



RESEARCH ARTICLE

Home Remedies for Haemorrhoids: Bridging the Gap Between Folk Medicine and Modern Healthcare Via Metabolomic Compounds

Liyana Amalina Adnan¹, Tg Ainul Farha Tg Abdul Rahman¹, Zulkarnin Zakaria¹, Awwab Abd Zaman@Bakri¹, Mohamad Ikwan Hami Ismail¹, A'wani Aziz Nurdalila^{1,2*}

¹Kolej PERMATA Insan, Universiti Sains Islam Malaysia, Bandar Baru Nilai, 71800 Nilai, Negeri Sembilan Malaysia.

²Institute of Fatwa and Halal, Universiti Sains Islam Malaysia, Bandar Baru Nilai, 71800 Nilai, Negeri Sembilan Malaysia.

ARTICLE INFO

Received: Sep 16, 2025

Accepted: Nov 29, 2025

Keywords

Book of Turath
Haemorrhoid
Botanical Therapies
Traditional Remedies
Modern Healthcare
Metabolomic Compounds.

*Corresponding Author:

nurdalila.awani@usim.edu.my

ABSTRACT

This article dives into the interesting world of Book of Turath remedies for hemorrhoid, with the goal of bridging the gap between folk medicine and modern healthcare. Haemorrhoids, also known as piles, are swollen and inflamed blood vessels located in and around the anus and lower rectum. They can cause discomfort, pain, itching, and bleeding. It has long been treated with a variety of methods, including those based on traditional knowledge passed down through Book of Turath, or historical literature. The knowledge inherent in these remedies is done by collecting and analysing relevant passages from Book of Turath manuscript and dives into the botanical, mineral, and lifestyle-based therapies, highlighting their potential efficacy and safety. This article also takes a critical stance by comparing these traditional approaches with modern medical interventions for haemorrhoids. By analyzing the chemical composition, mechanisms of action, and clinical evidence of both traditional remedies and modern treatments, the aim of this study is to identify possible points of convergence and divergence of integrating Book of Turath knowledge into modern healthcare practices. Ultimately, this article endeavors to provide a comprehensive understanding of home remedies for haemorrhoids, fostering a dialogue between traditional healing practices and evidence-based modern medicine that could potentially enrich the therapeutic landscape for this common ailment.

INTRODUCTION

Haemorrhoids are a common medical ailment affecting the anal and rectal regions. They are vascular structures found in the anal canal, and their major purpose is to help with bowel movement management by providing a cushioning effect during stool transit. Haemorrhoids can become problematic when they become swollen, inflamed, or irritated. This condition can cause discomfort, pain, itching, and bleeding, especially during bowel movements (1).

Haemorrhoids are classified into two main types based on their location and severity. There are internal Haemorrhoids that occur inside the rectum and are not visible from the outside. They are usually painless and are often associated with bleeding during bowel movements. The other is external Haemorrhoids, these develop under the skin around the anus and are visible from the outside. They can be painful and may cause itching and irritation (1).

Although the precise source of haemorrhoids is not always known, various factors might contribute to their development, including straining during bowel movement, chronic constipation or diarrhea, sitting for prolonged periods, obesity, pregnancy, aging, genetics and a sedentary lifestyle. Aspects of modern living that may contribute to haemorrhoids include increasing consumption of processed foods, a sedentary lifestyle, and the use of cell phones while defecating, which amounts to much more

time spent on the toilet. Haemorrhoids are diagnosed with a history and physical examination rather than laboratory tests or imaging investigations (2).

Haemorrhoids are normally diagnosed by a physical examination of the anal and rectal areas by a healthcare expert. Additional tests, such as anoscopy or sigmoidoscopy, may be conducted in certain situations to rule out other potential disorders and establish the severity of the haemorrhoids. It is critical to determine if the symptoms are due to haemorrhoids or another anorectal condition. Hemorrhoidal symptoms are connected to the position of the enlarged hemorrhoidal tissue in relation to the dentate line. Internal haemorrhoids are found around the dentate line and are frequently accompanied by painless bleeding. Sharp discomfort with bowel motions is most often the result of an accompanying fissure (3)(4).

Internal haemorrhoids that are enlarged may also prolapse, producing pruritus ani or faecal soiling symptoms. Internal haemorrhoids that are symptomatic but do not prolapse are classed as first degree. Second-degree haemorrhoids prolapse and naturally shrink (3). Manual reduction of the prolapsed tissue is required for third-degree haemorrhoids. Fourth degree haemorrhoids cannot be reduced. External haemorrhoids are those that are found distal to the dentate line (4).

Treatment for haemorrhoids can vary depending on the severity of the condition. Mild cases can often be managed with lifestyle changes, such as increased fiber intake, maintaining proper hydration, and avoiding straining during bowel movements. Over-the-counter creams and ointments may help alleviate symptoms like itching and discomfort.

For more severe cases, medical interventions might include rubber band ligation use a technique in which a rubber band is wrapped around the hemorrhoid's base to cut off its blood supply, causing it to shrink and fall off, sclerotherapy use injection of a chemical solution into the hemorrhoid to cause it to shrink, infrared coagulation use infrared light to coagulate and shrink the hemorrhoid and hemorrhoidectomy is surgical removal of the hemorrhoid, usually reserved for severe cases.

Many patients tried avoiding surgical procedures. The home treatment or traditional way of treating the haemorrhoids using herbal treatment are the alternative of the present surgical methods are widely used. This might be due to the fact that herbal treatments constitute easily accessible, less toxic and affordable natural healing agents (5)(6). This leads haemorrhoid patients to seek out and obtain conventional haemorrhoid treatment techniques and Book of Turath is one of the reference materials for haemorrhoids patients seeking homoeopathic therapy through home remedies.

Haemorrhoids treatment in Book of Turath

The book chosen is a Malay medical book titled Kitab Tayyib Al-Ihsan Fi Tibb Al-Insan, written in Malay (Bahasa Melayu) and uses Jawi script. This book was chosen because it is a Malay-Jawi medical book that talks about the classical medical science system by using the principle of experimentation and the use of various local sources of medicine.

This book contains 14 chapters in all talking about the traditional treatment of a disease. In this study, Haemorrhoids was selected as one of the samples to be discussed. Thus, the original text of the introduction and the suggestion of treatment from the original text of the Kitab are presented in the following paragraph. The author describes about hemorrhoids, a disease in which the veins in the anus and lower rectum swell. The pain felt like it was on fire and very itchy because of the swelling (Figure 1). Causes of hemorrhoids includes straining during bowel movements, having chronic diarrhea or constipation or having anal intercourse. Thus, the original text of the introduction and the suggestion of treatment from the original text of the Kitab are presented in the following paragraph.

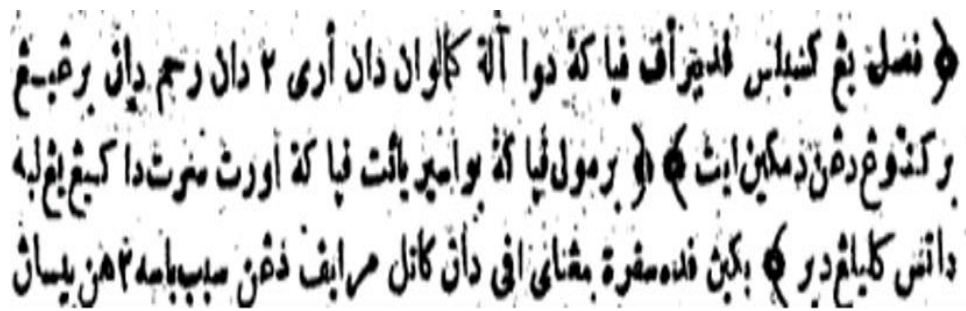


Figure 1: Original text in Malay Jawi script in Book of Turath mentioning hemorrhoids.

According to the guidance given in the Book of Turath, treating haemorrhoids involves incorporating conventional remedies that have been passed down through generations. Natural substances and holistic techniques are frequently used in these remedies. Based on the principles described in Book of Turath, Table 1 shows some probable remedies for haemorrhoids.

Table 1. Probable remedies for haemorrhoids.

Potential remedies	How it works
Herbal Compresses	Herbal compresses were utilised by many traditional cultures to relieve haemorrhoid symptoms. Topically applied calming and anti-inflammatory herbs such as basil leaves, candlenut and celery might be used to treat the afflicted region. These herbs are said to help with inflammation, itching, and pain relief.
Sitz Baths	A sitz bath is immersing the lower body, particularly the buttocks and hips, in warm water soaked with herbs such as peppermint and cloves. This method is believed to improve blood circulation, decrease inflammation, and alleviate haemorrhoid symptoms.
Herbal Teas	Consuming herbal teas made from herbs like ginger, wild rue and honey could aid in improving digestion, reducing constipation, and promoting bowel regularity.
Ointment	Use on the surface of the anus with celery, garlic, peppermint and ginger mixed with honey. Believed to help reduce inflammation, itching, and pain.

Home remedies for haemorrhoids may offer various benefits, especially for people who prefer alternative methods or prefer to supplement conventional therapies. It should be noted that home treatments may not work for everyone and may not be appropriate for severe cases. For example, basil leaves (*O. gratissimum*) consist of bioactive compounds quercetin and epigenin which serve several impactful effects such as an anti-inflammatory, antioxidant, anti-microbial and wound-healing effects (7)(8). The usage of pulp and aerial portions of basil has also been practised in Benin Republic for the treatment of colic, pelvic aches, diarrhoea and haemorrhoid (pile) (9).

A research by Offiah and Chikwendu (10) proved the anti-diarrhoeal effects and anti-microbial activity of *O. gratissimum* leaves' extract. They were able to demonstrate the reduction in the amount of moisture in rats' faeces which eventually indicated the efficacy of the *O. gratissimum* leaves' extract as anti-diarrhoeal agent. These attributes might be due to the extracts' phytochemical composition such as tannins, triterpenoid, steroids and carbohydrates which greatly responsible for antidiarrhoeal effects and inhibit motility of intestines. The prevention of diarrhoea will eventually reduce the risk of haemorrhoid in patient.

One of the effects of haemorrhoids include swollen and bleeding in the anal which further cause major discomfort in patient. Therefore, in Tayyib Al-Ihsan fi Tibb Al-Insan book recommend treatments using aloe vera and cow ghee. Aloe vera and cow ghee consist of high saturated and unsaturated fatty acid which are vital for decreasing the area of wound, promoting collagen formation, and regenerating tissue of the damaged area (11)(12)(13). Furthermore, haemorrhoids can also be treated using peganum harmala as it consists of inhibitory activity which facilitate the

recovery of pathogen-related diseases including haemorrhoids, skin inflammation, and wound healing (14).

Comparison of Active Compounds in Remedies for Haemorrhoids from Book of Turath with Pharmaceutical Products

There are various treatments that can be used for haemorrhoids such as by herbal compressing, soaking in a sitz bath, drinking herbal teas and using ointments on affected areas. The treatments that are suggested by Book of Turath exhibited similarities and differences with modern techniques that used pharmaceutical products. Therefore, in this research, the analysis of active compounds in remediation suggested by Book of Turath will be compared with pharmaceutical products. This will give lights to the academicians, medicinal practitioners on alternative yet effective treatments for haemorrhoids.

Herbal Compress

According to Book of Turath, herbal compress for treatment of haemorrhoids was prepared by mixing basil leaves, candlenut and celery (Figure 2) which further topically applied on affected areas. It is not unexpected that basil has been used for centuries as a traditional method of curing inflammatory disorders. The anti-inflammatory activity of basil is largely credited to the presence of eugenol, which can block the activity of the enzyme cyclooxygenase (COX). Basil extracts diminish inflammation by stopping the release of pro-inflammatory cytokines and mediators (most notably nitric oxide). Cytokines are proteins passed from one cell to another that sanction direct cell-to-cell communication (15)(16)(17).

Furthermore, basil leaves contain 1,8-cineole, an active molecule with anticancer, antibacterial, antioxidant, and anti-inflammatory activities (18)(19). It induces apoptosis via MAPK-mediated and caspase-dependent pathways, inhibits L-asparaginase in spoilage organisms and many pathogens, and suppresses oxidative stress and inflammatory aberrations via the nuclear factor erythroid-2-related factor 2 (Nrf2) and nuclear factor-kappa B (NF- κ B) signaling pathways, respectively (20). Basil extracts can also suppress nitric oxide (NO) production, lowering inflammation in afflicted areas (21). NO is a signaling molecule implicated in a wide range of pathophysiological processes, including inflammation, neuronal transmission, apoptosis, vasodilation, and neurotoxicity (22)(23).

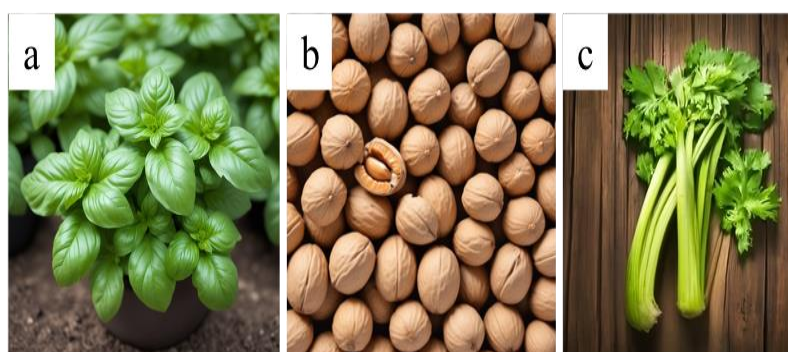


Figure 2: (a) Basil leaves (*Ocimum basilicum*), (b) Candlenut (*Aleurites moluccanus*), (c) Celery (*Apium graveolens*).

Palmitic acid, linoleic acid, oleic acid, and stearic acid are the fatty acids found in candlenut oil. The inhibition zone diameters produced by potassium soap, fatty acids, and methyl esters against *Staphylococcus aureus* were 12.07, 8.75, and 6.67 mm (at 1% concentrations) and 13.20, 9.77, 7.33 mm (at 2% concentrations), respectively, whereas against 2% concentration *Escherichia coli* are 12.18, 11.02, 7.32 mm (at 1% concentrations) and 14.00, 13.23, and 8.70 mm (at 2% concentration) (24).

Fatty acids have the ability to inhibit a variety of enzymes, and generally, unsaturated fatty acids often inhibit enzymes more effectively than saturated fatty acids. The suppression of enzymes in the membrane or cytosol, which are important for bacterial growth and survival, indicates that fatty acids have antibacterial capabilities. Unsaturated fatty acids can hinder the production process in bacteria in vivo, affecting the composition of the bacterial cell membrane. This can cause bacterial

cell membrane permeability and fluidity to become unstable, resulting in lysis (25). The addition of celery for herbal compress treatment might be due to its capability of reducing glucose, blood pressure, and blood lipids which can strengthen the heart and reduce inflammation (26).

Sitz Bath

Menthol is considered as one of the vital components in peppermint and it can be extracted by hydrodistillation method, a historic process shown to separate the essential oil components of peppermint (27). Peppermint (Figure 3) essential oil (PEO) can also be separated by microwave-assisted hydrodistillation (28). Although hydrodistillation and steam distillation provide greater extraction yields and quantitation of key components, microwave-assisted distillation can reduce extraction time from 180 minutes to 30 minutes.

Menthol is a TRPM8 (transient receptor potential melastatin 8) channel agonist. Menthol can activate the TRPM8 channel in irritable bowel syndrome (IBS), inhibiting the chemical and mechanosensory responses of nociceptive TRP channels and decreasing the release of pro-inflammatory mediators from nerve terminals (29). PEO can help to control IBS by suppressing the expression of pro-inflammatory cytokines while increasing the amounts of anti-inflammatory cytokines. PEO can inhibit xylene-induced intestinal inflammation in mice and acetic acid-induced colitis in rats when taken orally (30). Menthol's gastroprotective impact is mostly due to anti-inflammatory action, which is linked to prostaglandin E2 (PGE2) synthesis, K⁺-ATP channel activation, and antisecretory effect (31).

Another significant ingredient that can be used for preparing sitz bath is *Syzygium aromaticum* or commonly known as cloves (Figure 3). The dried flower bud of clove is a culinary and medicinal herb with several pharmacological characteristics, including anti-cancer, antibacterial, anti-inflammatory, antioxidant, and antiviral activities. Because of its health benefits, such as improving circulation, digestion, and metabolism, as well as treating stomach issues, it is also utilized in functional foods to boost their nutritional and can also be used to prevent constipation and haemorrhoids (32).

Bacterial infection may worsen the symptoms of haemorrhoids, therefore treatment with clove is crucial as it serves as significant anti-bacterial agent. The antibacterial activity of clove essential oils and oleoresins may be mediated by more than one mechanism. They have the ability to disrupt cell membranes, inactivate key enzymes, and destroy microorganism genetic information (33). Apart from that, clove bud oil has been shown to be an effective inhibitor of oral infections such as cariogenic and periodontal microorganisms (34).



Figure 3: (a) Cloves (*Syzygium aromaticum*), (b) Peppermint (*Mentha piperita*).

Herbal Teas

Therapeutic benefits of herbal teas (35) made from ginger, wild rue, and honey in alleviating symptoms associated with hemorrhoids. From reducing inflammation to promoting tissue healing, these herbal concoctions offer a holistic approach to managing hemorrhoid discomfort, providing relief and enhancing overall rectal health.

Ginger

Ginger (Figure 4), a popular herb in traditional medicine, has attracted attention for its anti-inflammatory, analgesic, and digestive benefits. The benefits of ginger in treating hemorrhoids, including its mechanisms of action and potential benefits for people looking for alternative or complementary treatments (36).

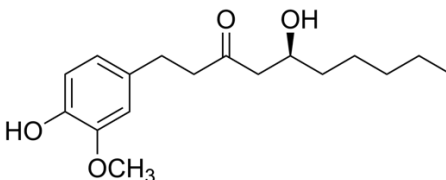
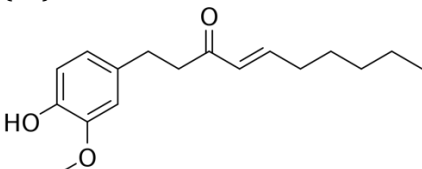
Its anti-inflammatory properties have been experimentally established, making it useful in the treatment of acute inflammatory disorders such as piles. As a result, this can be used to create effective and economical modern haemorrhoids treatments that can be used broadly throughout the country and beyond. The antioxidant action of ginger helps to scavenge free radicals and protect cells from harm. This removes toxins from the body and keeps hemorrhoids from worsening (36).

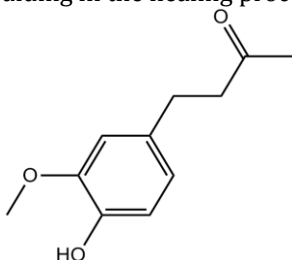
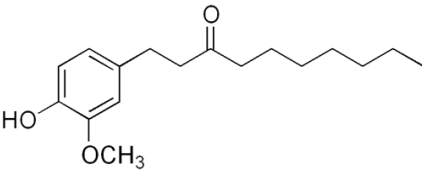
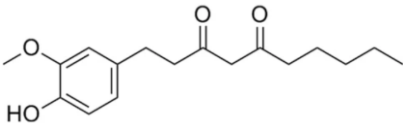


Figure 4: Ginger (*Zingiber officinale*).

Ginger is one of the most medically beneficial herbs and can be consumed in a variety of ways. Whether you drink it raw, with your regular cups of tea, or your food, the benefits will remain the same. To be useful in the treatment of hemorrhoids, ginger can act in two key roles. First, it cleanses the body of waste materials as part of the hemorrhoid treatment, and second, it has anti-inflammatory, analgesic, and antioxidant properties. The following points demonstrate how ginger can be used to treat piles (Table 2).

Table 2. Ginger in the treatment of hemorrhoids.

Treatment	Compounds involved in treatment
Anti-inflammatory action	<p>Gingerols and shogaols have anti-inflammatory effects that can help lessen the irritation and swelling caused by hemorrhoids. These compounds have the potential to relieve pain and improve healing by blocking inflammatory pathways (37).</p>  <p>Figure 5: Gingerols compound.</p>
Analgesic effects	<p>Gingerol and its metabolites, such as shogaol, exhibit analgesic properties, offering relief from pain commonly experienced with hemorrhoids. By modulating pain perception pathways, ginger compounds can help manage discomfort and improve overall comfort (38).</p>  <p>Figure 6: Shogaol compound.</p>
Antioxidant activity	<p>Phenolic compounds like gingerol and zingerone act as antioxidants, scavenging free radicals and reducing oxidative stress. This antioxidant</p>

	<p>activity may support tissue repair and protect against further damage, aiding in the healing process of hemorrhoids (39).</p>  <p>Figure 7: Zingerone compound.</p>
Promotion of blood circulation	<p>Certain ginger compounds, such as shogaol and paradol, have vasodilatory properties, which means they expand blood vessels and enhance blood circulation. Increased blood flow to the rectal area can speed up recovery and lower the likelihood of hemorrhoidal problems (40).</p>  <p>Figure 8: Paradol compound.</p>
Digestive support	<p>Gingerdiol (41) helps good digestion by increasing the synthesis of digestive enzymes and GI motility. This can help to prevent constipation, a common risk factor for hemorrhoids, as well as encourage regular bowel movements, which reduce strain during defecation.</p>  <p>Figure 9: Gingerdiol compound.</p>

Wild Rue

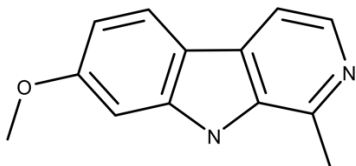
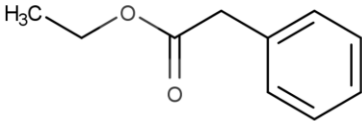
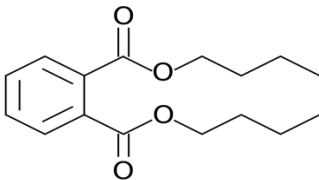
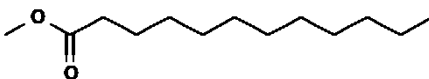

Wild rue (Figure 10), has long been utilized in numerous cultures for its therapeutic characteristics, including its potential to heal hemorrhoids. Wild rue has a long history of use in various traditional medicine systems, including Ayurveda, Traditional Chinese Medicine, and European herbalism (42). In these systems, it has been used to address various health issues, including digestive disorders and inflammatory conditions like hemorrhoids.



Figure 10: Wild rue (*Peganum harmala*).

Some people choose to use natural remedies for hemorrhoids, such as wild rue, rather than traditional drugs or therapies. They may see herbal medicines as more comfortable or more holistic approaches to controlling their ailment. Some of the advantages of wild rue in treating hemorrhoids are included in Table 3.

Table 3. Advantages of wild rue in treating hemorrhoids.

Treatment	Compounds involved in treatment
Anti-inflammatory action (43)	<p>Compounds such as methyl oleate, harmine, and dibutyl phthalate may possess anti-inflammatory properties, which could help reduce inflammation and swelling associated with hemorrhoids.</p>  <p>Figure 11: Harmine compound.</p>
Analgesic effects	<p>Some compounds, such as harmine and 2-octanol benzoate (44), may have analgesic effects, providing relief from pain and discomfort caused by hemorrhoids.</p>  <p>Figure 12: 2-octanol benzoate compound.</p>
Antimicrobial property	<p>Certain compounds, including dibutyl phthalate and methyl oleate, might exhibit antimicrobial properties (45), which could help prevent infections in the anal area, reducing the risk of complications associated with hemorrhoids.</p>  <p>Figure 13: Dibutyl phthalate compound.</p>
Vasodilatory	<p>Compounds such as 2-octanol benzoate and methyl dodecanoate may have vasodilatory properties (44), which means they can enlarge blood vessels and improve circulation. Increased blood flow to the rectal area may aid in the healing of hemorrhoids and lower the risk of complications.</p>  <p>Figure 14: Methyl dodecanoate compound.</p>
Moisturizing and emollient	<p>Compounds like methyl oleate may have moisturizing and emollient properties (46), which could help soothe irritated skin around the anal area and alleviate discomfort associated with hemorrhoids.</p>  <p>Figure 15: Methyl oleate compound.</p>

Honey

Honey, a natural substance revered for its myriad health benefits since ancient times, has emerged as a potential remedy for the discomfort and distress associated with hemorrhoids. While various treatment options exist, ranging from medications to surgical interventions, the use of honey in managing hemorrhoids has garnered attention for its antibacterial, anti-inflammatory, and wound-healing properties. In many cultures, honey has deep-rooted significance and is considered a sacred or revered substance with healing properties. People may choose to incorporate honey into their health routines as part of cultural or traditional practices passed down through generations (47).

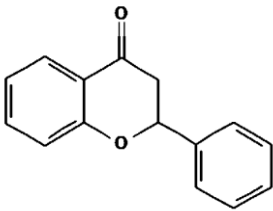
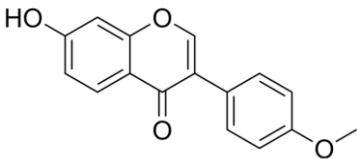
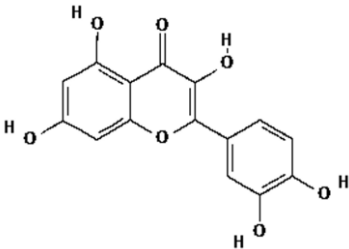
It is widely available in most parts of the world, making it convenient for individuals to obtain without the need for a prescription or visiting a healthcare provider. Its accessibility makes it an attractive option for those seeking immediate relief or managing chronic conditions at home and to whom prefer natural remedies over pharmaceutical drugs due to concerns about synthetic chemicals, additives, or potential side effects associated with medications. Honey (Figure 16), being a natural substance, is perceived as a safer and more holistic alternative.

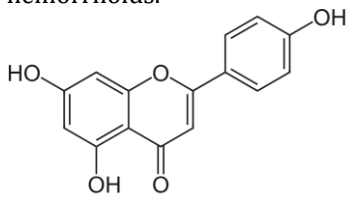
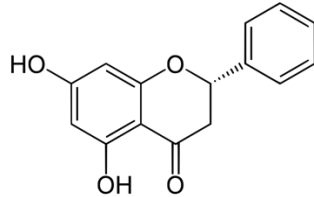
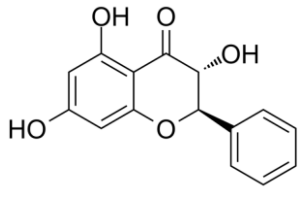
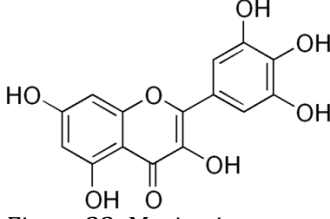


Figure 16: Honey from bees.

Some general properties and potential effects of honey that contain these compounds relevant to hemorrhoid treatment are included in Table 4.

Table 4. General properties and potential effects of honey.

Treatment	Compounds involved in treatment
Anti-inflammatory	<p>Many flavonoids such as flavonone possess anti-inflammatory properties (48), which can help reduce inflammation and swelling associated with hemorrhoids. By inhibiting inflammatory pathways, flavonoids may alleviate pain and discomfort.</p>  <p>Figure 17: Flavonone compounds.</p>
Antioxidant	<p>Flavonoids are potent antioxidants (48), scavenging free radicals and reducing oxidative stress. This antioxidant activity may help protect against cellular damage and promote tissue repair in the rectal area affected by hemorrhoids.</p>  <p>Figure 18: Flavonoid compounds.</p>
Vasoconstrictive effects	<p>Certain flavonoids, such as quercetin (49), have vasoconstrictive effects, meaning they can help tighten blood vessels. This action may reduce bleeding associated with hemorrhoids and promote the shrinking of swollen veins.</p>  <p>Figure 19: Quercetin compounds.</p>

Analgesic	<p>Some flavonoids, including apigenin and luteolin, possess analgesic properties (48), providing relief from pain commonly experienced with hemorrhoids.</p>  <p>Figure 20: Apigenin compounds.</p>
Anti-hemorrhagic	<p>Flavonoids like pinocembrin and pinobanksin (50) may have anti-hemorrhagic properties, which could help control bleeding from hemorrhoids by strengthening blood vessel walls and improving blood clotting mechanisms.</p>  <p>Figure 21: Pinocembrin compounds.</p>
Improvement of vascular tone	<p>Flavonoids (pinobanksin) can improve vascular tone by regulating the release of vasoactive substances (50), which may contribute to the reduction of venous congestion and discomfort associated with hemorrhoids.</p>  <p>Figure 22: Pinobanksin compounds.</p>
Wound healing	<p>Some flavonoids, such as myricetin (51), have been shown to promote wound healing by enhancing collagen synthesis and fibroblast proliferation. This property may facilitate the healing of damaged tissues in the rectal area.</p>  <p>Figure 23: Myricetin compounds.</p>

Herbal teas made from ginger, wild rue, and honey offer a natural and effective approach to managing hemorrhoids, providing relief from pain, inflammation, and itching. By harnessing the healing properties of these botanical ingredients, individuals can create homemade remedies that promote rectal health and enhance overall well-being.

Ointment

Using ointments for treating hemorrhoids involves the topical application of medicated creams or balms directly to the affected area around the anus. Ointments are formulated with various active ingredients, such as celery, garlic, ginger, and honey can be used as soothing agents and anti-inflammatory compounds, to alleviate symptoms and promote healing (52).

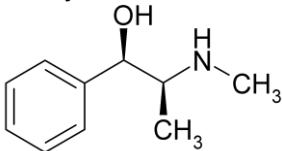
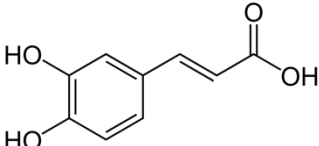
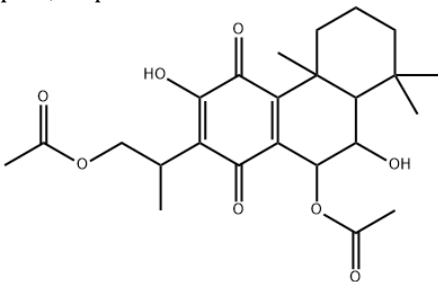
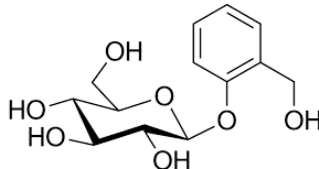
Celery

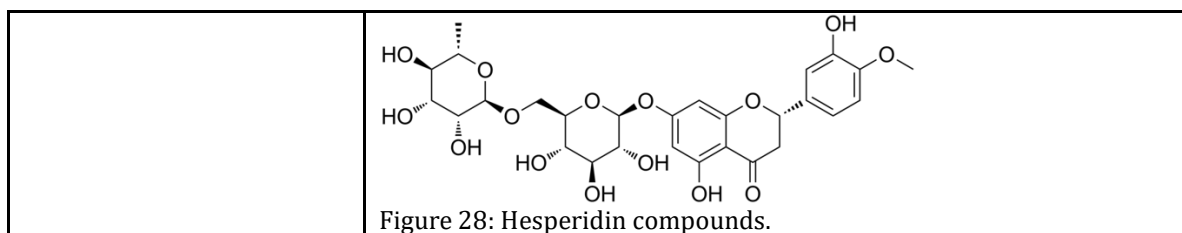
Celery, a crunchy green vegetable rich in fiber, vitamins, and minerals, can potentially offer benefits in managing hemorrhoids due to its various nutritional properties and potential effects on digestive health. It is a good source of dietary fiber, including both soluble and insoluble fiber. Fiber plays a

crucial role in promoting regular bowel movements and preventing constipation, a common contributor to the development and exacerbation of hemorrhoids (53).

By softening stool and increasing stool bulk, celery (Figure 2) can help alleviate straining during bowel movements, reducing pressure on the rectal veins and minimizing the risk of hemorrhoid formation or exacerbation. Celery contains various compounds (Table 5) that may offer potential benefits in treating hemorrhoids due to their pharmacological properties.

Table 5. Potential compounds found in celery in treating hemorrhoids.

Compound	Treatment
Alkaloids	<p>While the role of alkaloids (54) in treating hemorrhoids specifically is not well-documented, certain alkaloids may possess analgesic properties, helping to alleviate pain associated with hemorrhoids. Additionally, alkaloids might contribute to the overall pharmacological activity of herbal remedies used for hemorrhoid treatment.</p>  <p>Figure 24: Alkaloids compounds.</p>
Phenolic Acids	<p>Phenolic acids, such as caffeic acid, ferulic acid, and p-coumaric acid, exhibit antioxidant and anti-inflammatory properties (55). These properties can help reduce inflammation, swelling, and discomfort associated with hemorrhoids.</p>  <p>Figure 25: Caffeic acid compounds.</p>
Terpenes	<p>Terpenes found in plants like limonene and pinene may have anti-inflammatory and analgesic effects (56). By reducing inflammation and pain, terpenes can contribute to relieving symptoms of hemorrhoids.</p>  <p>Figure 26: Terpene compounds.</p>
Glycosides	<p>Glycosides are compounds formed by the combination of sugar molecules with other functional groups. While their specific role in treating hemorrhoids may vary, some glycosides exhibit antioxidant and anti-inflammatory properties (57), which can help alleviate symptoms of hemorrhoids and promote tissue healing.</p>  <p>Figure 27: Glycosides compounds.</p>
Flavonoids	<p>Flavonoids, including quercetin, rutin, and hesperidin (58), possess antioxidant, anti-inflammatory, and vasoprotective properties. These compounds can help reduce inflammation, improve blood circulation, strengthen blood vessel walls, and promote tissue repair in the rectal area affected by hemorrhoids.</p>



Garlic

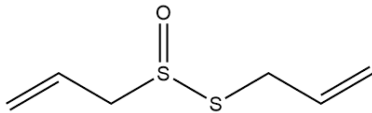
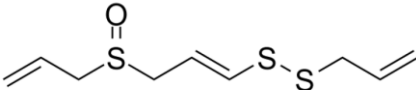
Garlic has been used traditionally for centuries in various cultures for its medicinal properties, including its potential benefits in treating hemorrhoids. Garlic (Figure 29) contains bioactive compounds with various health-promoting properties, including antibacterial, antiviral, anti-inflammatory, and antioxidant effects. Its diverse pharmacological profile makes it a versatile ingredient in home remedies for a wide range of health issues.

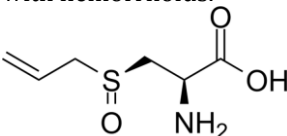
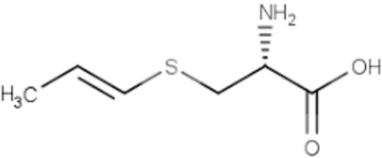
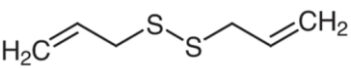


Figure 29: Garlic (*Allium sativum*).

It can be easily incorporated into a variety of home remedies, including topical applications, dietary supplements, and culinary preparations. Its versatility and simplicity make it accessible to individuals seeking natural alternatives to conventional treatments. Compared to pharmaceutical medications, garlic is relatively inexpensive, making it an attractive option for individuals seeking cost-effective home remedies. Some of the advantages of garlic in treating hemorrhoids are included in Table 6.

Table 6. Advantages of garlic in treating hemorrhoids.

Compound	Treatment
Anti-inflammatory properties	<p>Garlic contains compounds such as allicin (59), which have been shown to possess anti-inflammatory properties. Traditionally, garlic poultices or ointments applied topically to hemorrhoids may help reduce inflammation and swelling, providing relief from discomfort.</p>  <p>Figure 30: Allicin compounds.</p>
Antimicrobial effects	<p>Garlic has natural antimicrobial properties (Ajoene compound) due to its sulfur-containing compounds (60). Applying crushed garlic or garlic juice topically to hemorrhoids may help prevent infections and promote healing of anal fissures or wounds associated with hemorrhoids.</p>  <p>Figure 31: Ajoene compounds.</p>
Pain relief	<p>Garlic has been used traditionally as a natural pain reliever. Crushed garlic cloves that contain Alliin compound (59) applied topically or</p>

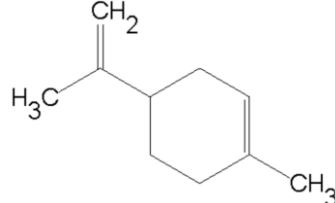
	<p>consumed orally may help alleviate pain and discomfort associated with hemorrhoids.</p>  <p>Figure 32: Alliin compounds.</p>
Improvement of blood circulation	<p>Some traditional practices involve consuming garlic orally to improve blood circulation such as S-1-Propenyl-L-cysteine compounds (61). Enhanced blood flow to the rectal area may promote healing of hemorrhoids and reduce the risk of complications.</p>  <p>Figure 33: S-1-Propenyl-L-cysteine compounds.</p>
Boosting immune function	<p>Garlic is believed to have immune-boosting properties such as Diallyl disulfide compound (62) due to its sulfur compounds and other bioactive compounds. Strengthening the immune system may aid in the healing process of hemorrhoids and reduce the risk of infections.</p>  <p>Figure 34: Diallyl disulfide compounds.</p>

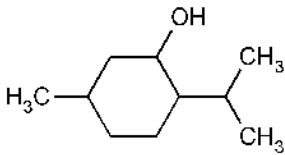
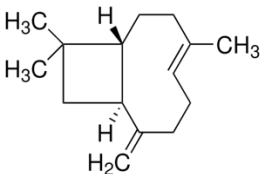
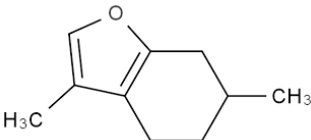
Peppermint

Peppermint (Figure 3), with its refreshing aroma and soothing properties, has emerged as a popular ingredient in home remedies for hemorrhoids. From topical applications to herbal teas, peppermint offers a natural and refreshing approach to managing the discomfort of hemorrhoids, providing relief and promoting overall rectal health (63).

While various treatment options exist, including medications and surgical interventions, interest in natural remedies has grown due to their potential effectiveness and minimal side effects. peppermint is often utilized for its natural therapeutic compounds, which include monoterpene, monoterpenoid, sesquiterpene, and sesquiterpenoid. Here's how these compounds found in peppermint contribute to its traditional use in treating hemorrhoids (Table 7).

Table 7. Compounds found in peppermint in treating hemorrhoids.

Compound	Treatment
Monoterpene	<p>Peppermint contains monoterpene compounds such as limonene and pulegone. These compounds possess anti-inflammatory and analgesic properties, which can help reduce swelling and alleviate pain associated with hemorrhoids. Additionally, monoterpene compounds (27) may have cooling effects, providing a soothing sensation when applied topically to inflamed areas.</p>  <p>Figure 35: Limonene compounds.</p>
Monoterpenoid	<p>Menthol is a common monoterpenoid found in peppermint oil (64). Menthol has a cooling and numbing effect on the skin, which can help relieve itching and discomfort caused by hemorrhoids. When applied topically, menthol provides a soothing sensation and may help reduce inflammation and irritation.</p>

	 <p>Figure 36: Menthol compounds.</p>
Sesquiterpene	<p>Some sesquiterpene compounds found in peppermint, such as beta-caryophyllene (65), have anti-inflammatory properties that can help reduce swelling and inflammation associated with hemorrhoids. Sesquiterpenes may also have antimicrobial effects, which can help prevent infections in the anal area.</p>  <p>Figure 37: Beta-caryophyllene compounds.</p>
Sesquiterpenoid	<p>Peppermint contains sesquiterpenoid compounds like menthofuran (66), which have been studied for their anti-inflammatory and analgesic properties. These compounds may help alleviate pain and discomfort caused by hemorrhoids, promoting relief and comfort.</p>  <p>Figure 38: Menthofuran compounds.</p>

Ointment is one of the greatest solutions for healing hemorrhoids due to its multiple benefits. Ointments provide focused comfort by targeting hemorrhoidal symptoms like pain, itching, and inflammation. They are quickly absorbed by the skin, providing immediate comfort and ease for at-home therapy. Furthermore, ointments are adaptable, allowing for modification based on individual requirements, and they are generally well-tolerated with few adverse effects. Their non-invasive nature makes them a popular alternative for many people looking for conservative treatment options. Overall, using ointments is an efficient and practical way to manage hemorrhoids, offering relief and aiding recovery with minimal effort (67).

CONCLUSION

Traditional treatments for haemorrhoids, as discussed in Book of Turath, offer alternative approaches utilizing natural substances and holistic techniques. Herbal compresses, sitz baths, herbal teas, and ointments made from ingredients like basil, candlenut, celery, peppermint, wild rue, honey, garlic, and ginger have been traditionally used to alleviate symptoms and promote healing. These remedies often contain bioactive compounds with anti-inflammatory, analgesic, antioxidant, antimicrobial, and wound-healing properties.

Comparing these traditional remedies with modern pharmaceutical products reveals both similarities and differences in the active compounds and mechanisms of action. While pharmaceutical products may offer targeted and standardized treatments, traditional remedies provide holistic approaches that may appeal to individuals seeking alternative or complementary therapies. Overall, understanding the active compounds and therapeutic effects of traditional remedies for haemorrhoids can provide valuable insights for healthcare practitioners and patients alike. By exploring both traditional and modern treatment options, individuals can make informed decisions about managing their haemorrhoidal symptoms effectively while considering their preferences and needs.

ACKNOWLEDGEMENT

We would like to thank Kolej PERMATA Insan, USIM management for assisting the research team with the grant code PPPI/PTJ/KGI/USIM/14023.

REFERENCES

- Kuiper S.Z. Patient-centred haemorrhoidal disease management. Doctoral Thesis; Maastricht University; 2024. Page 9-27.
- Garg P. Conservative treatment of haemorrhoids deserves more attention in guidelines and clinical practice [letter]. *Dis. Colon Rectum*. 2018; 61(7); e348.
- <https://www.health.harvard.edu/blog/natural-remedies-for-hemorrhoid-2021022321942>. Solan, M. Dated 12-01-2023 time 14:00 GMT
- Melese G, Anteneh B, Bekalu K, Yigardus A, Yalemgeta B, Abtie A, Dehnnet A. Medicinal plants used for management of haemorrhoids in Ethiopia: A systematic review. *Heliyon*. 2022; 8(8); e10211.
- Ikpeazu V.O, Ugbogu E.A, Emmanuel O, Uche-Ikonne C, Okoro B, Nnaemeka J. Evaluation of the safety of oral intake of aqueous extract of *Stigma maydis* (corn silk) in rats. *Acta Sci. Pol. Technol. Aliment*. 2018; 17; 387–397.
- Ijioma S.N, Emmanuel O, Nosiri C.I, Ugbogu E.A. Evaluation of toxicity profile and pharmacological potentials of Aju Mbaise polyherbal extract in rats. *Sci. Afr*. 2021; 00681.
- Benitez N.P, Leon E.M.M, Stashenko E.E. Eugenol and methyl eugenol chemotypes of essential oil of species *Ocimum gratissimum* L. and *Ocimum campechianum* Mill. from Colombia. *J. Chromatogr. Sci*. 2009; 47; 800–803.
- Melo R.S, Maria A, Azevedo A, Helena T, Rodrigues S, Ponte I.L, Carneiro V.A. Effectiveness of *Ocimum gratissimum* L. Essential Oil Against Multidrug-Resistant Isolates of *Staphylococcus aureus* and *Escherichia coli*. *Mole*. 2019; 24; 3864–3880.
- Kpoviessi K.B.G, Kpoviessi S.D, Yayi Ladekan E, Gbaguidi F, Frederich M, Moudachirou M, Quetin-Leclercq J, Accrombessi G.C, Bero J. In vitro antitrypanosomal and antiplasmodial activities of crude extracts and essential oils of *Ocimum gratissimum* Linn from Benin and influence of vegetative stage. *J. Ethnopharmacol*. 2014; 155; 1417–1423.
- Offiah V.N, Chikwendu U.A. Antidiarrhoeal effects of *Ocimum gratissimum* leaf extract in experimental animals. *J. Ethnopharmacol*. 1999; 68; 327–330.
- Biyani D.M, Verma, P.R.P, Dorle A.K, Boxey V. Wound healing activity of cow ghee: a veterinary case report. *Int. J. Ayurvedic Research*. 2011; 2(3); 115–118.
- Shaikh S.S, Ukande M.D, Murthy K, Shete R.V, Solunke R.S. Traditional remedies for wound healing: a review. *J Drug Deliv. Therapeut*. 2019; 9; 761e4.
- Nandanwar R, Gurjar H, Sahu V.K, Saraf H. Studies on wound healing activity of gel formulation containing cow ghee and Aloe vera. *Int. J. Pharma. Sci. Res*. 2010; 1; 50-54.
- Hashempur M.H, Khademi F, Rahmanifard M, Zarshenas M.M. An Evidence-Based Study on Medicinal Plants for Hemorrhoids in Medieval Persia. *J. Evid. Based Complementary Altern. Med*. 2017; 22(4); 969-981.
- Haruka T, Chie Takahashi-Muto, Mana N, Masahiro K, Rieko Tanaka-Yachi, Chikako K. Anti-inflammatory Effects of Extracts of Sweet Basil (*Ocimum basilicum* L.) on a Co-culture of 3T3-L1 Adipocytes and RAW264.7 Macrophages. *Journal of Oleo Science*. 2020; 69(5); 487– 493.
- Nisar A, Jagtap S, Vyavahare S, Deshpande M, Harsulkar A, Ranjekar P, Prakash O. Phytochemicals in the treatment of inflammation-associated diseases: the journey from preclinical trials to clinical practice. *Front Pharmacol*. 2023; 9(14); 1177050.
- Yilma H.G, Fekade B.T, Archana B, Nishant R, Mesfin G.T, Nasser S, Kundan K.C, Rakesh K.B. Anti-inflammatory activity of phytochemicals from medicinal plants and their nanoparticles: A review. *Current Research in Biotechnology*. 2023; 6; 100152.
- Ashish K, Jnanesha A.C, Lal R.K, Dubey B.K. Intercropping and mixed herb distillation for high-quality oil yield using lemon-scented basil (*Ocimum africanum* Lour.) cv. CIM-Jyoti and lemongrass (*Cymbopogon flexuosus* (Nees ex Steud.) cv. Krishna. *Acta Ecol. Sin*. 2022; 42; 269–273.
- Lal R.K, Gupta P, Mishra A, Chanotiya C.S. Evaluation of yield and agronomic components by trial cross and selection of high essential oil yielding hybrids in Basil. *Ind. Crops Prod*. 2022; 177; 114486.

- Cai Z, Peng J, Chen Y, Tao L, Zhang Y, Fu L, Long Q, Shen X. 1,8-Cineole: a review of source, biological activities, and application. *J. Asian Nat. Prod. Res.* 2020; 23; 938–954.
- Raina P.M, Deepak, C.V, Chandrasekaran A, Wagh N, Kaul-Ghanekar, R. Comparative analysis of anti-inflammatory activity of aqueous and methanolic extracts of *Ocimum basilicum* in RAW264.7, SW1353 and human primary chondrocytes. *J. Herb. Med.* 2016; 6(1); 28–36.
- Signori D, Magliocca A, Hayashida K. et al. Inhaled nitric oxide: role in the pathophysiology of cardio-cerebrovascular and respiratory diseases. *ICMx.* 2022; 10; 1-28.
- Iova O.M, Marin G.E, Lazar I, Stanescu I, Dogaru G, Nicula C.A, Bulboacă A.E. Nitric Oxide/Nitric Oxide Synthase System in the Pathogenesis of Neurodegenerative Disorders-An Overview. *Antioxidants (Basel).* 2023; 12(3); 753.
- Sutrisno R.D.A, Rini R, Ihsan B.R, Husni W.W. Antibacterial activity of potassium salt, fatty acids, and methyl esters of candlenut seed oil against *Staphylococcus aureus* and *Escherichia coli*. *AIP Conference Proceedings.* 2020; 2231(1); 040081.
- Yoon B.K, Jackman J.A, Valle-González E.R, Cho N.J. Antibacterial Free Fatty Acids and Monoglycerides: Biological Activities, Experimental Testing, and Therapeutic Applications. *Int. J. Mol. Sci.* 2018;19(4); 1114.
- Mandeep S, Usha N, Kirandeep K, Neeraj R, Chandan J. Genetic, genomic and biochemical insights of celery (*Apium graveolens* L.) in the era of molecular breeding. *JARMAP.* 2022; 31; 100420.
- Hudz N, Kobylinska L, Pokajewicz K, Horčinová Sedláčková V, Fedin R, Voloshyn M, Myskiv I, Brindza J, Wiczorek PP, Lipok J. *Mentha piperita*: Essential Oil and Extracts, Their Biological Activities, and Perspectives on the Development of New Medicinal and Cosmetic Products. *Molecules.* 2023; 28(21); 7444.
- Radivojac A, Bera O, Zeković Z, Teslić N, Mrkonjić Ž, Bursać Kovačević D, Putnik P, Pavlić B. Extraction of Peppermint Essential Oils and Lipophilic Compounds: Assessment of Process Kinetics and Environmental Impacts with Multiple Techniques. *Molecules.* 2021; 26; 2879.
- Peiris M, Weerts Z.Z.R, Aktar R, Masclee A.A, Blacksha A, Keszthelyi D. A putative anti-inflammatory role for TRPM8 in irritable bowel syndrome—An exploratory study. *Neurogastroenterol. Motil.* 2021; 33(9); e14170.
- Azad A.K, Al-Mahmood S.M.A, Kennedy J.F, Chatterjee B, Bera H. Electro-hydrodynamic assisted synthesis of lecithin-stabilized peppermint oil-loaded alginate microbeads for intestinal drug delivery. *Int. J. Biol. Macromol.* 2021; 185; 861-875.
- Hui Z, Shan R, Han Y, Shun T, Chenyang G, Maolun L, Qiu T, Tianqi M, Haibo X. Peppermint essential oil: its phytochemistry, biological activity, pharmacological effect and application. *Biomed. Pharmacother.* 2022; 154; 113559.
- Otunola G.A. Culinary spices in food and medicine: an overview of *Syzygium aromaticum* (L.) Merr. and LM Perry [Myrtaceae]. *Front. Pharmacol.* 2022; 12; 793200.
- Chen L, Li X, Wang Y, Guo Z, Wang G, Zhang Y. The performance of plant essential oils against lactic acid bacteria and adverse microorganisms in silage production. *Front. Plant Sci.* 2023; 14; 1285722.
- Radu C.M, Radu C.C, Bochiş S.A, Arbănaşi E.M, Lucan A.I, Murvai V.R, Zaha D.C. Revisiting the Therapeutic Effects of Essential Oils on the Oral Microbiome. *Pharmacy (Basel).* 2023;11(1); 33.
- Poswal F.S, Russell G, Mackonochie M. et al. Herbal Teas and their Health Benefits: A Scoping Review. *Plant Foods Hum Nutr.* 2019; 74; 266–276.
- Hu D, Gao T, Kong X, Ma N, Fu J, Meng L, Duan X, Hu C.Y, Chen W, Feng Z, Latif S. Ginger (*Zingiber officinale*) extract mediated green synthesis of silver nanoparticles and evaluation of their antioxidant activity and potential catalytic reduction activities with Direct Blue 15 or Direct Orange 26. *PLoS One.* 2022; 17(8); e0271408.
- Yücel Ç, Karatoprak G.Ş, Açıkara Ö.B, Akkol E.K, Barak T.H, Sobarzo-Sánchez E, Aschner M, Shirooie S. Immunomodulatory and antiinflammatory therapeutic potential of gingerols and their nanoformulations. *Front. Pharmacol.* 2022; 13; 902551.
- Rayati F, Hajmanouchehri F, Najafi E. Comparison of anti-inflammatory and analgesic effects of Ginger powder and Ibuprofen in postsurgical pain model: A randomized, double-blind, case-control clinical trial. *Dent Res J (Isfahan).* 2017;14(1); 1-7.
- Mustafa I, Chin N.L. Antioxidant Properties of Dried Ginger (*Zingiber officinale* Roscoe) var. *Bentong*. *Foods.* 2023;12(1); 178.

- Ngwatshipane M.M, Otang-Mbeng W. The Therapeutic and Phytopharmacological Potential of Ginger (*Zingiber officinale*). IntechOpen. 2023. doi: 10.5772/intechopen.105900.
- Akbari A, Nasiri K, Heydari M, Mosavat SH, Iraj A. The Protective Effect of Hydroalcoholic Extract of *Zingiber officinale* Roscoe (Ginger) on Ethanol-Induced Reproductive Toxicity in Male Rats. J. Evid. Based. Complementary Altern. Med. 2017; 22(4); 609-617.
- Shahrajabian M, Sun W. Wild Rue (*Peganum harmala*), an Extraordinary Source of Natural Products and Pharmacological Benefits, in Proceedings of the 4th International Electronic Conference on Foods, 15–30 October 2023, MDPI: Basel, Switzerland, doi:10.3390/Foods2023-15068
- Abbas M.W, Hussain M, Qamar M, Ali S, Shafiq Z, Wilairatana P, Mubarak M.S. Antioxidant and Anti-Inflammatory Effects of *Peganum harmala* Extracts: An In Vitro and In Vivo Study. Molecules. 2021; 26(19); 6084.
- Sharifi-Rad J, Quispe C, Herrera-Bravo J, Semwal P, Painuli S, Özçelik B, Hacıhasanoğlu F.E, Shaheen S, Sen S, Acharya K, Amirian M, Castillo C.M.S, López M.D, Schoebitz M, Martorell M, Goloshvili T, Al-Harrasi A, Al-Rawahi A, Kumar M, Suleria H.A.R, Cho W.C. *Peganum* spp.: A Comprehensive Review on Bioactivities and Health-Enhancing Effects and Their Potential for the Formulation of Functional Foods and Pharmaceutical Drugs. Oxid. Med. Cell Longev. 2021; 5900422.
- Amiri R, Fozouni L. Antibacterial Effects of *Peganum harmala* Seed Extracts on Drug-resistant Clinical Isolates of *Acinetobacter baumannii* in North of Iran. Jundishapur J. Nat. Pharm. Prod. 2020; 15(2); e92426.
- Iranshahy M, Fazly Bazzaz S, Haririzadeh G, Abootorabi BZ, Mohamadi AM, Khashyarmanesh Z. Chemical composition and antibacterial properties of *Peganum harmala* L. Avicenna J. Phytomed. 2019; 9(6); 530-537.
- Samarghandian S, Farkhondeh T, Samini F. Honey and Health: A Review of Recent Clinical Research. Pharmacognosy Res. 2017; 9(2); 121-127.
- Chagas M.D.S.S, Behrens M.D, Moragas-Tellis C.J, Penedo G.X.M, Silva A.R, Gonçalves-de-Albuquerque C.F. Flavonols and Flavones as Potential Anti-Inflammatory, Antioxidant, and Antibacterial Compounds. Oxid. Med. Cell Longev. 2022; 9966750.
- Aghababaei F, Hadidi M. Recent Advances in Potential Health Benefits of Quercetin. Pharmaceuticals (Basel). 2023; 16(7); 1020.
- Spiegel M. Theoretical Insights into the Oxidative Stress-Relieving Properties of Pinocembrin – An Isolated Flavonoid from Honey and Propolis. J. Phys. Chem. B. 2023; 127(41); 8769-8779.
- Taheri Y, Suleria H.A.R, Martins N, Sytar O, Beyatli A, Yeskaliyeva B, Seitimova G, Salehi B, Semwal P, Painuli S, Kumar A, Azzini E, Martorell M, Setzer W.N, Maroyi A, Sharifi-Rad J. Myricetin bioactive effects: moving from preclinical evidence to potential clinical applications. BMC Complement Med. Ther. 2020; 20(1); 241.
- Lohsiriwat V. Hemorrhoids: from basic pathophysiology to clinical management. World J. Gastroenterol. 2012;18(17); 2009-17.
- Hashempur M.H, Khademi F, Rahmanifard M, Zarshenas M.M. An Evidence-Based Study on Medicinal Plants for Hemorrhoids in Medieval Persia. J. Evid. Based Complementary Altern. Med. 2017; 22(4); 969-981.
- Aboody M.S.A. Cytotoxic, antioxidant, and antimicrobial activities of Celery (*Apium graveolens* L.). Bioinformation. 2021; 17(1); 147-156.
- Kooti W, Daraei N. A Review of the Antioxidant Activity of Celery (*Apium graveolens* L.). J. Evid. Based Complementary Altern. Med. 2017; 22(4); 1029-1034.
- Del Prado-Audelo M.L, Cortés H, Caballero-Florán I.H, González-Torres M, Escutia-Guadarrama L, Bernal-Chávez S.A, Giraldo-Gomez D.M, Magaña J.J, Leyva-Gómez G. Therapeutic Applications of Terpenes on Inflammatory Diseases. Front Pharmacol. 2021; 12; 704197.
- Yamashita M, Tae F, Song A, Sho I, Yuto T, Hiroyuki K, Takuya Y, Hiroyoshi M, Masaru K, Eiichiro O, Takeshi I. The apiosyltransferase celery UGT94AX1 catalyzes the biosynthesis of the flavone glycoside apiin, Plant Physiology. 2023; 193(3); 1758–1771.
- Panche A.N, Diwan A.D, Chandra S.R. Flavonoids: an overview. J. Nutr. Sci. 2016; 5; e47.
- El-Saber B.G, Magdy B.A, Wasef G.L, Elewa Y.H.A, Al-Sagan A.A, Abd El-Hack M.E, Taha A.E, Abd-Elhakim M.Y, Prasad D.H. Chemical Constituents and Pharmacological Activities of Garlic (*Allium sativum* L.): A Review. Nutrients. 2020; 12(3); 872.

- Ledezma E, Apitz-Castro R. Ajoene the main active compound of garlic (*Allium sativum*): a new antifungal agent]. *Rev. Iberoam. Micol.* 2006; 23(2); 75-80.
- Kodera Y, Ushijima M, Amano H, Suzuki J-i, Matsutomo T. Chemical and Biological Properties of S-1-Propenyl-L-Cysteine in Aged Garlic Extract. *Molecules.* 2017; 22(4); 570.
- Song X, Yue Z, Nie L, Zhao P, Zhu K, Wang Q. Biological Functions of Diallyl Disulfide, a Garlic-Derived Natural Organic Sulfur Compound. *Evid. Based Complement Alternat. Med.* 2021; 5103626.
- Babar A, Naser A.A, Saiba S, Aftab A, Shah A.K, Firoz A. Essential oils used in aromatherapy: A systemic review. *Asian Pac. J. Trop. Biomed.* 2015; 5(8); 601-611.
- Almatroodi S.A, Alsahli M.A, Almatroudi A, Khan A.A, Rahmani A.H. Peppermint, (*Mentha × piperita*): Role in Management of Diseases through Modulating Various Biological Activities. *Pharmacog. J.* 2021; 13(3); 822-827.
- Hui Z, Shan R, Han Y, Shun T, Chenyang G, Maolun L, Qiu T, Tianqi M, Haibo X. Peppermint essential oil: its phytochemistry, biological activity, pharmacological effect and application. *Biomed. Pharmacother.* 2022; 154; 113559.
- Beigi, M., Torki-Harchegani, M., & Ghasemi Pirbalouti, A. (2018). Quantity and chemical composition of essential oil of peppermint (*Mentha× piperita* L.) leaves under different drying methods. *International Journal of Food Properties*, 21(1), 267-276.
- Gurel, E., Ustunova, S., Ergin, B., Tan, N., Caner, M., Tortum, O., & Demirci-Tansel, C. (2013). Herbal haemorrhoidal cream for haemorrhoids. *Chin J Physiol*, 56(5), 253-262.