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Research Article

Formulation And Evaluation Of Syrup From Gond Katira

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ABSTRACT

Gond Katira, also known as Tragacanth gum, is a natural gum obtained from the sap of certain plant species. It has been traditionally used in various culinary and medicinal applications due to its potential health benefits. This study aimed to formulate and evaluate a syrup derived from Gond Katira for its potential medicinal and nutritional properties. The syrup formulation involved the incorporation of Gond Katira extract along with other compatible excipients to enhance its stability, palatability, and therapeutic efficacy. Various physicochemical parameters including viscosity, pH, density, and organoleptic properties were assessed to ensure the quality of the formulated syrup. Furthermore, the syrup was subjected to microbiological analysis to evaluate its microbial load and ensure its safety for consumption. Additionally, stability studies were conducted to assess the shelf-life and storage conditions of the syrup formulation. The results of this study indicated that the formulated syrup from Gond Katira exhibited favorable physicochemical properties, including desirable viscosity, pH, and density, along with acceptable organoleptic characteristics. Microbiological analysis revealed that the syrup met the standard microbial limits, indicating its safety for consumption. Overall, the formulation and evaluation of syrup from Gond Katira present a promising approach to harnessing the potential health benefits of this natural gum in a convenient and palatable dosage form, which could be utilized as a dietary supplement or for medicinal purposes. Further clinical studies are warranted to explore its therapeutic potential and efficacy in various health conditions.

INTRODUCTION

Gond Katira, also known as Tragacanth gum, is a naturally occurring gum obtained from the sap of several plant species belonging to the Astragalus genus. It has been traditionally used in various culinary and medicinal applications across different cultures due to its potential health benefits. Gond Katira has been recognized for its ability to impart viscosity and stability to food and pharmaceutical formulations, making it a valuable ingredient in the food, beverage, and pharmaceutical industries.In recent years, there

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has been a growing interest in exploring the therapeutic properties of Gond Katira, leading to increased research focus on its formulation and evaluation in various dosage forms. Among these, the formulation of syrups from Gond Katira presents an attractive option due to its ease of administration, palatability, and potential for controlled dosing.Syrups are liquid dosage forms consisting of a concentrated solution of sugar or sugar substitute, along with active ingredients dissolved or suspended in a suitable vehicle. They are commonly used for administering medications to pediatric and geriatric populations, as well as individuals with difficulty swallowing solid dosage forms. The formulation of syrups from Gond Katira involves the incorporation of Gond Katira extract or powder into a syrup base, along with other compatible excipients such as sweeteners, flavors, preservatives, and stabilizers. The selection of excipients is crucial to ensure the stability, palatability, and therapeutic efficacy of the final product. Additionally, the physicochemical properties of the syrup, including viscosity, pH, density, and organoleptic characteristics, need to be carefully optimized to meet regulatory standards and ensure consumer acceptability.Furthermore, the evaluation of Gond Katira syrup involves assessing its physicochemical properties, microbiological safety, stability, and potential therapeutic effects. Physicochemical analysis provides valuable information about the quality and consistency of the syrup formulation, while microbiological testing ensures its safety for consumption by assessing microbial contamination levels. Stability studies are essential to determine the shelf-life and storage conditions of the syrup, ensuring its efficacy and safety over time.Overall, the formulation and evaluation of syrup from Gond Katira represent a promising avenue for harnessing the potential health benefits of this natural gum in a convenient and palatable dosage form. By providing a comprehensive introduction to this topic, this study aims to contribute to the growing body of research on Gond Katira and its applications in the food and pharmaceutical industries.

Nutritional Value of Gond Katira

Table 1.Nutrional Value Of Gond Katira

Calories	94
Protein	4 g
Fat	0 g
Carbohydrates	23 g
Fiber	8 g
Calcium	22 mg
Iron	2 mg

Dietary Fiber:

Gond Katira is rich in dietary fiber, which is essential for digestive health. Fiber helps regulate bowel movements, prevents constipation, and supports overall gastrointestinal function. Incorporating Gond Katira into the diet can contribute to achieving recommended daily fiber intake levels.

Protein:

Gond Katira contains protein, albeit in moderate amounts. Protein is essential for building and repairing tissues, supporting muscle growth, and maintaining overall health. Including Gond Katira in the diet can help boost protein intake, especially for individuals following vegetarian or plant-based diets.

Minerals:

Gond Katira contains various minerals, including calcium, potassium, magnesium, and iron. These minerals play crucial roles in maintaining bone health, supporting nerve and muscle function, regulating blood pressure, and oxygen transport in the body.

Low Calorie:

Gond Katira is relatively low in calories, making it a suitable addition to weight management and calorie-controlled diets. It provides bulk and satiety without significantly increasing calorie intake, which can aid in appetite control and weight loss efforts.

Prebiotic Properties:

Gond Katira exhibits prebiotic properties, promoting the growth and activity of beneficial gut bacteria. Prebiotics support gut health by nourishing probiotics and enhancing digestive function, immune response, and nutrient absorption.

Fat:

Primarily composed of complex polysaccharides rather than fat. Tragacanth gum is a hydrocolloid, meaning it forms a gel-like substance when mixed with water, and it is commonly used as a thickening agent in food and pharmaceutical formulations. Overall, Gond Katira is generally considered to be a low-fat or fat-free food ingredient. Additionally, Gond Katira contains antioxidants such as flavonoids and polyphenols, which help neutralize harmful free radicals in the body, reduce oxidative stress, and protect against chronic diseases such as heart disease, cancer, and inflammation-related conditions. These antioxidant properties further enhance the nutritional value of Gond Katira and contribute to its potential health benefits. The presence of hydroxyl groups and and ionic charges in Gum katira increases peremeability of cell membrane which promotes active molecular absorption and bioavailability. Gum katira polysaccharide is frequently employed as a drug delivery vehicle and its biodegradability and lack of cytotoxicity make it viable alternative to synthetic polymers for long term drug administration.These crystalline herbs are an incredible source of dietary fibre, and natural prebiotics which assist in lowering the body's heat to a great extent. It encompasses the key macronutrients including carbohydrates, proteins and healthy fats.

History of Gond Katira

The extraction and utilization of Gond Katira, or Tragacanth gum, have historical roots, and the knowledge about this natural gum has been accumulated over time through traditional practices. The use of Gond Katira in traditional medicine and its applications in various industries have not been attributed to specific individual scientists but rather to the collective wisdom of traditional healers and communities. In the context of modern scientific research and applications, various scientists and researchers have contributed to understanding the properties and potential uses of Gond Katira. However, the body of work is often collaborative and spans multiple disciplines. Some areas of research may include:

Chemistry and Composition:

Gum tragacanth is regarded as a proteinaceous polysaccharide, with a protein content of approximately 3% to 4%.Pistelli 2002 Gum tragacanth .Scientists studying the chemical composition of Gond Katira, including the polysaccharides such as tragacanthin and bassorin, play a key role in understanding its unique properties. Duke 1992, Khan 2010, Morton 1977,

Tischer 2002 Maximum viscosity of tragacanthin is attained only after 24 hours at room temperature or after heating for 8 hours at high temperatures. Ahmad 2019 Tragacanth has 2 major constituents: tragacanthin (20% to 30%), a water-soluble fraction consisting of tragacanthic acid and arabinogalactan, and bassorin (60% to 70%), a water-insoluble fraction.

Pharmaceutical and Biomedical Research:

Researchers in pharmaceutical and biomedical fields explore potential applications of Gond Katira in drug delivery systems, wound healing, and other medical applications.

Food Science and Technology

Experts in food science and technology may investigate the thickening and stabilizing properties of Gond Katira for applications in the food industry.

Cosmetic Science:

Scientists in cosmetic science explore the use of Gond Katira as a thickening agent and stabilizer in cosmetic formulation.

Ancient Roots:

- Gond Katira has its origins deeply embedded in traditional medicine systems, including Ayurveda and Unani, where it has been used for centuries in various cultures.
- Historical records suggest that ancient civilizations in the Middle East and parts of Asia utilized Gond Katira for its medicinal properties.

Traditional Medicinal Use:

- In traditional medicine, Gond Katira was valued for its cooling properties, making it a popular remedy in regions with hot climates.
- It was often used to address respiratory issues, throat ailments, and urinary disorders. The mucilaginous properties were believed to provide relief from irritation and inflammation.

Culinary Heritage:

- Gond Katira found its way into culinary traditions, particularly in Indian cuisine. It became a staple in desserts and beverages, contributing to the texture and consistency of dishes like falooda, ice creams, and certain sweets.

Trade and Cultural Exchange:

- As trade routes developed over the centuries, Gond Katira became part of the exchange of goods and cultural practices between the Middle East, Asia, and other regions.

Forms Available :

Gond Katira comes in various forms including gum, powder, and capsules, providing flexibility in consumption

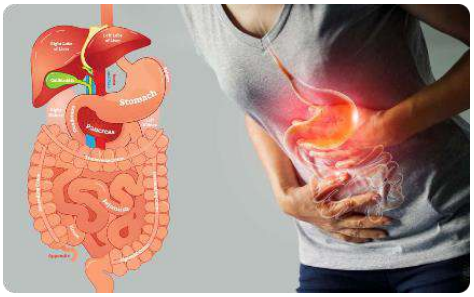
Dosage and Preparation :

Recommended dosage and preparation methods vary depending on the desired use and form of Gond Katira

Health Benefits of Gond Katira

Aid in Constipation:

Gond Katira has laxative properties i.e it can stimulate the evaluation of bowel movement.It softens stools and bring about easy elimination.



Healthy Skin :

Gond Katira is often used in skincare products due to its ability to moisturize and hydrate the skin,promoting a healthy and glowing skin. Also believed to improve skin elasticity, reduce acne, and provide a natural glow.

Immune Booster :

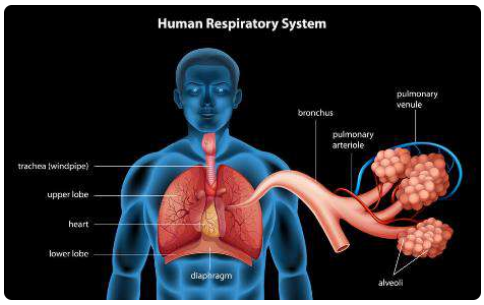
Due to its immunomodulatory effects, Gond Katira may support a healthy immune system. Its antioxidant properties help strengthen the immune system and protect against infections.

Prevent Heat Strokes :

Tragacanth powder has excellent cooling property. It cools downs your body and prevent increasing body heat.

Respiratory Health :

It is believed to have positive effects on the respiratory system, providing relief from cough, sore throat and respiratory ailments.



Pregnant Women :

Gum Tragacanth nutritional value is high. This is why it can be given to pregnant women who require lots of nutrition to maintain their health and their babies health.

Diabetes :

As with other water-soluble gums, some preliminary evidence suggests that concomitant ingestion of tragacanth with a high sugar load can moderate glucose levels in patients with diabetes

Current Research on Gond Katira

Biomedical Applications:

Ongoing research explores the potential of Gond Katira in drug delivery systems, tissue engineering, and regenerative medicine.

Phytochemical Analysis:

Scientists are isolating and characterizing the bioactive compounds present in Gond Katira to determine their therapeutic potential.

Preclinical Studies:

Animal models are being used to investigate the safety, efficacy, and dosage optimization of Gond Katira for various health conditions.

Food and Beverage:

Researchers are investigating innovative ways to incorporate Gond Katira in functional foods and beverages.

Skincare and Cosmetics:

Gond Katira is being explored for its potential anti-aging and moisturizing properties in skincare and cosmetic products.

Antimicrobial activity :

Tragacanth gum does not possess antimicrobial properties and requires functionalization or modification to introduce microbicidal activity. Silver nanoparticles and quaternary ammonium compounds, which possess permanent positive charges, are commonly used as antimicrobial agents to inhibit bacterial growth in various applications.

Wound Healing – Animal Data :

n a study evaluating wound healing in rabbits, creams were prepared from tragacanth gum (6 and 9 wt%) using a mixture of water and glycerin (4:1 wt%) as the vehicle. The wound healing profile of the group treated with the tragacanth gum–containing cream was better than in the untreated control. The best healing effect was observed with the cream containing 6% tragacanth gum.

Ayurvedic and Unani Medicine :

Gond Katira has a long history of use in Ayurvedic and Unani medicine for its therapeutic properties.

Safety Considerations

Gond Katira, also known as Tragacanth Gum, is a natural gum obtained from the sap of the thorny shrub Astragalus gummifer. While it is generally considered safe for consumption and has several health benefits, there are still some safety considerations to keep in mind.

Quality and Source:

Ensure that you are obtaining Gond Katira from a reputable source to minimize the risk of contamination or adulteration with harmful substances.

Allergies:

Some individuals may be allergic to Gond Katira or other components of the plant. If you have a known allergy to legumes or plants in the Fabaceae family, it's best to avoid Gond Katira.

Dosage:

Like with any supplement or food additive, moderation is key. Excessive intake of Gond Katira may lead to digestive issues such as bloating or diarrhea. Follow recommended dosages and consult with a healthcare professional if you have any concerns.

Hydration:

Gond Katira swells considerably when soaked in water. Make sure to soak it adequately and drink plenty of water along with it to prevent choking or blockages in the throat or digestive tract.

Interaction with Medications:

If you are taking any medications or have a pre-existing medical condition, consult with your healthcare provider before adding Gond Katira to your diet, as it may interact with certain

medications or exacerbate certain health conditions.

Pregnancy and Breastfeeding:

There is limited information available regarding the safety of Gond Katira during pregnancy and breastfeeding. It's best to err on the side of caution and avoid its use unless specifically recommended by a healthcare provider.

Children and Elderly:

Use caution when giving Gond Katira to children or elderly individuals, as they may have a higher risk of choking or digestive issues.

DRUG PROFILE

Gond Katira or Tragacanth is a natural gum resin obtained from the sap of various plant species belonging to the Astragalus genus belonging to family Leguminosae mainly found in the Middle East.. It is pale and semitransparent, insoluble in water but swells into a pasty transparent mass when hydrated.

Chemical Constituents of Gond Katira

1. **Polysaccharides :**

Complex carbohydrates in Gond Katira responsible for its gelling properties.

2. **Glycoproteins :**

Proteins with carbohydrate chains, contributing to its texture enhancing qualities.

3. **Pectin :**

A plant-based polysaccharide, found in some Gond Katira varieties.

4. **Trace Elements :**

Minor constituents in Gond Katira, varying by source and processing

Properties

- The gum is translucent and the powder is a white or pale yellow, odourless and tasteless.
- Gum looks like a curved or twisted ribbon, like flakes marked with concentric ridges.
- The fracture of the gum is normally short and horny.
- Gum tragacanth is a viscous and water-soluble mixture of polysaccharides.
- It absorbs water to become a gel, which can be stirred into a paste.
- Tragacanthin partially dissolves and partially swells in water yielding a viscous colloid.

Chemical Nature of Gum

- Tragacanth gum contains linear chains of galacturonic acid in xylose and with varying levels of fructose.
- Tragacanth contains from 20% to 30% of a water-soluble fraction called tragacanthin (composed of tragacanth acid and arabinogalactan).
- It also contains from 60% to 70% of a water-insoluble fraction called bassorin.

- Tragacanth acid is composed of D-galacturonic acid, D-xylose, L-fructose, D-galactose, and other sugars.
- Tragacanthin is composed of uronic acid and arabinose and dissolves in water to form a viscous colloidal solution (sol), while bassorin swells to form a thick gel.
- The gum also contains several carbohydrates like L-arabinose, D-galactose, D-Xylose, L-fructose, L-rhamnose etc.

▪ **Mechanism of Action**

▪ Tragacanth contains ingredients that stimulate the movement of the intestines. It acts as a stabilizer by the formation of non-covalent protein-polysaccharide complexes via interactions by the methoxylated galacturonic acid in the soluble part of the gum and by the viscosity increase induced by the insoluble bassorin part.

Uses of Tragacanth Gum

- Tragacanth is used as an emulsifier, binding agent, and demulcent. Orally, tragacanth is used both for diarrhea and as a laxative. Topically, tragacanth is an ingredient in toothpaste, hand lotions, and vaginal creams, and medicinal jellies like spermicidal jelly. It is used as a binding agent for the preparations of tablets and pills. In foods, tragacanth is used as a stabilizer, thickener, and suspending ingredients in salad dressings, foods, and beverages.The mucilage is used as adhesives.

Physicochemical Properties

Gum katira has been explored as an excipient and drug delivery carrier. Therefore to establish its suitability such as pharmaceutical excipient, various physiochemical properties such as :

- Particle Size Distribution
- Solubility
- Total microbial load
- Ash value
- Loss on Drying
- Moisture content
- Rheokinetics

Organoleptic Properties

- Appearance: Crystalline
- Colour: White or faint yellow
- Odour: None
- Taste: Mucilaginous
- Solubility: Insoluble in alcohol, partially soluble in water

Identification Tests

Table 2 : Identification Tests

Sr. No	Test	Observation	Inference
1.	When Solution of Tragacanth Is Boiled with Few Drops Of 10 Per Cent Aqueous Ferric Chloride Solution	Deep Yellow Precipitate Is Formed	Presence Of Tragacanth
2.	When It Is Warmed with Sodium Hydroxide Solution	Canary Yellow Colour Is Developed	Presence Of Tragacanth

Cultivation

Gond Katira is mostly found in mid-east,Iraq,Iran even in Western Asia.Iran produces an enormous quantity of Gond Katira.They are grown in arid condition.

Collection

Locate the Astragalus shrubs and carefully collect the sap that exudes from the bark.

Gum Extraction

Process the collected sap through traditional methods to extract the Gond katira gum.

Purification

Clean and purify the extracted gum to remove any impurities or foreign particles by washing with methanol and then dried.

MATERIALS AND METHOD

Preformulation Studies

1. **Characterization of Gond Katira:**

Determine the chemical composition, molecular weight, and structure of Gond Katira.

Analyze its solubility profile in different solvents to identify suitable dispersion media.

2. **Compatibility Studies:**

Conduct compatibility studies between Gond Katira and other excipients to assess any potential interactions.

3. **Solubility Studies:**

Determine the solubility of Gond Katira in various solvents, including water and organic solvents.

This information helps in selecting the appropriate solvent system for preparing the suspension.

4. **Particle Size Analysis:**

Analyze the particle size distribution of Gond Katira particles using techniques such as laser diffraction or microscopy.

Understanding the particle size distribution aids in optimizing syrup formulation and stability.

5. **Micromeritics Studies:**

Perform micromeritics studies to assess the bulk properties of Gond Katira particles, including particle size distribution, surface area, and porosity. These parameters influence suspension formulation and processing

6. **Hydration Kinetics:**

Investigate the hydration kinetics of Gond Katira particles by monitoring their swelling behavior over time.

This information helps in optimizing the syrup formulation and predicting stability.

7. **Stability Studies:**

Evaluate the physical and chemical stability of Gond Katira in suspension formulations under various storage conditions (e.g., temperature, humidity, light).

Assess changes in particle size, viscosity, and solubility over time to determine shelf-life stability.

Process of Formulation Step by Step:

Raw Material Inspection and Weighing:

- Inspect and verify the quality of Gond Katira obtained from a reliable source.
- Weigh the required quantity of Gond Katira using precise measurements.

Cleaning and Purification:

- Clean and remove impurities from Gond Katira by methods such as washing.
- Purify the gum to eliminate any contaminants that could affect the final product.

Dissolution of Gond Katira:

- Dissolve the weighed Gond Katira in a suitable solvent (usually water) under controlled conditions.
- Apply gentle heat and agitation to facilitate the dissolution process.


Excipient Addition:

- Introduce other excipients, such as preservatives, sweeteners, flavoring agents, and stabilizers, as per the formulation requirements.
- Mix the ingredients thoroughly to achieve a homogeneous blend.

Homogenization:

- Homogenize the entire mixture to reduce particle size and improve the stability of the syrup.
- This step is crucial for achieving a uniform and consistent product.



Filtration:

- Filter the homogenized suspension to remove any remaining particulate matter and ensure clarity.
- Use a filter with an appropriate pore size to retain any undissolved particles with the use of membrane filter.

Filling and Packaging:

- Fill the final suspension into appropriate containers, such as bottles or sachets.
- Ensure that the filling process is conducted under controlled conditions to maintain product integrity.

Stability Testing:

- Conduct stability studies to assess the product's stability over time under different storage conditions.
- Monitor physical and chemical changes to ensure product quality throughout its shelf life.

Table 3 : Formulation Table

Sr. No	Components	Ingredients	Qty. Taken
1	API	Gond Katira	6gm
2	Vehicle	Distilled Water	60 ml
3	Sweetener	Sucrose	12gm

EVALUATION PARAMETERS :

Testing a suspension dosage form containing Gond Katira involves a series of quality control tests to ensure the product's safety, efficacy, and compliance with regulatory standards. Here are some common tests for a suspension dosage form that includes Gond Katira:

Visual Inspection:

- Check for any signs of discoloration, precipitation, or foreign particles in the suspension.
- Ensure that the product has a uniform appearance.
- No particulate matter observed.

pH Measurement:

- Measure the pH of the syrup to ensure it falls within the specified range.
- pH can influence the stability and effectiveness of the formulation.

Clarity and Colour:

- Evaluate the clarity and color of the syrup.
- Any changes in color or the presence of haze may indicate stability issues.

Density:

W1 = 12.160 (wt.of empty gravity bottle)

W2 = 24.180 (wt.of gravity bottle with water)

W3 = 24.810 (wt.of gravity bottle with sample

Mass of Liquid sample = W3 – W1

= 24.810 – 12.160

= 12.65

Mass of Distilled Water = W2 – W1

= 24.180 – 12.160

= 12.02

Specific Gravity of Liq .Sample = Mass of liq. sample /Mass of eq. volume of water

= 12.65/12.02

= 1.052

Specific Gravity of Liquid = ρ of liquid / ρ of water

ρ Of Liquid = Specific gravity of liquid x Density of Water (std volume)

= 1.052 × 0.997

ρ of Density = 1.048 g/ml

Hence, it is heavier than water.

Liquid Sample > Dis.Water

Organoleptic Properties:

1. **Colour:** Canary Yellow

2. **Odour:** Pleasant
3. **Taste:** Sweet

Stability Studies:

- Conduct stability studies to assess the long-term stability of the suspension under different storage conditions.
- Monitor changes in physical and chemical properties over time.

RESULT AND DISCUSSIONS

In this research we found that Formulation of Syrup F1 and F2 was formulated which was kept at cool (8°C - 15°C) and at Room Temperature (15°C - 25°C).Evaluation of Syrup was carried out as per the standards and the test results are mentioned below:

Table 4 : Evaluation Test Resu

Sr. No	Evaluation Parameters	Result	
		F1	F2
1.	Colour	Canary Yellow	Canary Yellow
2.	Odour	Pleasant	Pleasant
3.	State	Liquid	Liquid
4.	Density	1.048 g/ml	1.048g/ml
5.	pH	Acidic	Acidic

CONCLUSION

The research on Gond Katira clearly demonstrates its significant potential in promoting human health and well-being. Gond Katira offers promising opportunities in pharmaceutical applications, providing improved stability, palatability, and ease of administration. As we unravel its mysteries, it is essential to support continued scientific investigation, ensuring responsible development and integration of this remarkable natural substance into mainstream medicine.Formulation 1 which was kept in cool temperature was found to be more stable than that kept at Room temperature.

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