, contributing to physical discomfort, psychological stress, and financial burden due to ongoing medical expenses and lost productivity [1]. Epidemiological studies have shown a rising trend in these diseases across both developed and developing countries, a phenomenon that cannot be explained by genetic factors alone but is also driven by changes in diet, lifestyle, and possibly increased exposure to environmental toxins [2, 3, 4, 5].

In this context, the wisdom of traditional Chinese medicine (TCM) offers a unique perspective, advocating for the prevention and treatment of diseases through natural means, including herbal remedies. One such remedy that has gained attention for its potential benefits in promoting intestinal health is a Chinese herbal tea, a blend crafted from centuries-old knowledge of the medicinal properties of plants.

At the core of this herbal tea is the hemp seed, revered in TCM for its nourishing properties and its ability to moisturize the intestines and alleviate constipation [6]. Complementing the hemp seed are mulberry leaves, *Polygonatum odoratum*, *chrysanthemum*, and *Lycium barbarum*. This herbal tea embodies the TCM principle of harmony and balance, aiming to treat not just the symptoms of intestinal diseases but the root causes, by nurturing the body's natural healing mechanisms and restoring equilibrium to the gut flora. The tea promises a gentle, yet effective, approach to enhancing digestive health, offering a beacon of hope for those suffering from the discomfort and challenges of intestinal diseases.

In the following sections, we will explore the scientific foundations behind the nutritional and pharmacological properties of hemp seed, the cornerstone of this herbal formula, and how the combined actions of the tea's ingredients can offer a comprehensive solution to improving gut health and well-being.

2. The history of hemp seed as traditional Chinese medicine

Hemp seed has a storied history in Traditional Chinese Medicine (TCM) that stretches back thousands

of years, marking it as one of the oldest and most versatile plants used in medical practices.

In TCM, hemp seed is known as "huo ma ren". The applications of hemp seed in TCM were multifaceted. Apart from addressing constipation, it was also used to nourish the body, improve the condition of the skin, and as a general health tonic. Its role in soothing the gastrointestinal system and promoting bowel movement without the harshness associated with some laxatives made it a preferred choice for maintaining digestive health.

Throughout history, the medical and nutritional uses of hemp seed were documented by various scholars and physicians in their compendiums. For instance, in the "Bencao Gangmu" (Compendium of Materia Medica), written by Li Shizhen in the 16th century, hemp seed is described in detail, indicating its significance in the pharmacopeia of the time. This comprehensive work compiled centuries of medicinal knowledge in China and is considered one of the most important texts in the history of Chinese medicine.

Despite the long-standing use of hemp in Chinese medicine, its reception in other parts of the world has been mixed, largely due to the psychoactive properties of other parts of the cannabis plant. Nonetheless, the distinction between the non-psychoactive hemp seed and other parts of the cannabis plant is being increasingly recognized, leading to a resurgence in the interest and use of hemp seeds for their nutritional and medicinal properties in line with traditional practices.

3. The main nutritional components of hemp seed

Hemp seeds, the edible part of the *Cannabis sativa* L. plant, have been utilized in traditional medicine and as a food source for thousands of years^[7]. Industrial hemp seeds contain negligible amounts of THC (tetrahydrocannabinol <0.3%), the psychoactive compound found in marijuana. Instead, they are packed with a wealth of nutrients that have profound health benefits^[8, 9].

3.1 Essential fatty acids

Hemp seeds is abundant in lipids, among which polyunsaturated fatty acids mainly include oleic acid, linoleic acid, linolenic acid, palmitic acid, eicosanodienoic acid, shoefillic acid and eicosemic acid. The saturated fatty acids were stearic acid, arachidic acid, myristic acid, caproic acid, 2-methyl-propionic acid, docosanic acid, xylowax acid, palmitic acid, etc. The corresponding esters are methyl oleate, ethyl linoleate, methyl stearate, methyl linolenic acid, ethyl linolenic acid, methyl palmitate, ethyl palmitate, trimethyl-dicyclic acetate heptyl ester, butyl dodecyl phthalate, ethyl-propylene sulfite, etc^[8].

Essential fatty acids including ω -3 and ω -6 fatty acids are those that cannot be synthesized by the human body and must be obtained from the external diet. Hemp seeds are remarkably rich in essential fatty acids, boasting a perfect ratio of ω -6 to ω -3 fatty acids (approximately 3:1), which is considered ideal for human health^[10, 11]. Excessive levels of ω -6 polyunsaturated fatty acids (PUFAs) and imbalanced ω -6/ ω -3 ratios are implicated in the pathogenesis of numerous diseases, including cardiovascular disease, cancer, inflammation, and autoimmune disorders.

These polyunsaturated fats are crucial for maintaining heart health, supporting neurodevelopment, and reducing inflammation^[12, 13]. Specifically, α -Linolenic acid, a type of ω -3 fatty acid found in hemp seeds, has been shown to have a moderating effect on inflammation, which can be particularly beneficial for inflammatory conditions of the gut^[14, 15].

3.2 Dietary fiber

The outer shell of the hemp seed is a good source of both soluble and insoluble fiber^[9]. Both types of fiber enhance gut motility—the movement of the digestive system that pushes contents forward. Insoluble fiber physically stimulates the intestinal walls, encouraging peristaltic movements, while soluble fiber's gel-like consistency prevents the stool from becoming too dense or hard, facilitating smoother transit through the intestines^[16].

What's more, soluble fiber absorbs water as it passes through the digestive system, which increases stool bulk and moisture. This process not only softens the stool but also increases its size, which is a key factor in stimulating the bowel movements necessary to relieve constipation^[16].

Dietary fiber also acts as a prebiotic, providing nourishment for beneficial gut bacteria. A healthy microbiome is associated with improved gut health and regular bowel movements. The fermentation of

some fibers in the colon also produces short-chain fatty acids (SCFAs) that may help to regulate fluid balance in the intestines and stimulate bowel movements [21].

Regular intake of dietary fiber helps to maintain a more consistent bowel movement pattern, which can prevent both constipation and diarrhea. This regulatory effect is crucial for long-term digestive health.

3.3 Protein

Hemp seeds are considered a complete protein source, meaning they provide all nine essential amino acids that the body cannot produce on its own (Table 1). The digestibility of hemp protein is particularly high, making it a valuable plant-based protein source [17, 18]. Proteins are essential for the repair and growth of body tissues, including the mucosal lining of the intestines, which is crucial for maintaining gut barrier function and overall intestinal health.

Table 1: The determination of 18 kinds Amino acids in hemp seed

Amino acid	Contents (mg/100mg)	Amino acid	Contents (mg/100mg)
Aspartic acid	1.099	Isoleucine	0.804
Threonine	0.357	Leucine	0.166
Serine	0.477	Tyrosine kinase	0.532
Glutamic acid	1.855	Phenylalanine	0.042
Glycine	0.48	Lysine	0.408
Alanine	0.42	Ammonia	0.02
Cystine	0.079	Histidine	1.466
Valine	0.58	Arginine	1.145
Methionine	0.414	Proline	0.52

3.4 Minerals

Hemp seeds are a good source of various vitamins and minerals, particularly P,K,Mg,Ca,Fe,Zn,Cua and Mn [19]. The iron content is relatively high among them, reaching 80.33mg/kg (Table 2). Iron serves as a crucial constituent of various oxidases such as hemoglobin, myoglobin, and cytochrome. It is closely related to hematopoietic function, oxygen transport, and intracellular biological oxidation processes. These trace elements are involved in the normal function of the human body and are also closely related to intestinal health.

Table 2: The determination of elements in hemp seed

Element	Contents (mg/kg)	Element	Contents (mg/kg)	Element	Contents (mg/kg)
Al	76.77	Fe	80.33	As	\
Ba	0.71	Mn	22.14	Cr	2.62
Cu	7.57	Zn	41.41	Se	0.26

3.5 Cannabinoids

Cannabinoids mainly exists in hemp leaf, stem and root, the content in seeds is very low. Cannabinoids in fruits mainly exist in the peel, including cannabinol, cannabidiol (CBD), tetrahydrocannabinol (THC), etc. [8]. THC is the active ingredient responsible for the addictive psychotropic effects of cannabis. Despite the low THC content in industrial hemp, there have been reported instances of individuals experiencing symptoms related to the digestive and nervous systems, such as nausea, vomiting, dizziness, and drowsiness within 1-6 hours after consuming food fried with hemp oil. Therefore, it is advisable to remove the peel and consume only the seed portion when consuming cannabis-infused food.

3.6 Other bioactive compounds

Hemp seeds are rich in tocopherols, chlorophyll, phytosterols and polyphenolic compounds. In European hemp seed oil products, the tocopherol content reaches 0.08%~0.11%, and the γ -tocopherol content accounts for 85%. Tocopherol and chlorophyll are beneficial for the oxidative stability and antioxidant effect of oil. In addition, 0.4% phytosterols were found in hemp seeds, mainly β -sitosterol, accounting for 73% of the total sterol content. Phytosterols can competitively inhibit the absorption of

cholesterol in human body, and thus have the function of lowering cholesterol. Hemp seeds also contains flavonoids, which have high antioxidant activity^[20]. Pharmacological studies of polyphenols have shown that they have pharmacological effects such as anti-cancer, anti-oxidation, antibacterial, lipid-lowering, and prevention and treatment of cardiovascular diseases.

4. Pharmacological action of hemp seed

The nutritional components of hemp seed provide a multi-faceted approach to supporting intestinal health. The essential fatty acids can help reduce inflammation in the gut, while the high-quality protein and antioxidants aid in repairing and maintaining the gut lining. The dietary fiber promotes regular bowel movements, preventing constipation, and potentially playing a role in the modulation of the gut microbiota, contributing to a healthy digestive system.

4.1 Anti-inflammatory properties

One of the distinctive pharmacological actions of hemp seed is its anti-inflammatory effect. The essential fatty acids, particularly gamma-linolenic acid (GLA) and alpha-linolenic acid (ALA), play significant roles in modulating the inflammatory response.

These fatty acids regulate the body's inflammatory response through a variety of molecular mechanisms. ω -3 PUFAs can change the composition of cell membrane fatty acids, regulate the size of lipid rafts related to lipid metabolism on the cell membrane, change the fluidity and permeability of the cell membrane, thereby changing the function of various receptors, enzymes and ion channels connected to the membrane, affecting lipid metabolism, ion metabolism and vasoconstriction. Additionally, the body metabolizes these fatty acids into anti-inflammatory compounds, such as prostaglandin E1, which can help reduce inflammation in the gut mucosa^[15]. This intervention is particularly beneficial for conditions like inflammatory bowel disease (IBD), where chronic inflammation leads to damage in the intestinal lining.

4.2 Modulation of the gut microbiota

The disruption of the delicate balance of the gut microbiota, often referred to as dysbiosis, plays a critical role in the pathogenesis of many intestinal diseases. Modern diets, high in processed foods and low in fiber, have been implicated in contributing to the deterioration of gut health. The dietary fibers present in hemp seeds, both soluble and insoluble, serve as prebiotics, feeding the beneficial bacteria in the gut. The fermentation of these fibers produces short-chain fatty acids (SCFAs), such as butyrate, acetate, and propionate, which have several beneficial effects on gut health^[21]. Butyrate, for instance, is a key energy source for colonocytes (the cells lining the colon) and has been shown to promote a healthy intestinal barrier, reduce inflammation, and protect against colon cancer^[22].

The impact of ω -3 polyunsaturated fatty acids (PUFAs) on the gut microbiota cannot be disregarded. Following supplementation with omega-3 PUFAs, a reduction in Faecalibacterium and an elevation in Bacteroidetes and butyrate-producing bacteria from the Lachnospiraceae family were observed within the gut microbiota. Dysbiosis of the gut microbiota is frequently observed in patients with inflammatory bowel disease. However, ω -3 PUFAs can exert a beneficial role by reinstating equilibrium to the gut microbiota of these patients and enhancing the synthesis of anti-inflammatory compounds such as short-chain fatty acids^[23].

The mixture of hemp seed oil and water could induce changes in the intestinal flora of mice, increase the proportion of Bacteroidetes and decrease the proportion of Firmicutes, and improve the biodiversity of intestinal bacterial community in mice^[24]. The research findings have also demonstrated that hemp seed oil can increase the levels of acetic acid and butyric acid and relieve constipation^[25]. The presented evidence suggests that hemp seeds can contribute to a balanced gut microbiota, crucial for overall gut health and the prevention of gastrointestinal disorders.

4.3 Gastrointestinal motility and laxative effect

The fiber content in hemp seeds is also instrumental in promoting gastrointestinal motility and preventing constipation. Insoluble fiber increases stool bulk and accelerates the passage of food and waste through the gut, while soluble fiber can help soften the stool by absorbing water, making it easier to pass. This dual-action supports regular bowel movements and can alleviate symptoms of constipation,

a common concern in the general population and particularly for individuals with certain gastrointestinal conditions [26].

4.4 Antioxidant properties

Hemp seeds contain various antioxidants, including vitamin E and a range of phytochemicals like cannabidiol, although in small quantities [9]. These antioxidants can neutralize free radicals in the body, reducing oxidative stress and inflammation. Oxidative stress is a contributing factor to the development and progression of several chronic diseases, including intestinal disorders [27,28]. By mitigating this stress, hemp seeds can help protect the gut lining and maintain the integrity of the intestinal barrier.

5. Advantages of the formula

The principle of synergy in traditional Chinese medicine (TCM) suggests that the combination of certain herbs can enhance their individual effects, leading to improved therapeutic outcomes. In this herbal tea formula, the ingredients work together to provide comprehensive support for gut health, while each herb chosen plays a distinct role in supporting the digestive system and overall gastrointestinal well-being.

This combination not only addresses the physical aspects of intestinal health, such as inflammation and bowel movement regularity, but also aligns with the holistic view of health in TCM, which includes the balance of internal organ systems.

5.1 Hemp seed

As discussed, hemp seeds offer a wide range of health benefits due to their anti-inflammatory, antioxidant, and fiber-rich properties. These tiny seeds are packed with essential nutrients that can support not only gut motility but also overall digestive health.

5.2 Mulberry leaf

Mulberry leaves have long been recognized for their remarkable ability to regulate blood sugar levels. However, their benefits extend beyond glycemic control and can positively impact digestive health as well. By preventing sudden spikes in blood sugar levels, mulberry leaves play a crucial role in maintaining the balance of gut bacteria [29].

Maintaining a healthy balance of gut bacteria is essential for optimal digestion and overall well-being. The diverse community of microorganisms residing within our intestines plays a vital role in breaking down food particles, absorbing nutrients efficiently, and supporting immune function. When we consume foods high in refined sugars or carbohydrates, our blood sugar levels tend to rise rapidly. This sudden surge not only affects our overall health but also disrupts the delicate equilibrium of gut bacteria. By promoting stable blood sugar levels through its natural compounds like 1-deoxynojirimycin (DNJ), mulberry leaves contribute to creating an environment conducive to beneficial bacterial growth while inhibiting the proliferation of harmful pathogens.

5.3 Polygonatum odoratum

Polygonatum odoratum is traditionally used for its moistening properties, beneficial for individuals with dryness symptoms according to TCM, which can extend to dry stools and constipation [30].

The active constituents of *Polygonatum odoratum*, such as flavonoids and saponins, exhibit hypoglycemic effects by inhibiting protein glycosylation, suppressing α -glucosidase activity, and reducing blood glucose levels. Additionally, *Polygonatum odoratum* can regulate the gut microbiota in obese rats, leading to increased production of short-chain fatty acids, improved intestinal motility and sensitivity, and alleviation of diarrhea. These findings suggest that *Polygonatum odoratum* may hold significant therapeutic potential for modulating intestinal microbiota in disease treatment.

5.4 Chrysanthemum

Chrysanthemum, a popular herbal flower used in traditional medicine across various cultures, especially in Asia, has several effects on intestinal health. It contains compounds that can influence gut

health in multiple ways.

Chrysanthemum flowers are rich in antioxidants, which can help protect the gut lining from damage caused by free radicals^[31]. This protection can maintain the integrity of the intestinal barrier, preventing issues like leaky gut syndrome, where harmful substances can enter the bloodstream from the gut.

The plant has been shown to possess anti-inflammatory properties, which can reduce inflammation in the gastrointestinal tract^[31]. This is beneficial for managing conditions such as inflammatory bowel disease (IBD), including Crohn's disease and ulcerative colitis.

Stress is known to negatively impact gut health, and Chrysanthemum tea has been traditionally used for its calming effects. By reducing stress, it indirectly benefits the gut, as stress can alter gut motility and permeability, leading to gastrointestinal issues. Consuming Chrysanthemum tea or extracts can also aid in digestion by stimulating bile flow and helping in the breakdown of food^[31]. This can alleviate symptoms of indigestion, such as bloating and gas.

5.5 *Lycium barbarum*

Lycium barbarum is rich in antioxidants, including zeaxanthin and lutein, which protect against oxidative stress. It's also known for its immune-boosting effects, vital for maintaining gut health and preventing infections. *Lycium barbarum* can modulate the expression of immune-related genes in the colon, augment innate immune function, facilitate short-chain fatty acid production, thereby bolstering host immune capacity. Additionally, *Lycium barbarum* can regulate the composition of the intestinal microbial community by increasing Firmicutes and Proteobacteria proportions while decreasing Bacteroidetes proportion within the gut tract. Furthermore, it stimulates the proliferation of potentially beneficial bacteria such as Bifidobacterium, Lactobacillus, and Akkermansia^[32].

6. Conclusion

The pharmacological actions of hemp seed, centered around its anti-inflammatory, prebiotic, laxative, and antioxidant, make it an invaluable component of a holistic approach to intestinal health. By addressing inflammation, supporting the gut microbiota, promoting regular bowel movements, and reducing oxidative stress, hemp seeds can contribute significantly to the management and prevention of various gastrointestinal disorders. This multifaceted pharmacological profile underscores the scientific rationale for including hemp seed in the Chinese herbal tea formula designed to improve intestinal health and demonstrates the potential of this traditional remedy in a modern therapeutic context.

In essence, this Chinese herbal tea, with its rich composition and promising health benefits, stands as a testament to the enduring relevance of traditional medicine in our contemporary quest for health and vitality. It offers not just a remedy but a pathway to a more harmonious state of health, inviting us to rekindle our connection with the natural world and its profound capacity for healing.

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