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Characterization and Phytochemical Screening of Mucilage Isolated from *Hibiscus rosasinesis*

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ABSTRACT

Hibiscus is a Malvaceae genus that includes shrubs, subshrubs, trees, and herbs. Its various species are widely disseminated in various parts of the Asian region for gardening and therapeutic purposes. Hibiscus is a tall, erect, heavily branched evergreen shrub that grows to be between 2.5 and 5 meters tall. Although hibiscus mucilage has several health benefits, there are still many unknowns about it. The goal of this study is to characterize and examine the mucilage of China rose (*Hibiscus rosasenensisLinn*). The mucilage was isolated by the aid of distilled water and acetone. Evaluations for carbohydrates, protein, fat, reducing and non-reducing sugars, alkaloids, tannins, phenolic compounds, and micrometric properties, surface tension, swelling index, and viscosity, as well as other parameters like micrometric properties, surface tension, swelling index, and viscosity, were performed. Chemical substances found in plants may or may not be therapeutically active. A variety of phytochemical tests have been conducted to detect several categories of naturally occurring phytochemicals. The many criteria utilized in phytochemical research are thought to be effective in determining the bioactive profile of medicinal plants. Alkaloids, tannins, phenols, and flavonoids, among other phytocompounds, are found in varying amounts in the flower of hibiscus rosasinesis studied.

1. INTRODUCTION

Hibiscus rosasinensis seems to be a bushy forever flowering shrub or small tree with glossy leaves and single, crimson red flowers in summer and fall (Malvaceae) that grows 2.5–5 m (8–16 ft) tall and 1.5–3 m (5–10 ft) wide. The 5-petaled flowers have a diameter of 10 cm (4 in) with conspicuous orange-tipped crimson anthers [1]. Mucilage are a naturally metabolic product made in plant cells from sugars and uronic acid units. The sticky and slimy mass that mucilaginous plant components generate when dissolved in water demonstrates their hydrophilic character. Mucilage is abundant in *Hibiscus rosasinensis* [2]. Tropical Asia is home to Hibiscus rosa-sinensis. This plant is native to South-Eastern Asia (China), however, it can be found in the tropics and as a houseplant all over the world. Hibiscus has been grown for generations all over the world. Hibiscus has been planted on the rims of the Indian and Pacific oceans for generations. Colonialism in the eighteenth and nineteenth centuries contributed to the flower's romantic image [3]. Hibiscus is derived from the Greek name hibiskos, which was given to the marshmallow plant, a near related of the hibiscus, by the Greek physician Dioscorides in the first century. *Hibiscus rosasinensis*, an ancient species that was once used as a decorative bloom in China, is thought to have been cultivated around for hundreds of years. The leaf's mucilage possesses anti-inflammatory properties.Various therapeutic qualities have been documented, including antidiabetic, antioxidant, and hypotensive action. The therapeutic efficacy and stability of any formulation are dictated not only by the active pharmaceutical ingredients but also by the excipients and manufacturing method [4]. Researchers have recently become interested in excipients derived from natural sources. This is because excipients generated from natural sources have various advantages over excipients derived from synthetic or semi-synthetic sources. Gums and mucilage are examples of hydrocolloids. Gums are generated as a result of either plant injury or a pathological condition [5]. Mucilages are considered physiological and typical metabolic products. Because of their biodegradability, safety, availability, and affordability, naturally occurring mucilages are now widely employed. Leaves and flowers offer anti-ulcer properties and are said to improve hair development and colour. 2011 (Sankaran) [6]. HR leaf extract has been shown to have anti-diabetic properties [7]. The chemical components of hibiscus mucilage. Hibiscus-mucilage RL is a mucilage made up primarily of L-rhamnose, D-galactose, D-galacturonic acid, and glucuronic acid, with a molecular mass of 1.0 x 107. Its primary structural properties were revealed by methylation analysis, partial hydrolysis, and nuclear magnetic resonance studies, which included a unique backbone chain made up of alpha-1,4-linked D-galactosyl alpha-1,2-linked L-rhamnosyl alpha-1,4-linked D-galacturonic acid units. Mucilage is widely used as binders, disintegrants, emollients, emulsifiers, gelling agents, granulating agents, lubricants, suspending agents, sustained-release agents, and skin-soothing agents in the pharmaceutical and cosmetic industries, and their therapeutic values for diabetes, immune-stimulation, cancer, angiotensin-converting enzyme inhibition, stomachic, anti-inflammation, wound healing, and antioxidant properties have also been investigated. They're also employed as buccal tablets, sustaining agents in matrix tablets, and coating agents in microcapsules, including protein delivery microcapsules [8].

2. MATERIALS AND METHODS:

2.1 Collection of plant material

Hibiscus rosasinensis blooms and leaves were collected fresh and disease resistant. The leaves and blossoms were collected and cleaned with water to remove any contaminants. They were then shade dried for at least one week before being processed into a fine powder in a blender. The powdered were sieved with no. 22 and then used for further testing.

2.2 Chemicals and reagent used

Acetone, 1% α-napthol, conc. H_2SO_4, 5% $FeCl_3$, Wagner's reagent, glacial acetic acid, distilled water, ruthenium red solution, benedict,s reagent, million's reagent, 1% sodium nitrite, conc. HCl, 1% copper sulfate solution, 10% sodium hydroxide.

2.3 Preparation of extract

The extraction procedures of mucilage include two steps.

Extraction of mucilage:

Mucilage was isolated from crushed *Hibiscus rosasinensis* flowers. Its dried powdered crushed combined with 500ml distilled water in a 1000ml beaker and let to boil for at least 3-4 hours, stirring constantly and maintaining the temperature below 60°C to release sufficient mucilage in the water while reducing the amount of water. To extract marc from the filtrate, this concentrated solution was filtered and cooled through muslin fabric. The extracts were collected on a clean petri dish after cooling.

Isolation of mucilage:

Acetone is added here to extract in a volume three times that of the filtrate to precipitate mucilage. The mucilage that had precipitated was washed with acetone before being filtered through a muslin cloth. Mucilage was then dried in a hot air oven at a temperature of less than 40°C. Before being stored in an airtight container, the dried mucilage was pulverized and passed through sieve #80.

2.4 Preliminary phytochemical screening:

Test for carbohydrate, tannin, alkaloid, glycoside, mucilage, reducing sugar, flavonoids, aminoacid,fat is done and their result is provided in table 1.[9]

Test for measuring pH, swelling index, solubility, loss on drying, totoal ash value, density, angle of repose, car's index, particle size determination, viscosity are performed and result is provided in table 3.[9]

Table 1: Phytochemical tests of isolated mucilage spectra of Hibiscus

S No	Test Present / Absent
1. Carbohydrates	+
2. Hexose sugar	-
3. Monosaccharides	-
4. Proteins	-
5. Fats and oils	-
6. Tannins and phenolic compounds	-
7. Alkaloids	-
8. Amino acids	+

Table 2: Organoleptic characterization of *Hibiscus rosasinensis*

S No	Organoleptic Properties	
1	Colour	Green
2	Odour	Characteristic
3	Taste	Mucilaginous
4	Texture	Irregular
5	Fracture	Rough

Table 3: Micromeritic study data of isolated mucilage

S. No.	Parameters	Result (±S. D)
1.	Swelling Index	63.16±0.285
2.	pH	6.825±0.025
3.	Surface Tension(dyne/cm)	76.45±1.28
4.	Bulk Density(gm/ml)	0.758±0.004
5.	Bulkiness(ml/g)	1.658±0.0041
6.	Tapped Density(gm/ml)	0.66±0.006
7.	Angle of Repose (^{0})	7.688±0.89
8.	Carrs Index	7.32±0.89
9.	Hausners Ratio	1.04±0.03
10.	Mean Particle Size	159.87±9.547
11.	Viscosity (Poise)	12.74±0.025
12.	Ash Value (%)	5.84±0.194

Physicochemical properties

The existence of carbohydrate and mucilage in Hibiscus was confirmed by positive results from Molisch's Test (purple colour formation) and Ruthenium red test (pink colour production on powdered particles), respectively. The extracted mucilage obtained from the flower of a plant was studied to determine their physical and chemical properties. Extracted mucilage was marginally soluble in water, yielding a dark, slimy solution, but they are practically insoluble in ethanol, acetone, and chloroform. The pH of a 1 % w/v suspension of Hibiscusmucilage in water was 6.825 ± 0.025, indicating that it may be less irritating to the GIT when utilized in uncoated tablets. The amount of moisture contained in the material that is available to interact with other materials is indicated by the weight loss on drying. The dried mucilage's of Hibiscus lost 9.6% of its weight after drying. For Hibiscus, the swelling index of ratio measured was 42 and viscosity was found to be12.74±0.025.

RESULTS:

Various evaluation factors were applied to isolated mucilage. Several chemical tests were carried out to validate the presence of several phytoconstituents. Carbohydrates and amino acids were found to be positive in *Hibiscus rosasinensis* mucilage, while alkaloids, tannins, protein, fat, and oils were found to be negative. As a result, the presence of carbohydrates and amino acids in the mucilage is confirmed. Proteins, gum, lipids, alkaloids, and tannins were all missing from the isolated mucilage. The organoleptic features of isolated mucilage were investigated. It has a mucilaginous flavor and a distinct odour. The texture and fracture of the material were found to be rough and uneven. The outcomes are presented in a table. Insoluble in benzene, ether, chloroform, n-butanol, ethanol, acetone, glycerine, and paraffin, the mucilage isolated from *Hibiscus rosasinensis* was soluble in warm water and marginally soluble in cold water. For flow behavior, various micromeritic tests were performed on the mucilage, including carr's index, angle of repose, bulk density, true density, and bulkiness. The isolated mucilage's angle of repose was measured to be 7.621. It demonstrates that it has great flow characteristics. The bulkiness of the powder and its Carr's index value was found to be 7.32 and 1.65indicating that it is heavy and has outstanding flow qualities.

DISCUSSION

After drying, the mucilage produced from Hibiscus was discovered to be an amorphous free-flowing powder. Hibiscus had an overall yield of 8.6% w/w. The mucilage was soluble in water and formed a viscous solution after standing, but it was insoluble in all other organic solvents. All of the mucilage's other physicochemical qualities indicate that it can be used as a good excipient in tablet formulation. There were no significant interactions found in the drug-excipient compatibility investigation.

CONCLUSION

The results of the study show that mucilage obtained from *Hibiscus rosasinensis* leaves can be employed as a pharma adjuvant for drug delivery and also has good biocompatibility. Physicochemical tests revealed that it was acceptable, appropriate, and capable of being used as a formulation component in innovative drug delivery systems for controlled drug distribution. The isolated polymer has a pH of 6.825, making it non-irritant in nature and biocompatible. Physicochemical investigations revealed that it was acceptable, appropriate, and capable of being used as a formulation component in innovative drug delivery systems for controlled drug distribution. and based on this research, we can conclude that hibiscus mucilage plays an important role in the pharmaceutical sector, even though there has been relatively little research done on hibiscus mucilage except for the binder and skin moisturizing effect.

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