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

Azam Mohsenzadeh¹,², Shokoufeh AhmadiPour²,³, Parisa Rahmani³ and Parmida Shakarami⁴

¹Fellowship of Pediatric Immunology, Children’s Medical Center, Tehran University of Medical Sciences, Tehran, Iran
²Pediatric Department, Lorestan University of Medical Sciences, Khorramabad, Iran
³Pediatric Gastroenterology and Hepatology Research Center, Tehran University of Medical Sciences, Tehran, Iran
⁴Medical Student, Shahid Beheshti University of Medical Sciences, Tehran, Iran

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; more 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 nausea [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, *Matricaria 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]. |
| 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 caryophyllata* | 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

This article is distributed under the terms of the Creative Commons Attribution License (CC-BY 4.0) which permits any use, distribution, and reproduction in any medium, provided the original author(s) and the source are credited.
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

10. Funding

There is no financial support for this study

11. Authors’ contributions

All authors reviewed, commented and approved the final manuscript.

12. Acknowledgements

References

1. Walker GM, Neilson A, Young D, Raine PA. 2006 Colour of bile vomiting in intestinal obstruction in the newborn: questionnaire study. Bmj 332, 1363.
2. Pomerance HH. 1997 Nelson textbook of pediatrics. Archives of pediatrics & adolescent medicine 151, 324–324.
3. Marlow D. 1969 Textbook of pediatric nursing. In Textbook of pediatric nursing Philadelphia. Saunders.
4. Fleisher GR, Ludwig S. 2010 Textbook of pediatric emergency medicine. Lippincott Williams & Wilkins.
5. Rogers MC. 1992 Textbook of pediatric intensive care. Lippincott Williams and Wilkins.
6. Antonarakis ES, Hain RDW. 2004 Nausea and vomiting associated with cancer chemotherapy: drug management in theory and in practice. Archives of disease in childhood 89, 877–880.
7. Thompson HJ. 1999 The management of post-operative nausea and vomiting. Journal of advanced nursing 29, 1130–1136.
8. Jamshidi-Kia F, Lorigooini Z, Amini-Khoei H. 2018 Medicinal plants: past history and future perspective. Journal of herbmed pharmacology 1, 1–7.
9. Sewell RD, Rafieian-Kopaei M. 2014 The history and ups and downs of herbal medicines usage. Journal of Herbmed Pharmacology 3.
10. Nasri H, Shirzad H. 2013 Toxicity and safety of medicinal plants. Journal of HerbMed Pharmacology 2.
11. Asgari S, Setorki M, Rafieian-kopaei M, Shahinfard N, Ansari R, Forouz Z et al. 2012 Postprandial hypolipidemic and hypoglycemic effects of Allium hertifolium and Sesamum indicum on hypercholesterolemic rabbits. African Journal of Pharmacy and Pharmacology 6, 1131–1135.
12. Jalaly L, Sharifi G, Faramarzi M, Nematollahi A, Rafieian-Kopaei M, Amiri M, Moattar F. 2015 Comparison of the effects of Crataegus oxyacantha extract, aerobic exercise and their combination on the serum levels of ICAM-1 and E-Selectin in patients with stable angina pectoris. DARU Journal of Pharmaceutical Sciences 23, 54.
13. Shayganni E, Bahmani M, Asgary S, Rafieian-Kopaei M. 2016 Inflammaging and cardiovascular disease: Management by medicinal plants. Phytomedicine 23, 1119–1126.
14. Rahimi-Madiseh M, Heidarian E, Kheiri S, Rafieian-Kopaei M. 2017 Effect of hydroalcoholic Allium ampeloprasum extract on oxidative stress, diabetes mellitus and dyslipidemia in alloxan-induced diabetic rats. Biomedicine & Pharmacotherapy 86, 363–367.
15. Rabiei Z, Gholami M, Rafieian-Kopaei M. 2016 Antidepressant effects of Mentha pulegium in mice. Bangladesh Journal of Pharmacology 11, 711–715.

16. Asadi-Samani M, Bagheri N, Rafieian-Kopaei M, Shirzad H. 2017 Inhibition of Th1 and Th17 cells by medicinal plants and their derivatives: A systematic review. Phytotherapy Research.

17. Rahimi-Madiseh M, Karimian P, Kafeshani M, Rafieian-Kopaei M. 2017 The effects of ethanol extract of Berberis vulgaris fruit on histopathological changes and biochemical markers of the liver damage in diabetic rats. Iranian Journal of Basic Medical Sciences 20, 552.

18. Jamshidi-Kia F, Lorigooini Z, Amini-Khoei H. 2018 Medicinal plants: past history and future perspective. Journal of herbal pharmacology 1, 1–7.

19. Marx WM, Teleni L, McCarthy AL, Vitetta L, McKavanagh D, Thomson D, Isenring E. 2013 Ginger (Zingiber officinale) and chemotherapy-induced nausea and vomiting: a systematic literature review. Nutrition reviews 71, 245–254.

20. Tayarani-Najaran Z, Talasaz-Firooz E, Nasiri R, Jalali N, Hassanzadeh MK. 2013 Antiemetic activity of volatile oil from Mentha spicata and Mentha piperita in chemotherapy-induced nausea and vomiting. Cancer 17, 4125–9.

21. http://www.naturestemple.net/cinnamon-cinnamomum-verum/.

22. Safraju F, Shahnazi M, Nazemiyeh H et al. 2014 The effect of lemon inhalation aromatherapy on nausea and vomiting of pregnancy: a double-blinded, randomized, controlled clinical trial. Iranian Red Crescent Medical Journal 16.

23. Sanaati F, Najafi S, Kashaninia Z, Sadeghi M. 2016 Effect of ginger and chamomile on nausea and vomiting caused by chemotherapy in iranian women with breast cancer. Asian Pac J Cancer Prev 17, 727.

24. https://www.herbal-supplement-resource.com/lavender-oil.html.

25. Umadevi M, Pushpa R, Sampathkumar KP, Bhovmik D. 2012 Rice-traditional medicinal plant in India. Journal of pharmacognosy and phytochemistry 1.

26. Pasha H, Behmanesh F, Mohsenzadeh F, Hajahmadi M, Moghadamnia AA. 2012 Study of the effect of mint oil on nausea and vomiting during pregnancy. Iranian Red Crescent Medical Journal 14, 727.

27. Rahimi-Madiseh M, Lorigooini Z, Zamani-gharaghoshi H, Rafieian-kopaei M. 2017 Berberis vulgaris: specifications and traditional uses. Iranian Journal of Basic Medical Sciences 20, 569.

28. Dahham SS, Mohamad TA, Tabana YM, Majid A. 2015 Antioxidant activities and anticancer screening of extracts from banana fruit (Musa sapientum). Nutrition Reviews 71, 968–970.

29. Verit F, Erel O, Sav M, Celik N, Cadirci D. 2007 Oxidative stress is associated with clinical severity of nausea and vomiting of pregnancy. Am J Perinatol 24, 545–548.

30. Shirzad H, Shahrani M, Rafieian-Kopaei M. 2009 Comparison of morphine and tramadol effects on phagocytic activity of mice peritoneal phagocytes in vivo. International Immunopharmacology 9, 968–970.

31. Asgharzade S, Rafieian-kopaei M, Mirzaein A, Reisi S, Salimzadeh L. 2015 Aloe vera toxic effects: expression of inducible nitric oxide synthase (iNOS) in testis of Wistar rat. Iranian Journal of Basic Medical Sciences 18, 967.

32. Rabiei Z, Naderi S, Rafieian-Kopaei M. 2017 Study of antidepressant effects of grape seed oil in male mice using tail suspension and forced swim tests. Bangladesh Journal of Pharmacology 12, 397–402.

33. Rouhi-Boroujeni H, Heidarian E, Rouhi-Boroujeni H, Deris F, Rafieian-Kopaei M. 2017 Medicinal plants with multiple effects on cardiovascular diseases: A systematic review. Current Pharmaceutical Design 23, 999–1015.

34. Rabiei Z, Rafieian-Kopaei M, Mokhtari S, Shahrani M. 2014 Effect of dietary ethanolic extract of Lavandula officinalis on serum lipids profile in rats. Iranian Journal of Pharmaceutical Research: IJPR 13, 1295.

35. Karimi A, Mohammad-Kamalabadi M, Rafieian-Kopaei M, Amjad L et al. 2016 Determination of antioxidant activity, phenolic contents and antiviral potential of methanol
extract of Euphorbia spinidens Bornm (Euphorbiaceae). *Tropical Journal of Pharmaceutical Research* **15**, 759–764.

39. Hosseini Z, Lorigooini Z, Rafieian-Kopaei M, Shirmardi HA, Solati K. 2017 A review of botany and pharmacological effect and chemical composition of Echinophora species growing in Iran. *Pharmacognosy research* **9**, 305.

40. Heidarian E, Rafieian-Kopaei M. 2013 Protective effect of artichoke (Cynara scolymus) leaf extract against lead toxicity in rat. *Pharmaceutical biology* **51**, 1104–1109.

41. Baradaran A, Nasri H, Rafieian-Kopaei M. 2013 Erythropoietin and renal protection. *DARU Journal of Pharmaceutical Science* **21**, 78.