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Concise Review: **Herbal remedies for the treatment of nausea and vomiting**

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Abstract

Background: Vomiting occurs when the contractions of stomach muscle walls cause a large amount of the stomach content to go upward and flow back into the esophagus; this process is very common among infants. The aim of this review was to present the effects of medicinal plants on vomiting. **Methods**: In the current review, articles indexed in databases such as ISI, PubMed, Scopus, Islamic World Science Citation Center, Scientific Information Database, and Magiran were retrieved using the search terms *'vomiting'*, *'nausea'*, *'medicinal plants'*, and *'traditional medicine'*. **Results**: Based on the research findings, the medicinal plants *Zingiber officinale*, *Mentha piperita*, *Cinnamomum verum*, *Citrus limon*, *Matricaria chamomilla*, *Lavandula angustifolia*, *Allium cepa*, *Oryza sativa*, *Foeniculum vulgare*, *Cuminum cyminum*, *Eugenia caryophyllata*, *Elettaria cardamomum*, *Pimpinella anisum*, *Ferula assa-foetida*, *Ocimum basilicum*, and *Musa sapientum* were selected as the focus. **Conclusion**: In traditional medicine, treatment for vomiting is relevant, especially in children. The mechanisms of some of these plants have been understood but for many they are still unclear. Further investigations are needed to understand more about these medicinal plants and their mechanism of action for effective use in the clinic.

1. Introduction

Vomiting occurs when the contractions of stomach muscle walls cause a large amount of stomach contents to push upward and flow back into the esophagus, exiting through the mouth (or nose). Since the food is traveling upward, some of the foods and liquids will involuntarily flow back into the mouth [1–3]. Vomiting or spitting up food is very common among infants and not too worrying of an issue. However, vomiting can be dangerous if it causes loss of a lot of fluids, leading to dehydration in the baby [2–4]. If the baby vomits immediately after eating, it may reflect a more serious problem. Reflux occurs when the muscles between the esophagus and the stomach do not work properly and thus the contents of the stomach flow back into the pharynx [5]. Vomiting can be caused many various factors, including viral or bacterial infection, stomach infections, urinary tract infections, pneumonia, meningitis, strep throat, and even ear infections. Crying, toxic substances, and intestinal obstruction are also other factors which may cause vomiting [4,5].

In spite of significant progress in the prevention and treatment of nausea and vomiting, their effective management is still a major problem. It should be noted that severe vomiting can lead to development of many complications, such as dehydration, weight loss, fluid-electrolyte imbalance, anorexia, esophageal tears, weakness, wound dehiscence, fractures, pre-renal azotemia, or decline in behavioral and mental status [6]. The adverse effects of vomiting can deteriorate the patient's self-care, physical and mental status, as well as functional abilities. This can increase the patient's anxiety and dissatisfaction with the hospital experience, which in turn can contribute to future anticipatory nausea [7].

Prevention and treatment of vomiting by safe remedies are, therefore, essential. Complementary therapies have been widely used worldwide; moreC than 80% of the world's population rely on complementary and alternative therapies for their health care [8–10]. Currently, people all over the world, especially in developing countries, pay attention to medicinal plants [11–14]. These plants have been shown to be reliable in the treatment of various diseases as well as in the preparation of new medicines [15,16]. The active ingredients of these herbal remedies (drugs) are being extensively investigated due to the popularity and acceptance of herbal remedies [14,17].

In this regard, medicinal plants have been mostly used in various traditional systems and have been in use for a long time [9,18]. Traditional knowledge on the use of medicinal plants have contributed to the development of antiemetic remedies. Since the prevalence of vomiting in infants and children is high, in this review, traditional medicine and phyto-medicine for vomiting are investigated; the study herein evaluates how herbal remedies affect vomiting in children.

2. Materials and Methods

In the current review, articles were indexed from certain databases, including ISI, PubMed, Scopus, Islamic World Science Citation Center, Scientific Information Database, and Magiran. They were retrieved by using the search terms '*vomiting*', '*nausea*', '*ulcer*', '*medicinal plants*', and '*traditional medicine*'.

3. Results

Based on the search, the results showed that several plants are used in traditional medicine to treat vomiting in all people, especially children. The following are the medicinal plants: *Zingiber officinale*, *Mentha piperita*, *Cinnamomum verum*, *Citrus limon*, *Matricaria chamomilla*, *Lavandula angustifolia*, *Allium cepa*, *Oryza sativa*, *Foeniculum vulgare*, *Cuminum cyminum*, *Eugenia caryophyllata*, *Elettaria cardamomum*, *Pimpinella anisum*, *Ferula assa-foetida*, *Ocimum basilicum*, and *Musa sapientum***Tables 1 and 2** .

Table 1. Medicinal plants that are effective against vomiting

Botanical name	Family	Effects
Zingiber officinale (common ginger)	Zingiberaceae	The root of *Zingiber officinale is* used to treat some of the stomach disorders, including vomiting. In fact, *Z. officinale* is one of the most effective natural herbal drugs for vomiting. *Z. officinale* contains phenols that relieve stomach muscles and their effects on the stomach tissue is similar to those of relaxants. Phenols also accelerate the movement of toxins and digestible foods in the digestive system and thus prevent nauseation [19].
Mentha piperita (peppermint)	Lamiaceae	*Mentha piperita* soothes the stomach that has already been stimulated. *M. piperita* is also one of the most famous home remedies for vomiting, which quickly eliminates nausea and vomiting. Inhaling M. piperita aroma reduces nausea [20].
Cinnamomum verum (cinnamon)	Lauraceae	*Cinnamomum verum*, with its extraordinary nature and pleasant aroma, reduces the feeling of nausea and vomiting. *C. verum* is the best choice to treat nausea especially when it has been caused by indigestion. For best use, its tea should be prepared [21] (www.naturestemple.net).
Citrus limon (lemon)	Rutaceae	To treat nausea and vomiting using *Citrus limon*, cut it into small pieces and leave them nearby for the aroma to take effect [22].
Matricaria chamomilla (chamomile)	Asteraceae	Due to its immune nature, M*atricaria chamomilla* is widely used in many cultures as a mild sedative to treat stomach disorders. *M. chamomilla* is usually combined with other types of beneficial plants to prepare a good treatment for heartburn, stomach discomfort, vomiting, and nausea [23].
Lavandula angustifolia (lavender)	Lamiaceae	*Lavandula angustifolia* can help to reduce nausea and vomiting. *L. angustifolia* lowers blood pressure by controlling lipid digestion in the body. Pouring a few drops of *L. angustifolia* oil onto one's pillow or napkin to inhale it, or immersing oneself in water mixed with *L. angustifolia* oil, can help reduce nausea [24] (www.herbal-supplement-resource.com).
Allium cepa (onion)	Amaryllidaceae	Although the smell may not be favorable, juice from *Allium cepa* (in combination with other proper ingredients) is the best medicine for vomiting. *A. cepa*, apart from being one of the most essential foods to treat a variety of health problems including disorders of the immune system, can be considered one of the best home remedies for vomiting [24] (www.herbal-supplement-resource.com).
Oryza sativa (rice)	Poaceae	When *Oryza sativa* is boiled for a long time, its juice may become concentrated so best to dilute it with a little water. *O. sativa* juice can drunk hot or cooled down. The drink can remarkably alleviate vomiting/nausea [25].

Table 2. Effective medicinal plants on vomiting (*continued*)

Botanical name	Family	Effects
Foeniculum vulgare	Apiaceae	*Foeniculum vulgare* contains large amounts of bioactive compounds that can help to relax digestive muscles, thus limiting problems such as bloating, nausea, and flatulence [26].
Cuminum cyminum	Apiaceae	*Cuminum cyminum* seeds and powder are useful to relieve nausea. *C. cyminum* is almost the most well-known treatment for vomiting and nausea among the main home remedies. Pour half a teaspoon of *C. cyminum* seeds in a glass of warm water, let it brew, and then smooth it. Finally, drink the resulting tea to prevent vomiting [27].
Eugenia caryophylata	Myrtaceae	If you suffer from nausea while traveling, you can have a can of *Eugenia caryophyllata* flowers always with you, so when you get nausea, eat a little *E. caryophyllata* to get rid of nausea. Since it is difficult for children to use E. caryophyllata in this way, it is better not to do this for children (www.globalherbalsupplies.com).
Elettaria cardamomum	Zingiberaceae	*Elettaria cardamomum* is from the Zingiberacea family, so this aromatic seed is one of the best home remedies for vomiting (The Useful Plants of India).
Pimpinella anisum	Apiaceae	To treat nausea, rub the seeds of *Pimpinella anisum* a little, or pour some of them into a cup of boiling water and drink the tea after it brewed for 10 minutes (www.globalherbalsupplies.com).
Ferula assa-foetida	Apiaceae	*Ferula assa-foetida* can fight viruses and bacteria and thus reduce symptoms of diarrhea and vomiting, and it exert its effect fast. In addition, this spice helps digestion and stimulates the gastrointestinal tract. Add a teaspoon of *F. assa-foetida* powder to a glass of warm water and stir well. Take this mixture twice a day for a few days. To prevent diarrhea, vomiting, and other digestive problems, add a little *F. assa-foetida* to curry powder and everyday foods (www.globalherbalsupplies.com).
Ocimum basilicum	Lamiaceae	*Ocimum basilicum*, which has anti-spasmodic properties, is also a good drug for diarrhea and vomiting. It can make the stomach stronger and prevent many diseases of diarrhea and vomiting (www.globalherbalsupplies.com).
Musa sapientum		*Musa sapientum*, both ripe and raw, also helps in treating diarrhea and vomiting. The presence of amylase in *M. sapientum* helps to reduce the symptoms. *M. sapientum* also contains potassium and magnesium, two important electrolytes needed for the proper functioning of the digestive tract. In addition, *M. sapientum* is a sweet and desirable food that makes digestion easy [28].

4. Discussion

In this review article, medicinal plants used against vomiting are reported. Traditional knowledge of these plants can contribute to development of antiemetic remedies. Chronic nausea is usually multifactorial in origin. High intracranial pressure, dehydration, gastroduodenal ulcers, bowel obstruction, and metabolic abnormalities (including uremia, hyponatremia and hypercalcemia) can contribute to nausea and vomiting. Psychological parameters also can induce or exacerbate it [29]. Vomiting and nausea both are mediated and controlled through central nervous system, however, by different mechanisms. Vomiting is mediated through stimulation of a complex reflex which is coordinated through a putative true vomiting center; nausea, however, results from the stimulation of autonomic nervous system.

The vomiting center usually receives afferent stimuli through various central neurologic pathways. For example, various sensory stimuli of psychological response (e.g. taste, smell, and pain) from the limbic system are able to stimulate the chemoreceptor trigger zone (CTZ) and cause vomiting. Motion sickness, however, occurs through impulses from the labyrinthine apparatus. Endogenous biochemical and exogenous substances which accumulate during irritation, ischemia and inflammation can stimulate spinal and vagal nerves to cause nausea and vomiting. Intestinal damage or irritation also cause substantial generation and release of serotonin by the enterochromaffin cells in the enteric nervous system of serotonin, which stimulates 5HT3 receptors and causes severe vomiting [30]. The central pathway is also stimulated by substance P, which in turn stimulates the neurokinin-1 receptors and the gastrointestinal vagal afferent nerve fibers. Several other receptors such as CB1 (canabinoid-1), H1 (histamine-1), D2 (dopamine-2), D3 (dopamine-3), M3 (muscarinic-3), M5 (muscarinic-5), and GABAB (gamma amino butyric acid-B) contribute to vomiting [30,31]. Thus, medicinal plants with antiemetic activities can act through various pathways. The mechanisms of action of these plants should be investigated; the modes of actions of only some of these plants have been studied so far.

Studies have also suggested the association of oxidative stress and clinical severity of vomiting and nausea [32]. This is an important issue in the use of medicinal plants as antiemetic agents. Plants, including the medicinal plants presented in this review article, mostly have antioxidant activity [33–35]. Antioxidants can scavenge the free radicals and return the imbalance between antioxidant activity and oxidative stress, which are induced by various diseases [13,36,37]. Therefore, each medicinal plant should be studied not only for their mode of action but also for their ability to reduce oxidative stress. Furthermore, each medicinal plant may have its own effects on a wide range of diseases [38–41]. Therefore, these herbal remedies may benefit the patient (adult or child) in treating emesis as well as other diseases. Moreover, the use of these herbal remedies would be associated with lower cost and greater safety than non-herbal remedies.

5. Conclusion

Although the mechanisms of action for some of these plants have been understood, there are many other plants (reviewed in this article) whereby the mechanism of action has not been elucidated. All the plants discussed in this article are beneficial against vomiting and nausea. However, future investigations are needed to explore the most effective of these medicinal plants for use in treating nausea/vomiting in the clinic.

6. Open Access

7. List of abbreviations

Vom: Vomiting, **Nau**: nausea

8. Ethics approval and consent to participate

9. Competing interests

The authors declare that they have no conflict of interest

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