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"Strategies for Formulation and Evaluation of Poly Herbal Effervescent Granules for the Management of Digestive Activity''

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ABSTRACT: This research focused on formulating and evaluating effervescent granules of fennel (Foeniculum vulgare)seed Powder, known for its carminative, digestive, and antispasmodic properties. The goal was to enhance the palatability of herbal formulations by reducing bitterness while improving dissolution, ensuring a quicker onset of action. Citric acid, tartaric acid, sodium bicarbonate, and other excipients were incorporated using the wet granulation method to prepare effervescent granules.fennel seed powder was formulated into four different batches (F1-F4), and their flow properties, PH, and effervescence time were evaluated. The results indicated that granules exhibited excellent flow for all formulations remained within three minutes, with formulation F1 emerging as the most optimized due to its enhanced drug release (98.30%) and rapid effervescent time of approximately 95 second. The findings suggest that effervescent granules of fennel could serve as a promising formulation for improving herbal drug effectiveness and patient compliance

Keywords: Effervescent granules, fennel (Foeniculum vulgare), wet granulation, digestive aid, rapid action

PLANT PROFILE

Fennel (Foeniculum vulgare) is a medicinal plant known for its carminative and digestive properties. its seeds contain essential oils like anethole and fenchone, which help relieve bloating, indigestion, and spasms in the gastrointestinal tract. Fennel stimulates the secretion of digestive enzyme, promoting better nutrient absorption and easing discomfort. Traditionally used in herbal medicine and culinary preparations, it is valued for its mild laxative effect and ability to reduce gas formulation. Regular consumption of fennel tea or extracts supports overall digestive health.

I. CHAPTER-1

INTRODUCTION

1.1 IntroductionofGranules:

Effervescent granules are a specialized dosage form that consists of a blend of sodium bicarbonate, citric acid, and tartaric acid, when these granules come into contact with water, a chemical reaction takes place, releasing carbon dioxide gas, which leads to effervescence. This reaction helps in masking the undesirable taste of drugs and enhances their palatability. Additionally, the effervescence can contribute to faster drug dissolution, thereby promoting quicker therapeutic action. The formulation of these granules ensures improved patient compliance, especially for individuals who find it difficult to swallow conventional tablets or capsules.

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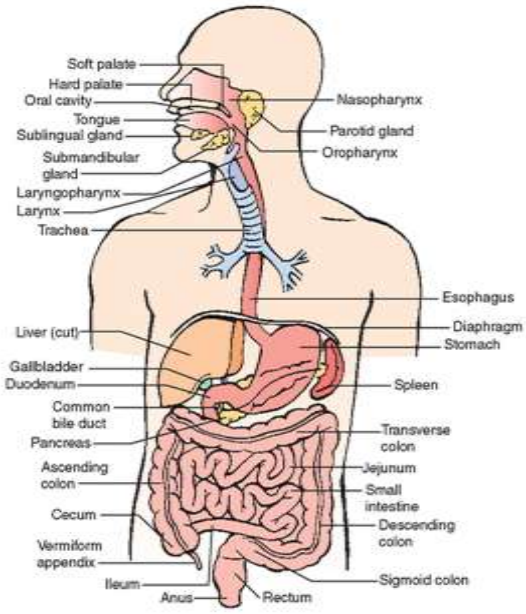
1.2 Introduction of digestive system:



The human digestive system is responsible for breaking down food into simpler substances that the body can absorb and utilize. It consists of two primary components:

1. Gastrointestinal (GI) tract

The GI tract is a long, continuous tube that starts at the mouth and ends at the anus. It passes through different body cavities, including the thoracic and abdominal regions. The major organs involved in digestion include:

- Mouth & pharynx- initiates the digestion process by chewing and mixing food with saliva.
- Esophagus-Transports food from the mouth to the stomach.
- Stomach- Removes waste and absorbs water.
- Small intestine -Absorbs nutrients from digested water.
- Large intestine- Removes waste and absorbs water.

The total length of the GI tract in an adult human is approximately 5-7 meters, and its muscular walls help maintain movement and function.

1. Accessory Digestive Organs

These organs assist digestive but do not directly handle food. Instead, they produce and release important enzymes and substances. The accessory organs include:

- Teeth & Tongue – Help in chewing, swallowing, and the initial processing of food.
- Salivary Glands- Secrete saliva to aid in digestion.
- Liver & Gallbladder- produce and store bile for fat digestion.
- Pancreas- Releases enzymes that break down carbohydrates, proteins and fats.

II. CHAPTER-2:INGREDIENTS

2.1Ingredients used along with its properties:

Sr.No	Mateials	Properties
1	Fennelseeds	Carminative Antispasmodic Antioxidant Antimicrobial Hepatoprotective Expectorant
2	Citricacid	Release CO_2 Antimicrobial & preservative Alkalizing Agent
3	Tarticacid	Antioxidant DigestiveAid &Diuretic

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4	Sodiumbicarbonate	Electrolyte Balance Antacid Mile Antiseptic
5	Sucrose	Odorless Flavoringagents Preservingagent Bindingagent
6	Croscarmellose sodium	Superdisintegrant

2.2 Formulation:

Sr.No	Ingredients	Batch1	Batch2	Batch3	Batch4
1	FennelPowder(gm)	1	1	1	1
2	Citricacid(gm)	2.5	2.5	2	2.5
3	Tartaric acid(gm)	1	2.5	2.5	3
4	Sodiumbicarbonate(gm)	3	4	3	5
5	Sucrose(gm)	1	1	0.5	1
6	Croscarmellose sodium (gm)	1	1	1	1

III. CHAPTER 3:METHOD USED IN FORMUALTION

FENNEL POWDER PROCESSING:

- To obtain the fennel powder, 50 grams of fennel seeds were taken and soaked in 200 ml of distilled water. The mixture was allowed to stand for 12 hours with occasional stirring to enhance extraction. After the soaking period, the extract was filtered using a muslin cloth or filter paper to remove solid residues. The obtained filtrate was then subjected to gentle evaporation at 40℃ until a concentrated extract was obtained, which was then stored for further formulation use.

PROCEDURE:

- Granules were prepared by the wet granulation method. All formulation ingredients were mixed according to the above formulation table and then the binding agent was added. the binding agent was prepared by dissolving 1g croscarmellose sodium in 10 ml of purified water to form a uniform solution. This solution was transferred to a spray bottle for controlled application. The prepared binding solution was then sprayed onto the mixture while continuously stirring to ensure distribution and propre binding of the ingredients.The wet mass was then passed through sieve no.20 to separate out granules. These granules were subsequently dried in hot air at 40℃.

IV. CHAPTER-4: EVALUATION PARAMETERS

1. OrganolepticProperty:

State: Solid Colour: Brown Odour:Pleasant

2. Angleofrepose:

- Theangleofreposewascalculatedwithfixed funnelmethod.
- The mixture was slowly poured down the funnel until the tip of conical pile reached very end.
- The conical piles base radius was calculated used is:

$$\theta = \tan^{-1}(h/r)$$

- θ = Angle of repose
- h = Height of the conical pile
- r = Radius of the base of the conical

3.pH:

- Granules were dissolved in 100 ml of distilled water.
-pH of the solution is measured by using pH meter.

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4 Effervescence time:

-A specified dose of effervescent granules was added to 100 ml of distilled water.

- The time taken for complete dissolution and disappearance of bubbles was recorded.

V. CHAPTER-5: RESULTS AND DISCUSSION

Sr.No	Parameters	Observation
1	State	Solid
2	Colour	Brown
3	Odour	Pleasant
4	Angleofrepose	Good
5	pH	5.0-6.2
6	Effervescencetime	95sec

VI. CHAPTER-6:CONCLUSION

Fennel (Foeniculum vulgare) is known for its carminative and digestive properties. To enhanced its palatability and effectiveness, effervescent granules were formulated using citric acid, tartaric acid, and sodium bicarbonate. Amon the four formulations, F1 showed the best results in terms of effervescence time, PH, and flow properties, making it the most suitable formulation for improve patient compliance.

CHAPTER-7: REFERENCES

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