

Formulation And Evaluation Of Herbal Insitu Gel With Gastro Protective Activity

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ABSTRACT:

This study shows novel herbal in-situ gel for the prevention and treatment of gastric ulcers is formulated and evaluated. The study concentrated on utilizing the well known anti-ulcer, anti-inflammatory, and anti-oxidant qualities of jamun fruit and pomegranate peel natural extracts by combining them in a gel matrix. Using in-situ gelation technology, the gel increases the bioavailability and effectiveness of the herbal compounds by allowing for targeted and sustained drug release in response to physiological stimuli like pH and temperature. Several natural polymers were used to optimize the formulation and both in-vitro and in-vivo techniques were used to evaluate its physical, chemical and biological characteristics. Because of its non toxic nature and ease of administration, The results demonstrated notable gastro protective, healing effects, improved anti-oxidant level and enhanced patient compliance.

KEYWORDS: Gastric Ulcers, Pomegranate Peel Extract, Herbal in-situ gel, Sustained Drug Release, Anti-Oxidant Properties.[1]

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INTRODUCTION:

Peptic ulcers are common and painful condition that affects millions of people around the world. They cause sores in the stomach and duodenum that can get worst if not treated. To manage H.Pylori infection effectively, is necessary to make changes to daily lifestyle, get therapy to lower acid levels and investigate into the primary root causes of the ulcer. Anti-ulcer drugs are important part of this approach because they quickly ease symptoms and help the body to heal[2].

The use of herbal formulation in anti-ulcer therapy has received considerable attention due to their potential effectiveness and reduced side effects in comparison to conventional medications. For centuries, Herbal remedies have been used in traditional medicines to treat digestive problems and ulcers[3]. Ulcers are open sores that develop on the surface of organs, tissues, or mucous membranes, often due to protective barriers. Peptic ulcers, which arise in the stomach, duodenum or oesophagus, are the most common form. There are two primary types:

1) GASTRIC ULCER:

A stomach ulcer which is also referred to as gastric ulcer, it is an open wound in the lining of stomach. It often causes localised stomach pain, which starts in one spot and often feels like it's burning or clenching. But not all stomach ulcer show symptoms that are easy to detect. Stomach ulcers are common and can be treated, but if they persists without treatment for long time they can get worse. Bleeding from some ulcers which fails to stop can

lead to lot of blood loss over a period of time. Some may keep eroding through the wall of the stomach until a hole appears.[4]

2) DUODENAL ULCER:

The ulcer which is present in the duodenum-lining.. Duodenum is first part of small intestine along side is located after the stomach. These ulcer are tend to cause discomfort in the upper abdomen, just beneath the breast bone. It may also develop into ulcers in the stomach. Duodenum and the stomach ulcers are both types of peptic ulcers.[5]

PATHOPHYSIOLOGY OF PEPTIC ULCER DISEASE:

An imbalance between protective and aggressive factors in the mucosa of the stomach and duodenum leads to the development of peptic ulcers.

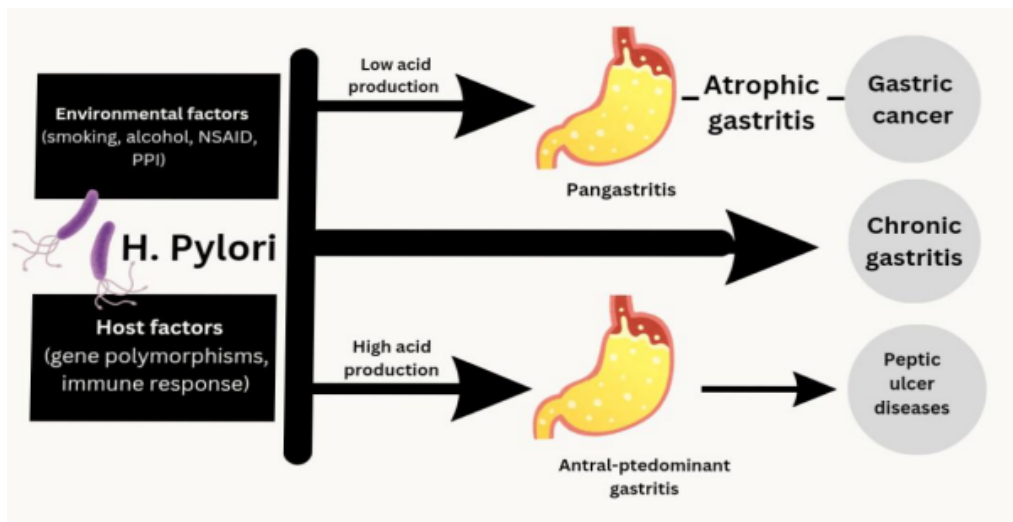
AGGRESSIVE FACTORS:

- Gastric acid (HCl)
 - Pepsin (proteolytic enzyme)
 - Helicobacter pylori (damages mucosa, stimulates acid)
 - NSAIDs (inhibit prostaglandin synthesis)
 - Bile salts
2. Protective (Defensive) Factors:
- Mucus-bicarbonate barrier
 - Prostaglandins (maintain blood flow, stimulate mucus and bicarbonate secretion)
 - Mucosal blood flow

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- Cell renewal and restitution
- 3.Imbalance Leads to Ulcer Formation
When aggressive factors overpower the protective ones, mucosal injury occurs, leading to inflammation, erosion, and eventually ulceration.
Anti-Ulcer Therapy: How It Targets Pathophysiology
Anti-ulcer drugs aim to restore the balance by:
- 4.Reducing Aggressive Factors
PPIs (e.g., omeprazole): Inhibit H⁺/K⁺ ATPase pump, reducing acid secretion

- H2 blockers (e.g., ranitidine): Block histamine on parietal cells, decreasing acid
Antibiotics: Eradicate H. pylori
Antacids: Neutralize existing acid
5.Enhancing Defensive Mechanisms
Sucralfate: Forms a protective barrier over ulcers
Misoprostol: Prostaglandin analog, restores mucosal defense
Bismuth compounds: Coat ulcers and kill H. pylori[6]



MATERIALS AND METHODS:

MATERIALS:

1. Pomegranate peel (Punica granatum): Dried, ground and extracted with ethanol for ellagic acid, which contributes anti-ulcer and anti-oxidant properties
2. Jamun seed (Syzygium cumini): Seeds are dried, powdered and extracted with hydro-ethanol for gallic acid, supporting gastro protective action.
3. Solvents and Reagents: Ethanol, Methanol, Distilled water, Filter paper
4. Equipments: Rotary Evaporator, Shaking Incubator, Soxhlet Extractor, Mortar and Pestle, FT-IR Spectrometer, Column chromatography equipment
5. Natural Polymers: Sodium alginate, HPMC (Hydroxypropyl methylcellulose), Pectin and Xanthum gum for gel formulation.[7]



METHODS:

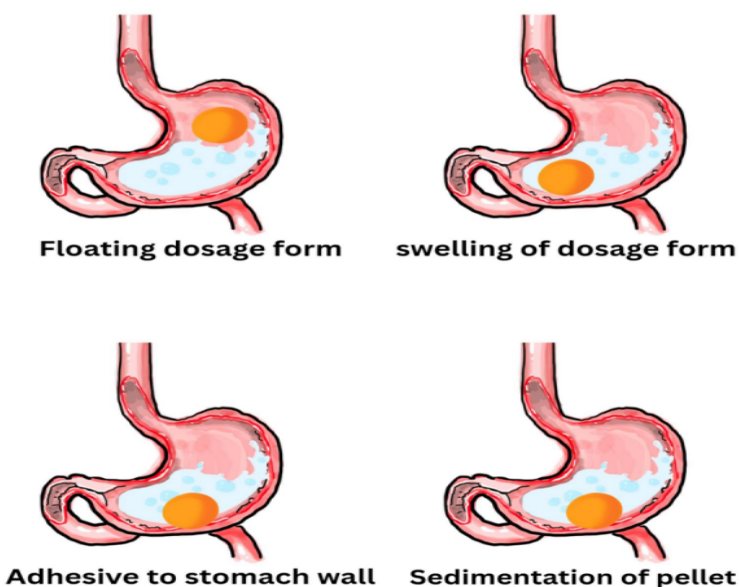
The pomegranate peel were washed and dried in vacuum oven at 50°C and grounded with mortar and pestle grounded with mortar and pestle to coarse powder and stored in incubator at 4°C. 20g of sample were immersed in 100ml of different solvent. The extracts were made using six different kinds of solvents including methanol, ethanol. The ratios of water to ethanol are 3:7, 5:5, and 7:3. The extracts were placed in the shaking incubator set to 200rpm for 24 hours at 37°C. Whatmann No:1 filter paper was used to filter the samples and the filtrate was then kept in an incubator set at 4°C. To extract as many components as possible from the pomegranate

peel, the extraction process was carried out three times . Phenolics, Antioxidants and antibacterial properties were examined using the combined extract. The jamun fruits were washed and removed the pulp and the outer layer of the seed, the inner kernel is dried under shade and ground into powder and kept in a sealed container. Aqueous extract was prepared using 500ml of distilled water and 100g of powder, while hydroalcoholic extract was prepared using C₂H₆O:H₂O (7:3)v/v. Soxhlet's equipment performed the extraction for 48 hours. The yields of the hydroethanolic and aqueous extracts were 9.1 %w/v and 18.3 %w/v.[8]



DICUSSION:To further assess the anti-ulcer herbal in-situ gel's safety and effectiveness, clinical trials are being conducted. Product development is the process of creating new goods that use the herbal in-situ gel technology to prevent ulcers.[9]

Floating Drug delivery System



RESULT:The herbal in-situ gel reduces the severity of stomach ulcers and promotes faster healing, and showed

strong anti-ulcer activity. The herbal in-situ gel demonstrated antioxidant qualities that decreased

inflammation and oxidative stress in the gastrointestinal system. The herbal in-situ gel maintains good gastro intestinal health . The herbal in-situ gel is made from natural sources, Thus making it safe and non toxic and act as an alternative to traditional medicines. The herbal in-situ gel is cost effective solution for treating gastric ulcers, which reduces the frequent medical visits.[10]

CONCLUSION:

The herbal in-situ gel containing pomegranate peel and jamun fruit extracts has shown promising results in treating and preventing gastric ulcers, demonstrating significant anti-ulcer activity, antioxidant properties, and improved gastrointestinal health. With its natural and non-toxic ingredients, easy-to-use application, and cost-effective benefits, this product has the potential to revolutionize the treatment of gastric ulcers, achieving making it a potential game-changer in the field of gastrointestinal health.[11]

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