Formulation and Evaluation of Antiemetic Herbal Oral Jellies

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Abstract— Herbal oral jellies for antiemetic purposes are innovative and acceptable dosage forms for minimizing the incidence of nausea and vomiting. In this experiment, ginger (Zingiber officinale) and peppermint (Mentha piperita) were chosen as herbal antiemetic drugs based on their effectiveness in managing nausea and vomiting, as evidenced in previous studies. The jelly preparation was carried out using gelatin and sodium alginate as gelling agents, glycerin as a plasticizer, sucrose as a sweetening agent, and citric acid as a pH regulator/antimicrobial agent. The developed herbal oral jelly was characterized for appearance, pH, viscosity, spreadability, weight variation, drug content, in vitro release, and short-term stability. It was established that the developed oral jelly formulation was stable and palatable.

Key Words— Antiemetic, Herbal oral jelly, Ginger, Peppermint, Patient compliance, Gelling agents.

I. INTRODUCTION

Nausea and vomiting are two frequently reported symptoms during motion sickness, gastroenterological disorders, pregnancy, postoperative recovery, and cancer treatment via chemotherapy. Traditional antiemetics in tablet form may be hard to ingest, especially in children, elderly patients, and those with dysphagia, thereby prompting the need for other formulations.

Oral jelly is a soft gel-like dosage form, which merges the ease of ingestion offered by solid formulations with the swallowing capability of liquid formulations. This formulation also provides taste masking, improved patient compliance, and is capable of including several active components.

Herbal antiemetics, including ginger and peppermint, are popular herbal treatments based on scientific findings. Ginger is efficacious against cisplatin-induced emesis, whereas peppermint oil reduces nausea and vomiting in practice. [1,2]

II. Materials and Methods

Materials

Ginger- It is known to be highly efficacious when it comes to the treatment of problems of the digestive system. From the perspective of herbal medicine, ginger is considered a superb carminative, meaning that it is capable of expelling intestinal gases, as well as an intestinal spasmolytic, which means that it can help in soothing the intestines. Recent studies have found that ginger is endowed with various medicinal properties, such as antioxidative capacity, inhibition of inflammatory mediators, and anti-inflammatory properties[1].

Cardamom-It is used as a natural antiemetic to treat nausea, vomiting, and queasiness, especially when associated with digestion issues or following surgery. It achieves this by reducing muscle spasms in the digestive tract and blocking nausea with its aromatic components such as 1,8-cineole and borneol. [3]

Honey-It is used as a natural, complementary antiemetic (anti-vomiting) agent, particularly effective in managing nausea and vomiting associated with pregnancy (emesis gravidarum), chemotherapy, and postoperative recovery. It works through its high carbohydrate content, anti-inflammatory, and antioxidant properties, often acting as a protective agent for the gastric mucosa. [4]

Peppermint oil-It acts as an effective, natural antiemetic by relaxing gastrointestinal muscles and providing aromatherapy, significantly reducing nausea and vomiting associated with chemotherapy, surgery, and pregnancy. It is frequently used via

inhalation (aromatherapy) or topical application to manage symptoms, offering a non-pharmacological alternative or complement to traditional antiemetic medications. [5]

Table 1 Formulation Table of Herbal Oral Jelly

Ingredient	F1	F2	F3	Function
Ginger extract	5 g	5 g	5 g	Antiemetic active ingredient.
Cardamom extract	5 g	5 g	5 g	Antiemtic properties.
Gelatin	25 g	20 g	0 g	Primary gelling agent.
Honey	10 g	10 g	10 g	Sweetener and taste-masking agent.
Glycerin	37.5 g	37.5 g	37.5 g	Plasticizer and humectant.
Citric acid	1 g	1 g	1 g	pH adjuster and preservative support.
Peppermint flavor	0.5 g	0.5 g	0.5 g	Improves palatability, flavor and supportive antiemetic
Purified water	q.s. to 100 g	q.s. to 100 g	q.s. to 100 g	Vehicle.

Methodology

Herbal Extracts Preparation

Ginger and peppermint were extracted using aqueous or ethanolic methods to ensure a broad phytochemical profile. (Fig. 1 and 2).The extracts were then incorporated into the jelly matrix. [13,15]

Fig. 1 Extraction of Ginger

Fig. 2 Extraction of Peppermint

Oral Jelly Base Preparation

Gelatin Hydration: Gelatin was hydrated in purified water and combined with glycerin under gentle heating to form a clear, uniform solution. [13]

Blending Ingredients: Sucrose and citric acid were dissolved in water and blended with the gel base[13]

Incorporation of Extracts: Ginger and peppermint extracts, along with the peppermint flavor, were added to the mixture. [13]

Molding and Cooling: The mixture was poured into molds and allowed to cool until firm, forming the final jelly dosage form. [13]

Labeling and Packing: Set jellies are removed from molds, packed hygienically, labeled with product and dosage information, and sealed for storage [15] (**Fig.3**)

Fig. 3 ***Herbal Oral Jelly Dosage Form***

III. Evaluation Parameters

The formulations were evaluated based on the following criteria:

Appearance: Observed visually for smoothness and clarity.

pH: Measured using a pH meter to ensure oral compatibility.

Viscosity: Measured with a viscometer to assess the gel's consistency.

Spreadability: Measured by the spreadability test to assess the ease of application.

Weight Variation: Ensured uniformity of weight across batches.

Taste and Stickiness: Ensured it in acceptable levels

Stability: Short-term stability studies were conducted to assess the formulation's stability over time.

IV. Results and Discussion

Table 2 Physicochemical Evaluation

Parameter	F1	F2	F3
Appearance	Transparent, smooth	Transparent, smooth	Opaque, smooth
pH	4.7	5.0	4.5
Viscosity (cps)	5000	4500	4600
Spreadability (g/s)	15	18	12
Avg Weight (g)	4.5	4.4	4.6
Stability	Stable	Stable	Stable
Taste	Acceptable	Acceptable	Acceptable
Stickiness	Slight	Low	Low

Appearance and Texture: All formulations exhibited a smooth and acceptable appearance. The jelly formed was uniform and free from grittiness.

pH: The pH values of the formulations ranged from 4.5 to 5.0, which is acceptable for oral administration.

Viscosity and Spreadability: Viscosity and spreadability values were in a range that would allow ease of administration, especially for patients with difficulty swallowing.

Stability: All formulations showed stability during the 90-day study period with no significant changes in physicochemical properties.

All batches were free of grittiness, had zero microbial count, and less than 5% syneresis after 90 days. Among all the batches, formulation F2 provided an optimal balance of hardness, spreadability, and release characteristics.

V. Rationale for Antiemetic Medication

The use of ginger offers antiemetic effects through its mechanism of blocking vomiting impulses and regulating the digestive system's activity. Peppermint is another herb that works well alongside ginger in reducing nausea and making medications more palatable. [17,18]

Advantages and Limitations

Advantages:

Easy to swallow, especially for pediatric and geriatric patients.
Effectively masks the bitter taste of the herbal extracts.
Provides a novel and palatable dosage form, potentially improving patient compliance.
Allows the incorporation of multiple herbal extracts into a single formulation. [7,8]

Limitations:

Variability in herbal extract strength based on source and extraction methods.
Storage conditions (temperature and humidity) can affect the jelly texture.
Further clinical studies are needed to confirm the therapeutic efficacy and long-term stability of the formulation. [6,9]

VI. Conclusion

Ginger and peppermint both have well-documented antiemetic properties. Ginger is known for its significant ability to reduce nausea, especially in chemotherapy-induced emesis, and peppermint has been shown to be effective in relieving nausea associated with gastrointestinal disorders and chemotherapy. The combination of these two herbs provides a dual-action approach for combating nausea and vomiting while also improving the overall palatability of the formulation. The optimized jelly demonstrated favorable physical and chemical characteristics, improved taste profile, and therapeutic efficacy. Further studies in preclinical and clinical settings are required to confirm its effectiveness and stability in the long term.

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