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FORMULATION OF HERBAL LOLLIPOP: AN EFFECTIVE TREATMENT FOR PAEDIATRIC MOTION SICKNESS

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ABSTRACT

Herbal lollipop as an innovative approach to treating motion sickness in pediatric patients, particularly those aged between 3 to 12 years. Motion sickness is caused by conflicting sensory information, which induces dizziness, nausea, and vomiting. The emphasis of the research is on natural ingredients mainly ginger, amla, and peppermint, which have been identified with gastrointestinal and central nervous system activity. Ginger is very effective in countering nausea, and its bioactive compounds like gingerol and shogaol increase the motility of the stomach. Amla is a great source of vitamin C and antioxidants, thus enhancing digestive health. Peppermint contains menthol, which exhibits antispasmodic activity and relaxes the gastrointestinal tract. The lollipop formulation process includes the mixing of these herbs with sugar and liquid glucose, which are then cooked and molded into tasty lollipops. This delivery mechanism enhances compliance in pediatric patients and offers a holistic alternative to traditional medications. Evaluation has shown that the herbal lollipop effectively controls symptoms of motion sickness and confers additional health benefits, such as antifungal and antibacterial properties. The results suggest that this formulation holds promise as a natural remedy for motion-related discomfort in children and deserves further research to validate its efficacy across diverse populations.

KEYWORDS: Ginger; Amla; Peppermint; Pediatric Motion Sickness; Herbal Remedies; Antifungal Activity.

1. INTRODUCTION

Motion sickness is a frequent condition marked by feelings of discomfort that are induced by specific kinds of movement. Motion sickness is one of the usual conditions where symptoms such as dizziness, nausea, or vomiting are caused due to various conflicting signals being sent from one's inner ear, the eyes, and body through the brain. The root cause is mostly a misleading communication while traveling by motor vehicle, boats, planes, trains, or riding attractions in an amusement park. Children between 3 to 12 years are more prone to motion sickness, but children below 2 years are do not experience symptoms.[1][2] The mechanism for motion sickness is based on a mismatch of sensory information. For instance, while reading or looking down inside a moving car, the child's inner ear feels that the child is moving but the eyes see stillness. Such a discrepancy creates confusion in the brain, which may give rise to symptoms of motion sickness.[3][4] The inner ear is quite sensitive; children with heightened sensitivity may experience more acute symptoms.[5] Symptoms in children can vary and often include an upset stomach (often the first sign), dizziness (especially common in younger children), nausea and vomiting (more pronounced after age 12), cold sweats, loss of energy, and behavioral signs such as becoming pale or squirmy.[1][2] To manage motion sickness in children, several preventive measures can be taken ensuring the child is not hungry before travel (light snacks like oatmeal or bananas are recommended), encouraging them to look outside rather than at books or screens, making frequent stops during car trips for breaks, and opting for auditory entertainment instead of reading materials. Other over-the-counter drugs that could be effective but have to be used under the advice of a pediatrician. If there are symptoms of motion sickness occurring outside of movement activity, or if symptoms continue after more than eight hours posttravel, a pediatrician has to be consulted so as to exclude other causes of such an illness.[1][2]

Motion sickness is best explained by the concept of the sensory conflict theory which states that it is caused as a result of conflicting sense information within the brain, and then this condition ensues through a mismatch created between signals received from a vestibular system (inner ear), and visual system combined with those from proprioception (awareness of body position). These systems, when sending incongruent messages like when the body is moving but the eyes see it as still confuse the brain, leading to symptoms such as nausea, dizziness, and vomiting.[6]

Motion detection is the main function of the vestibular system. The otolith organs detect linear accelerations and gravity, whereas the semicircular canals react to rotating movements. A mismatch known as a "neural mismatch" occurs when the signals from these systems do not match in motion sickness.[7] The vestibular cerebellum is also implicated in motion sickness; it helps regulate the vestibuleoocular reflex and can influence autonomic responses such as nausea. Studies have shown that excessive inhibition from this area can exacerbate symptoms. This means that genetic factors also contribute to the susceptibility of a person to motion sickness, suggesting that some people are more prone because of their unique neurophysiological makeup. Nearly 76% of individuals with vestibular migraine had a history of motion sickness, according to recent studies, indicating a substantial overlap between the two illnesses. Additionally, age affects susceptibility, with younger persons reporting more cases of motion sickness.[1] In a nutshell, motion sickness represents a complex interplay of sensory inputs and neural processing that leads to a physiological response characterized by discomfort and autonomic symptoms.

Motion sickness is treated by natural herbs and plants because of their chemicals that affect the central nervous system and the gastrointestinal tract. Active components included in many of these natural therapies relax the stomach and support digestive health, which helps reduce nausea and vomiting. They frequently function by calming the gastrointestinal tract's muscles, which might lessen nausea. Other herbs can help control the body's reaction to stress caused by motion since they have anti-inflammatory qualities. Through enhancing stomach movement and influencing the brain's vomiting area, these herbal therapies offer a comprehensive strategy for treating motion sickness symptoms. With a long history of traditional use, their use as natural alternatives to conventional medications makes them attractive options for those looking for relief from motion-related discomfort.[8][9]

1.1. Health Benefits

1.1.1. Ginger (Zingiber officinale)

The effectiveness of ginger in reducing motion sickness has been thoroughly studied, mainly because of its bioactive components, shogaol and gingerol. By enhancing stomach motility and adjusting the central nervous system, ginger has been shown in studies to dramatically lessen motion sickness-related nausea and vomiting. Although results of ginger's effectiveness in comparison to traditional treatments like dimenhydrinate are conflicting, a comprehensive review emphasizes that ginger may reduce nausea by modulating stomach

dysrhythmias and improving gastric emptying.[8][14] Ginger extract significantly improved the Motion Sickness Assessment Questionnaire (MSAQ) scores of individuals, especially when taking 160 mg of ginger extract plus 8 mg of gingerols prior to travel. Ginger may help reduce nausea, according to some research, while other studies show it has no discernible effect on stomach function during motion sickness episodes.[8][11]

Ginger's capacity to affect the gastrointestinal tract and the vomiting region of the brain is thought to be the cause of its antiemetic effects. Gingerol may help prevent nausea because it has been demonstrated to have anti-inflammatory and stomach acid secretion-inhibiting propertie.[12][13]

Other Health Benefits

- Anti-inflammatory Effects: Helps with aches brought on by exercise by reducing muscle soreness and pain.
- Digestive Aid: Promotes gastric motility, which facilitates the effective passage of food through the digestive tract.
- Cardiovascular Health: Associated with better control of blood sugar and decreased cholesterol.
- Antibacterial Properties: Supports improved tooth health by assisting in the fight against oral microorganisms.

Figure 1: Ginger rhizomes.

Table 1: Nutritional composition of ginger (per 100g).

Constituent	Value
Moisture	15.02 ± 0.04
Protein (g)	5.087 ± 0.09 (5.98)
Fat (g)	3.72 ± 0.03 (4.37)
Insoluble fibre (%)	23.5 ± 0.04 (30.0)
Soluble fibre (%)	25.5 ± 0.04 (30.0)
Carbohydrate (g)	38.35 ± 0.1
Vitamin C (mg)	9.33 ± 0.08 (10.97)

Total carotenoids (mg)	79 ± 0.2 (92.96)
Ash (g)	3.85 ± 0.61 (4.53)
Calcium (mg)	88.4 ± 0.97 (104.02)
Phosphorous (mg)	174 ± 1.2 (204.75)
Iron (mg)	8.0 ± 0.2 (9.41)
Zinc (mg)	0.92 ± 0 (1.08)
Copper (mg)	0.545 ± 0.002 (0.641)
Manganese (mg)	9.13 ± 0.01 (10.74)
Chromium (µg)	70 ± 0 (83.37)

Source: (Kikani & Rana, 2023)

1.1.2. Amla (Phyllanthus emblica)

Indian gooseberry, or amla, is high in vitamin C and other health-promoting phytonutrients. Amla's strong antioxidant content can help fight oxidative stress in the body, which may lessen nausea symptoms, even though there aren't many research specifically examining its direct effects on motion sickness. Active ingredients found in amla include tannins, gallic acid, and ellagic acid, which are known to have anti-inflammatory and digestive health-promoting effects.[8][16] Amla's tannins may lessen the gastrointestinal pain brought on by motion sickness and assist control digestive processes. Furthermore, amla's historical application in Ayurvedic medicine to enhance digestion raises the possibility that it could help those who are prone to motion sickness. While more targeted research is needed to establish a direct link between amla consumption and motion sickness relief, its general digestive benefits indicate potential as a supportive remedy.

Other Health Benefits

- Antioxidant Properties: Prevents oxidative stress in cells.
- Digestive Health: Encourages regular bowel movements and improves nutrient absorption.
- Anti-inflammatory Effects: Reduces the signs and symptoms of long-term illnesses like arthritis.

  Immune Support: Enhances skin health and immune function.
- Blood Sugar Regulation: May enhance lipid profiles and assist in controlling blood sugar levels.

Figure 2: Phyllanthus emblica.

1.1.3 Peppermint (Mentha piperita)

Motion sickness-related nausea is well recognized to be alleviated by peppermint. Menthone and menthol, the main active ingredients in peppermint, provide calming effects on the digestive system. Because menthol has antispasmodic qualities, it relaxes the gastrointestinal tract's muscles, which lessens the sensations of nausea.[8][12] According to research, taking peppermint tea or breathing peppermint oil can greatly reduce nausea when traveling. Menthol has a cooling effect that soothes the stomach and lessens nausea. Peppermint may also improve bile flow, which would aid in digesting even more.[14]

Other Health Benefits

- Digestive Relief: By calming the muscles in the gastrointestinal tract, this relieves discomfort related to digestion.
- Headache Relief: When applied directly or utilized in aromatherapy, cooling characteristics can help reduce headaches.
- Antimicrobial Effects: Lowers oral bacteria to aid in the battle against illnesses.
- Cognitive Benefits: Potentially enhances cognitive function and reduces fatigue

Figure 3: Mentha piperita.

Table 2: Herbs and their parts used.

Herbs	Part used
Zingiber officinale)	Rhizome
Phyllanthus emblica	Fruit
Mentha piperita	Leaves

2. MATERIALS AND METHODS

2.1. Materials

- Sugar
- Liquid Glucose
- Ginger (Zingiber officinale)
- Amla (Phyllanthus emblica)
- Peppermint (Mentha piperita)
- Black salt
- Citric acid

2.2. Methods



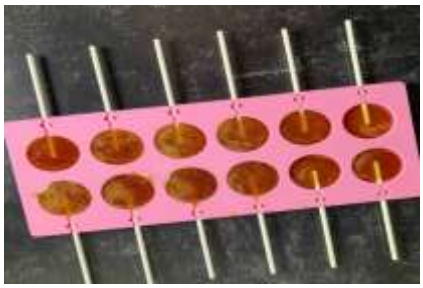
Step 1: Wash amla, ginger, and peppermint thoroughly. Cut amla and ginger into small pieces, peppermint leaves. Blend until smooth paste

Step 2: Strain the mixture through a fine mesh sieve or cheesecloth to extract the juice discard the pulp.

Step 3: Mix the extracted juice, 200g of sugar, and 200ml of liquid glucose in a bowl and stir until well combined.

Step 4: Pour the mixture into a saucepan over medium heat, stirring constantly to dissolve the sugar.

Step 5: Continue cooking until the mixture thickens to a syrupy consistency, 10 to 15 minutes. Mix thoroughly after adding the lemon juice, citric acid, and black salt.



Step 6: Apply oil to the lollipop molds. Once the liquid has thickened, pour it into molds, insert the lollipops, and let them cool at room temperature until they set.

Step 7: Place all of the wrapped lollipops in a tiny plastic bag after wrapping each one in transparent or colorful wrappers and securing them with a ribbon or thread.

3. RESULT AND DISCUSSION

Formulation of herbal lollipop to treat pediatric motion sickness will involve an in-depth exploration of motion sickness, which generally affects children from 3 years old up to 12 years of age. It is characterized by conflicting sensory inputs that trigger such symptoms as dizziness, nausea, and vomiting. The paper describes the possibility that natural herbs like ginger, amla, and peppermint are used to eliminate these symptoms through their gastrointestinal and CNS benefits. In fact, compounds in ginger may enhance gastric motility and reduce nausea, while compounds in amla have antioxidants that may eliminate oxidative stress, and peppermint is known to have antispasmodic effects that relieve the gastrointestinal tract. The study focuses on a holistic approach by using these herbal ingredients as alternatives to conventional medications, making them appealing for those seeking natural remedies for motion-related discomfort. The formulation process involves blending the herbs with sugar and liquid glucose, followed by cooking and molding into lollipops, providing an enjoyable method to administer these beneficial ingredients. This approach not only enhances compliance among pediatric patients but also capitalizes on the sensory appeal of lollipops.

In addition to use for the management of motion sickness, ginger shows tremendous antifungal and antibacterial properties; significant action can be observed, mainly against E coli. Active research shows that, through gingerol and shogaol compounds, there is indeed great potential to block bacterial action on account of disruptions in pathogenic cell membranes. Similarly, amla is rich in vitamin C and antioxidants that support immune function and may inhibit fungal growth, while peppermint contains menthol and other compounds that exhibit antifungal activity.

These natural substances work together to treat bacterial infections while also effectively supporting the management of fungal diseases. All things considered, the creation of herbal lollipops is a promising advancement in pediatric treatment, providing a novel and delicious way to treat motion sickness while utilizing the health advantages of conventional herbal cures.

Table 3: Treatment Table.

Sr. No.	Sample Code	Colour	Odour	Taste	Flavour	Appearance	Overall Acceptability
1.	F0	8	7.5	7	8	8	7.7
2.	F1	7	7	7	7.5	8	8
3.	F2	8	7	7	7.5	7.5	7.8

4. CONCLUSION

The research reaches the conclusion that a promising new treatment for children motion sickness is the herbal lollipop. It was established that ginger greatly reduces nausea, and peppermint and amla both have unique health advantages. The findings imply that this formulation offers a comprehensive substitute for pharmaceutical solutions while also acting as a fun treatment for kids. To confirm their efficacy in the general population and investigate additional motion sickness uses, however, larger clinical trials must be conducted in the future. In light of this, the study highlights the potential for herbs to enhance people's quality of life by alleviating motion-related discomfort.

REFERENCES

1. Takov, V., & Tadi, P. (2023, July 3). Motion Sickness. StatPearls - NCBI Bookshelf. https://www.ncbi.nlm.nih.gov/books/NBK539706/
2. Rice, A. (2023, June 27). Motion Sickness - Causes and Treatment | familydoctor.org. familydoctor.org. https://familydoctor.org/condition/motion-sickness/
3. Rova, K., Joffily, L., Carvalho, L., Cortese, E., Koohi, N., & Kaski, D. (2024). Motion sickness whilst reading as a passenger in the car is highly predictive of vestibular migraine. Frontiers in Neurology, 15. https://doi.org/10.3389/fneur.2024.1426081
4. Motion Sickness | CDC Yellow Book 2024. (n.d.). CDC.gov. https://wwwnc.cdc.gov/travel/yellowbook/2024/air-land-sea/motion-sickness
5. National Library of Medicine. (n.d.). Motion Sickness. https://medlineplus.gov/motionsickness.html
6. Warwick-Evans LA, Symons N, Fitch T, Burrows L. Evaluating sensory conflict and postural instability. Theories of motion sickness. Brain Res Bull, 1998 Nov 15; 47(5): 465-9.
7. Motion sickness. (n.d.). Mount Sinai Health System. https://www.mountsinai.org/health-library/condition/motion-sickness
8. Lien HC, Sun WM, Chen YH, Kim H, Hasler W, Owyang C. Effects of ginger on motion sickness and gastric slow-wave dysrhythmias induced by circular vection. Am J Physiol Gastrointest Liver Physiol, 2003 Mar; 284(3): G481-9.
9. Yarnell, Eric. (2016). Herbs for Motion Sickness. Alternative and Complementary Therapies, 22: 1-5. 10.1089/act.2016.29049.eya.
10. Shahrajabian, M. H., Sun, W., & Cheng, Q. (2019). Clinical aspects and health benefits of ginger (*Zingiber officinale*) in both traditional Chinese medicine and modern

industry. *Acta Agriculturae Scandinavica, Section B — Soil & Plant Science*, *69*(6): 546–556.

11. Nunes CP, Rodrigues CC, Cardoso CAF, Cytrynbaum N, Kaufman R, Rzetelna H, Goldwasser G, Santos A, Oliveira L, Geller M. Clinical Evaluation of the Use of Ginger Extract in the Preventive Management of Motion Sickness. Curr Ther Res Clin Exp, 2020 Jun 15; 92: 100591.
12. Mao QQ, Xu XY, Cao SY, Gan RY, Corke H, Beta T, Li HB. Bioactive Compounds and Bioactivities of Ginger (*Zingiber officinale* Roscoe). Foods, 2019 May 30; 8(6): 185.
13. Ayustaningwarno F, Anjani G, Ayu AM, Fogliano V. A critical review of Ginger's (*Zingiber officinale*) antioxidant, anti-inflammatory, and immunomodulatory activities. Front Nutr, 2024 Jun 6; 11: 1364836.
14. Lete, I., & Alluέ, J. (2016). The Effectiveness of Ginger in the Prevention of Nausea and Vomiting during Pregnancy and Chemotherapy. Integrative Medicine Insights.
15. Kikani, N. B., & Rana, N. K. (2023). Development of herbal lollipop incorporated with honey and ginger (Zingiber officinale). International Journal of Science and Research Archive, 8(2): 057–066.
16. Rahimzadeh, G., Tay, A., Travica, N., Lacy, K., Mohamed, S., Nahavandi, D., Pławiak, P., Qazani, M. C., & Asadi, H. (2023). Nutritional and Behavioral Countermeasures as Medication Approaches to Relieve Motion Sickness: A Comprehensive Review. *Nutrients*, *15*(6): 1320.