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ALTERNATIVE THERAPEUTIC APPROACHES FOR PARALYTIC ILEUS IN PERSIAN MEDICINE[1]

ALTERNATIVNI TERAPIJSKI PRISTUPI KOD PARALITIČKOG ILEUSA U PERZIJSKOJ MEDICINI

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SUMMARY

Paralytic ileus is a prevalent medical condition following surgery, exerting a significant financial impact on the healthcare system. Despite its considerable implications, there has been limited progress in advancing both diagnostic and curative approaches to address ileus. This study seeks to introduce alternative diagnostic methodologies rooted in Persian medicine (PM) for paralytic ileus. Our investigation involved a thorough review of literature, including The Canon of Medicine, and an exploration of various PM texts for relevant references. The findings were systematically compared with contemporary medi-

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cal documentation. According to Persian medicine, paralytic ileus is classified as a type of 'Gholanj' disease. Persian medicine physicians extensively documented this disease, presenting detailed insights. While some aspects of PM viewpoints and the etiology of intestinal obstruction were humoral-theory-based, a majority of his definitions align with current medical concepts. Additionally, Persian medicine physicians proposed numerous therapeutic approaches for managing ileus, such as the Hoghne method, rectal suppositories, topical application of medicines, sitz baths, and the use of laxatives. Gaining a deeper understanding of the pathophysiology and exploring alternative treatment options outlined in Persian medicine can prove valuable for future studies aimed at enhancing the management of paralytic ileus.

***Keywords**: gastrointestinal diseases, ileus, intestinal pseudo-obstruction, Avicenna, Persian medicine*

Introduction

Paralytic ileus is a temporary cessation of gastrointestinal motility that causes obstructive symptoms without any mechanical obstruction (Nazzani et al., 2019). It can be categorized into postoperative, metabolic, inflammatory, neurogenic, and drug-induced forms (Wattchow et al., 2021).

Postoperative ileus (POI) is a very common complication in patients undergoing an operation (Nantasupha et al., 2016). This condition is marked by symptoms such as nausea, vomiting, intolerance to solid food, abdominal distension, absence of bowel sounds, and an inability to pass flatus and feces. While this condition is more frequently observed following abdominal surgery, it poses a risk to all surgical patients (Matsui et al., 2022). POI is one of the most important factors affecting early patient recovery, post-surgical morbidity, and length of hospital stay. POI is a multifactorial complication of surgery and hence requires a multifactorial therapeutic approach. Several kinds of procedures have been attempted in clinical studies for the management of bowel function, such as motility agents, early oral feeding, adequate pain control, and physical therapy. However, due to their limited clinical efficacy, these approaches are not usually used in patients to treat POI. More attention to the pathophysiology of the disease and the use of alternative and complementary therapies may reduce the length of postoperative ileus, patient morbidity, and hospital costs (Bragg et al., 2015; Matsui et al., 2022; Sui, 2021).

Physicians in Persian medicine (PM) played an important role in medicine development. Iranian medical scholars, such as Hakim Azam Khan, Ahwazi, Aghili Khorasani, and many others, have extensively elucidated the characteristics and treatments of numerous diseases in their own books. One of the most promi-

nent and influential scientists in the history of PM is *Ibn-e-Sīnā,* who is popularly known as Avicenna in the Western world (Ghorat et al., 2017; Nasiri et al., 2023).

In PM, paralytic ileus has been described under the title of *Gholanj* disease (Aghili Shirazi, 2008; Avicenna, 2005; Chashti, 2008; Khadem et al., 2017; Majusi, 2009). The Gholanj chapter delves into the physiopathology and management of gastrointestinal obstructive disorders. Given the constraints of surgical procedures during that period, alternative therapeutic approaches were explored as effective and beneficial in addressing intestinal obstruction disorders resulting from compromised gastrointestinal function (Khadem et al., 2017).

This study aimed to offer alternative therapeutic strategies for postoperative ileus, encompassing considerations related to diet, medicinal treatments, and other procedures in Persian medicine (PM), and compare them with new scientific findings.

Methods

This paper undertakes an extensive exploration of PM texts and manuscripts, aiming to uncover potential insights into *Gholanj* disease from historically valuable sources. Our primary emphasis was on the contributions of six distinguished physicians from Medieval Persia: Avicenna (Al-qanun fi al-tibb), Hakim Azan Khan (Exir-e-Azam), Arzani (Teb-e-Akbari), Rhazes (Al Havi), Aghili Shirazi (Moalejat-e Aghili), and Jorjani (Zakhireye Kharazm Shahi). The traditional terminologies related to intestinal obstruction were investigated in the reference textbooks of Persian medicine (PM), specifically *Gholanj*, *Amaa*, and *Ilavoos*, using corresponding keywords. Furthermore, an exploration of original and review articles published from 2000 to 2023 was conducted across databases including Web of Science, PubMed, Scopus, and Embase, employing keywords such as 'ileus,' 'postoperative ileus,' 'pseudo-obstruction,' and 'intestinal pseudo-obstruction.'

Results

1. Etiology and Pathophysiology

Based on scientific evidence, the exact pathophysiology and etiology of ileus is incompletely understood because of the complexity and several factors involved. The term 'ileus' means colic, which is caused by intestinal obstruction. It is characterized by abdominal pain and distension, nausea, vomiting, and impairment of

defecation (Buchanan & Tuma, 2023). Several different types of ileus, including paralytic ileus (caused by intestinal muscle paralysis), dynamic ileus (caused by intestinal muscle contraction), postoperative ileus, and mechanical ileus (the result of an obstruction), have been described (Nasiri et al., 2023). Excluding mechanical conditions, these symptoms have been variously named as adynamic ileus or colonic pseudo-obstruction, per the level of bowel distention (Agah et al., 2015). Bowel motility reduction after surgery has been reported since the 1800s (Beach & Jesus, 2023). Because of the multifactorial etiology of the disease, various strategies are used to manage it (Nantasupha et al., 2016). Mechanism of gastrointestinal function is complex. It requires the coordination of motor and secretory activities of the gastrointestinal tract. The release of secretory fluids and GI motility is controlled by a variety of hormones, neural systems, and other factors, including osmolarity, pH, luminal distension, and concentration of digestive products. Also, these stimuli can create excitatory or inhibitory responses in the parasympathetic or sympathetic system (Furness, 2012; Matsui et al., 2022). Recent experimental studies have demonstrated that the pathophysiology of ileus is complex and multifactorial, consisting of pharmacological and endogenous characteristics (Agah et al., 2015). Activation of inhibitory neural pathways by nociceptive stimuli leads to an inhibition of propulsive mechanisms, which resolves shortly after closure of the abdomen. This condition leads to the formation of an inflammatory infiltrate in the gastrointestinal muscularis layer that results in a further prolonged phase of the ileus (Sui, 2021). Recent experimental evidence demonstrated that reduction of surgical stress and anti-inflammatory interventions, such as vagal stimulation, as potential targets to treat postoperative ileus and reduce the period of intestinal hypomotility can be used. Activation of nicotinic receptors on inflammatory cells by vagal input attenuates inflammation and promotes gastrointestinal motility in experimental models of ileus (Nasiri et al., 2023; Sui, 2021).

In the PM textbook, there is no term that refers to postoperative ileus. According to the main physiopathology of this disorder, which is a type of functional intestinal obstruction, this disorder is largely consistent with a type of disorder called *Gholanj* (Aghili Shirazi, 2008; Arzani, 2009; Jorjani, 2001; Razes, 2001).

Based on PM, *Gholanj* disease is a general term that refers to any abdominal pain due to obstruction of gas passing and defecation. This disease includes a range of intestinal disorders. Its common characteristics are inadequate intestinal movement and inability to pass flatus and defection (Avicenna, 2005) (Chashti, 2008). Paralytic ileus is one of the subtypes of *Gholanj* disease. This disorder is completely different from simple abdominal pain discussed under the title of

'*Maghs*' in the aspect of passage or non-passage of the intestinal contents (Aghili Khorasani, 2009; Chashti, 2008; Razes, 2001).

Colon is involved in the *Gholanj* disease. If the pathology of *Gholanj* occurs in the small intestine, this disease is known under another name, '*Ilavoos*' (Avicenna, 2005; Razes, 2001). Avicenna considered the pathophysiology and treatment of *Ilavoos* to be the same as *Gholanj*, but the prognosis of *Ilavoos* is less favorable than of *Gholanj* and mostly leads to death (Avicenna, 2005). The symptoms of the disease are abdominal pain, nausea and vomiting, abdominal swelling, inability to defecate and pass gas, phlegm, and decreased appetite. In severe cases, inability to urinate, thirst, chills, and unconsciousness may occur (Chashti, 2008). The most important physiopathology of this disease is intestinal obstruction disorder. This obstruction agent may be mechanical and/or functional and formed due to the accumulation of gas and secretion of some material into the intestinal lumen (Aghili Shirazi, 2008; Avicenna, 2005). *Gholanj* is divided into six categories on the basis of the etiology of disease:

1) Secretory: accumulation of mucus in the intestinal lumen.
2) Inflammatory: inflammation in the intestinal wall or inflammation of surrounding organs.
3) Flatulency: high gas accumulation in the lumen that leads to intestinal obstruction.
4) Sterrcoral: a colonic obstruction caused by the accumulation of fecal masses.
5) Torsion: intestinal torsion or bowel hernia.
6) Parasitic: accumulation of worms and parasites forming, which creates a mass in the colon

It seems that according to the physiopathology of ileus in modern medicine, paralytic ileus is compatible with Flatulency or Secretory *Gholanj* (Chashti, 2008).

2. Managements/ treatment

A recent review of the evidence shows that the management of paralytic ileus requires time and supportive treatment. Historically, bowel rest, intravenous fluid therapy, and nasogastric decompression were thought to be important steps to lower complications and improve outcomes. However, recent evidence shows that these treatments do not improve outcomes as previously thought (Wattchow et al., 2021).

Chewing gum has been studied and seems to be a cheap, well-tolerated way to potentially help with ileus as it stimulates the cephalocaudal reflex, which

promotes peristalsis and inhibits inflammation (Yin et al., 2023). Recent studies revealed that pharmacologic agents such as sympathetic inhibitors, parasympathetic stimulators (neostigmine), hormonal agents (cholecystokinin, motilin), and erythromycin have been ineffective in the management of paralytic ileus (Zia et al., 2023). The underlying condition must be treated to manage the ileus. Treating the infection, electrolyte abnormalities, and decreasing opiate use can all potentially decrease the durability of the ileus. These can be difficult to treat in the case of prolonged illness with mechanical ventilation and septic shock that leads to lengthy bed-bound periods (Yin et al., 2023; Wattchow et al., 2021). Thus, alternative methods can probably be considered for the management of paralytic ileus (Ghorat et al., 2017).

Based on PM, functional obstruction (paralytic ileus) is compatible with flatulency or secretory *Gholanj* (Khadem et al., 2017). In PM, various methods exist for managing functional obstruction (Moradi et al., 2016). The main treatment strategy revolves around the usage of medicinal herbs and specific recommendations. These medicinal herbs are applied using specific methods. The instructions of PM for managing functional bowel obstruction are as follows (Chashti, 2008).

2.1. Enema (Hoghne) method

In Persian Medicine, the primary and foremost therapeutic approach recommended for *Gholanj* disease is the administration of enema. Within this procedure, a rectal injection is administered, delivering an oil-based liquid containing herbal extracts infused from medicinal laxative plants (Chashti, 2008). In this procedure, a liquid with an oil base, enriched with extracts from medicinal laxative plants, is introduced into the rectum. Sesame oil is the predominant choice for the enema base, although alternatives such as olive oil, almond oil, violet oil, castor oil, flax oil, and duck fat are also cited. These oils possess laxative properties and contribute to the therapeutic enhancement of intestinal function (Table 1.) (Mahmoudi Nezhad et al., 2015; Tabaraei et al., 2018). Plants such as anise, cumin, and chamomile have been recommended for use in enemas, often possessing either laxative properties, promoting improved digestive function, or both. Based on PM sources, the plants recommended for enema use in managing functional obstruction (flatulency or secretory *Gholanj*) are outlined in Table 1. Additionally, the pharmacological effects or enhancement of the digestive system by these plants have been compared with evidence from scientific studies.

Based on PM sources, in the initial stages of ileus, it is advisable to incorporate mild laxative herbal remedies into the enema solution, particularly when there is an absence of gas passage and defecation (2005; Aghili Shirazi, 2008; Avicenna).

As intestinal functions gradually regain normalcy, the laxative component of the solution can be incrementally heightened. However, the use of severe laxatives like Citrullus colocynthis (L.) Schrad is contraindicated, whether administered orally or in an enema solution, especially during the early phase of the disease or in the presence of complete intestinal obstruction (Ahvazi, 1973; Jorjani, 2001; Razes, 2001). It is advisable to use the enema solution at a warm temperature, with a moderate concentration and volume. Furthermore, there is an emphasis on the necessity of repeating the enema procedure, even in the absence of fecal excretion, after several attempts (Majusi, 2009). The use of oral medication for *Gholanj* treatment is contraindicated, particularly in cases of complete intestinal obstruction with no passage of intestinal contents (Avicenna, 2005).

Table 1. The most common plants recommended for enema therapy.

Medicinal plant	**Common name**	**Traditional name**	**Traditional use**	**Pharmacological effect**
Apium graveolens L.	Celery	Karafs	Regulate the evacuation of bowel	Anti-inflammatory, antioxidant (Kooti et al., 2014)
Pimpinella anisum L.	Anise	Anisoon	Carminative, abdominal pains relief	Decreased appetite, antioxidant, muscle relaxant, and analgesic (Shojaii et al., 2012)
Bunium persicum (Boiss.) B.Fedtsch.	Black Cumin	Zireh Kermani (Zireh Siah)	Carminative, antispasmodic, astringent and used in the treatment of diarrhea, dyspepsia, colic (27)	Antioxidant, inhibitory effects on smooth muscle contractions induced by the spasmogens (Johri, 2011)
Ferula persica Willd.	Ferula	Sakbinaj	Abdominal pains relief	Anti-inflammatory (Sattar & Iranshahi et al., 2017)

Dorema ammoniacum D.Don.	Ammoniac gum	Oshagh	Antispasmodic	Diuretic (Delnavazi et al., 2015)
Foeniculum vulgare Mill.	Fennel	Raziyaneh (Badiyan)	Laxative, abdominal pains relief, antiemetic, colic in children	Anti-inflammatory, anti-allergic (Badgujar et al., 2014)
Cordia Myxa L.	Lasura	Sepestan	Lenient	Analgesic, anti-inflammatory (Ranjbar et al., 2013)
Ruta graveolens L.	Rue	Sodab	Carminative	Anti-inflammatory, antioxidant (Rath-eesh et al., 2009)
Ricinus communis L.	Ricinus	Karchak	Laxative	Intestinal colic (Scarpa & Guerci, 1982)
Carthamus tinctorius L.	Safflower	Ghortom	Analgesic	Antioxidant, analgesic, anti-inflammatory (Asgarpanah & Kazemivash, 2013)
Linum usitatissimum L.	Flax	Katan	Regulate the evacuation of bowel	Anti-inflammatory, analgesic (Kaithwas & Mukherjee, 2011)
Beta vulgaris L.	Beet	Choghondar (Selgh)	Laxative	Anti-inflammatory, antioxidant (Ninfali & Angelino, 2013)
Viola odorata L.	Sweet violet	Banafsheh (Banafsaj)	Laxative	Anticancer (Fazeenah & Quamri, 2020)
Althaea officinalis L.	Marshmallow	Khatmi	Laxative	Anti-inflammatory and anti-gastric ulcer (Hage-Sleiman et al., 2011)
Tribulus terrestris L.	Bindii	Kharkhasak (Hasak)	Laxative	Diuretic (Qureshi et al., 2014)

Anethum graveolens L.	Dill	Shevid (Shebet)	Carminative, stomachic, and diuretic	Relieve colic pain and flatulence, carminative, mildly diuretic, relieves intestinal spasms, and griping, helping to settle colic (Jana & Shekhawat, 2010)
Ficus carica L.	Fig	Anjir (Tin)	Laxative	Liver diseases (Badgujar et al., 2014)
Astragalus hamosus L.	Milk vetch	Eklilol-malek (Nakhonak)	Laxative	Enhance colonic antioxidant capacity and decrease inflammation and acute colonic injury (Tanideh & Bahrani, 2016)
Matricaria chamomilla L.	German chamomile	Baboonaj (Babooneh)	Laxative	Antispasmodic activities (Mehmood et al., 2015)
Ziziphus jujuba Mill.	Jujube	Annab	Laxative	Laxative (Daneshmand & Zare-Zardini, 2013)
Origanum majorana L.	Marjoram	Marzanjoush (Marzangoush)	Carminative, antispasmodic	Anti-inflammatory, antioxidant, and laxative (Khan et al., 2011)
Trigonella foenum-graecum L.	Fenugreek	Shanbalileh (Holbah)	Laxative	Laxative (Ulbricht et al., 2017)
Brassica oleracea L.	Wild cabbage	Kalam	Laxative	Digestive, tonic, laxative, and stimulant (Melchini & Traka, 2010)

2.2. Rectal suppositories

Various suppositories containing plant laxatives are suggested to enhance intestinal function and alleviate symptoms associated with obstructions (Aghili Shirazi, 2008; Arzani, 2009; Avicenna, 2005; Chashti, 2008). However, it is worth noting that enema proves to be more effective than suppositories. In situations where

enema use is limited, opting for suppositories is recommended as a convenient alternative (Jorjani, 2001; Razes, 2001). The medicinal composition of suppositories is nearly identical to that of enemas (Table 1.), with the distinction lying in the fewer components with potent laxative effects in the enema formulation.

2.3. Topical application of medicines

In Persian Medicine, addressing digestive disorders includes a therapeutic approach known as topical application of medicines on the abdomen (Ghorat et al., 2017; Mahdavi et al., 2020). According to the beliefs of Persian Medicine physicians, applying gastrointestinal medications topically on the abdomen is deemed more effective than oral administration (Avicenna, 2005). In PM, various methods exist for the topical application of medications to treat gastrointestinal disorders. Consequently, one of the complementary treatments for *Gholanj* disease involves anointing the abdomen with oils in a warmed form (Chashti, 2008). The application of oils such as almond oil, chamomile oil, and dill oil to the abdomen not only enhances intestinal function but also provides relief from pain (Aghili Shirazi, 2008). The synergistic effects of these oils are heightened when used in conjunction with gastrointestinal herbal medicines (Avicenna, 2005).

Another approach to the topical application of medicine is the use of abdominal poultices, known as *'Zomad'* (Avicenna, 2005). This method proves particularly beneficial when patients are unable to take medications orally or in the form of an enema (Razes, 2001). For instance, a recommended poultice is crafted from Matricaria chamomilla L., Viola odorata L., and barley flour. Another poultice formulation involves C. colocynthis and Carthamus tinctorius L. Additionally, a prescription includes a poultice made from cow gallbladders, with or without C. colocynthis, along with duck fat (Avicenna, 2005; Chashti, 2008).

Takmid represents an additional therapeutic approach for addressing digestive system disorders (Arzani, 2009). In this method, a heated mixture comprising ingredients such as salt, millet, and powdered cumin seeds from medicinal plants, with or without the addition of olive oil, is applied to the abdomen. Avicenna posited that the transfer of heat from these materials to the intestine contributes to alleviating bloating and gastrointestinal pain in patients. This technique is particularly advocated for instances of intense bloating and abdominal pain (Avicenna, 2005).

2.4. Sitz bath

The sitz bath emerges as a highly beneficial method for managing *Gholanj* pain and enhancing gastrointestinal movements, particularly in cases where the symp-

toms of gastrointestinal obstruction are not severe. In this approach, the patient sits in a bath filled with warm water for several minutes (Avicenna, 2005). It is crucial for the water to envelop the entire abdominal and side areas while avoiding coverage of the chest and heart. The patient should have an empty stomach and maintain a stable condition. The use of mineral water or water infused with digestive system-beneficial medicinal plants enhances the effectiveness of the sitz bath (Jorjani, 2001). For instance, immersing oneself in a bathtub filled with warm water and the extracts of M. chamomilla, Althaea officinalis L., and Malva sylvestris L. proves to be efficacious (Chashti, 2008).

2.5. Laxatives

As a rule, oral use of powerful laxatives in *Gholanj* disease is prohibited, especially in the earlier stages of the disease when there is no sign of intestinal movement and defecation (Chashti, 2008). According to *the Canon of Medicine,* when intestinal movements can be achieved with enema and suppositories, there is no need to use laxatives (Avicenna, 2005). After the gradual start of the intestinal movement and gas and fecal excretion, use a minimal quantity of laxatives such as *Aloe vera* (L.) Burm.f., *Convolvulus* arvensis L., and *C.colocynthis* is recommended. These medicines are applied in combination with other laxative medicines, either orally or in an enema solution (Avicenna, 2005; Razes, 2001).

2.6. Pain relief recommendations

The effectiveness of medicinal plants administered through an enema to relieve the pain of functional intestinal obstruction surpasses other methods (Chashti, 2008). Pain relief is also achieved through the application of poultices, indulging in a warm sitz bath, and sipping on warm water. Mary fumigation extract enema is specifically recommended for pain relief, as suggested (Aghili Shirazi, 2008). It is cautioned against using narcotics for pain relief, as they not only eliminate intestinal sensation but may also exacerbate the underlying causes of the disease (Avicenna, 2005).

Discussion

Postoperative ileus manifests as a functional gastrointestinal obstruction in the surgical ward, characterized by a lack of defecation and flatus, an inability to tolerate enteral nutrition, and the presence of abdominal pain and distension. While numerous therapeutic approaches have undergone clinical trials, their limited clinical efficacy has led to their exclusion from practical use (Chashti, 2008).

PM offers a diverse range of treatment methods for various diseases, serving as a potential source for innovative therapeutics. In this study, our aim was to explore postoperative ileus from the perspective of PM. We elucidated the substantial alignment between postoperative functional ileus and the Flatulency and Secretory types of *Gholanj* disease in PM. Additionally, we provided a comprehensive explanation of effective supportive treatments and herbal remedies cited in PM for managing this disorder. To the best of our knowledge, this is the first study that delves into the presentation of supportive management for functional ileus based on PM sources. While our previous study briefly examined postoperative ileus and its alignment with PM, this current study represents the first comprehensive exploration and a more detailed description of postoperative ileus from the perspective of PM. Moreover, Moradi et al. focused on various types of *Gholanj* but did not address the subject of postoperative ileus and its related treatments.

Avicenna's Canon suggests that symptoms of certain types of *Gholanj* disease closely resemble those of functional ileus or intestinal functional obstruction (Avicenna, 2005). The fundamental treatments for non-mechanical obstruction-related *Gholanj* disease are akin and encompass dietary measures, enema solutions, suppositories, and the use of medicinal plants.

Experimental studies have delineated two principal phases in the pathogenesis of postoperative ileus: the neural phase and the inflammatory phase. The neural phase is triggered by the stimulation of mechanoreceptors through skin incision and bowel manipulation, subsequently activating the sympathetic system and inducing hypomotility of the gastrointestinal tract. The inflammatory phase is initiated by bowel manipulation, sparking an inflammatory response in the cells of the bowel muscle layer. This process leads to the release of nitric oxide, impairing intestinal smooth muscle cell contractility and resulting in generalized hypomotility of the gastrointestinal tract (Nasiri et al., 2023). Consequently, recent studies have shifted focus towards anti-inflammatory treatments (Buchanan, 2023).

Scholars of PM have suggested using enema with medicinal plants as the main strategy in the treatment of functional obstructions (Avicenna, 2005; Chashti, 2008). Recent documents have demonstrated that enema is a strong treatment method in colonic pseudo-obstruction and most intestinal inflammatory disorders such as IBD (Cohen & Woseth, 2000; Crispino et al., 2015; Durai, 2009). In these studies, a topical anti-inflammatory medicine is applied for treatment (Cho et al., 2015). The application of medicinal plants enema probably has a positive effect on the improvement of gastrointestinal movement after surgery, especially in surgeries without direct intestinal manipulation (Khorana et al., 2015).

Based on PM, the use of warm extracts of medicinal plants in an oil base inside the rectum and sigmoid colon by enema can stimulate the parasympathetic system of the sacral area. This stimulation can cause a general increase in intestinal nervous activity, besides activating excretion reflux and strengthening gastrointestinal movements.

Suppositories are another treatment recommended for intestinal functional obstructions in PM (Avicenna, 2005). Recent documents have demonstrated that the use of laxative suppositories can be effective in the improvement of postoperative ileus. Wiriyakosol reports that bisacodyl suppositories can be safe and effective in treating postoperative ileus after colectomy in colon cancer patients (Wiriyakosol et al., 2007).

Theoretically, it seems that the application of enema and laxative suppositories for stimulation of bowel motility can be effective methods for rapid improvement of postoperative ileus. Due to almost local application and minimal absorption, these methods are safe. However, it may be damaging for anastomotic healing because of strong stimulation of the bowel activity.

According to Avicenna, the use of narcotics is contraindicated for pain relief in patients with obstruction. He believes that although narcotic medicine reduces the pain in the earlier stages of the disease, it may finally lead to the escalation and prolongation of the disease (Avicenna, 2005). Recent experimental studies have also demonstrated that the pathogenesis of postoperative ileus can be related to the use of narcotics and opioids. These medicines cause inhibitory effects on gastrointestinal movement, thereby aggravating postoperative ileus. Also, the studies demonstrate the dose-dependent relationship between the amount of received morphine and the time taken to regain bowel function (Delaney, 2004; Vather & Bissett, 2013).

Most medical plants that are recommended in enema solutions or suppositories, such as cumin, chamomile, and fennel, have potential biological effects, including analgesic, anti-inflammatory, anti-anxiety, and antispasmodic activities, which provide a pharmacological basis for their use in gastrointestinal disorders such as colic (Bahmani et al., 2014; Mahdavi et al., 2020).

Due to restrictions on the use of oral medications in ileus disease, effective medicinal plants for gastrointestinal function can be used by enema to reduce the duration of ileus and rapid recovery of intestinal movement.

Conclusion

Paralytic ileus is a common complication of surgery, with unfavorable consequences for patients and healthcare systems without any proven treatment for its management. Avicenna described this condition as *Gholanj* disease. Various instructions are discussed for the management of this condition. The main strategy for the treatment of *Gholanj* is the enema method. Based on Avicenna's viewpoint, stimulating gastrointestinal movement through an enema can help with faster recovery of gastrointestinal function. Further clinical trials are suggested in this field.

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SAŽETAK

Paralitički ileus učestalo je zdravstveno stanje koje se pojavljuje nakon operacije, a koje ima znatan financijski utjecaj na zdravstveni sustav. Unatoč njegovim značajnim implikacijama, postignut je maleni napredak u unapređenju dijagnostičkih i kurativnih pristupa u liječenju ileusa. Ova studija nastoji predstaviti alternativne dijagnostičke metode kod paralitičkog ileusa, koje imaju korijene u perzijskoj medicini. Naše istraživanje uključivalo je temeljit pregled literature, uključujući Kanon medicine (The Canon of Medicine) te istraživanje različitih tekstova u perzijskoj medicini. Nalazi su sustavno uspoređivani sa suvremenom medicinskom dokumentacijom. Prema perzijskoj medicini, paralitički ileus klasificira se kao vrsta Gholanj bolesti. Perzijski liječnici opsežno su dokumentirali ovu bolest, iznoseći detaljne uvide. Dok su neki aspekti gledišta perzijske medicine i etiologije crijevne opstrukcije bili temeljeni na humoralnoj teoriji, većina definicija usklađena je s trenutačnim medicinskim konceptima. Uz to, perzijski su liječnici predložili i brojne terapijske pristupe za liječenje ileusa, kao što su Hoghneova metoda, rektalni supozitoriji, lokalna primjena lijekova, sjedeće kupke i uporaba laksativa. Stjecanje dubljeg razumijevanja patofiziologije i istraživanje alternativnih mogućnosti liječenja opisanih u perzijskoj medicini može se pokazati vrijednim za buduće studije usmjerene na poboljšanje liječenja paralitičkog ileusa.

Ključne riječi: *gastrointestinalne bolesti, ileus, intestinalna pseudoopstrukcija, Avicena, perzijska medicina*