A Review: Formulation and Characterization of Phytosomal Gel by Using Amaltas for Skin Problem as an Antibiotic

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Abstract
A novel drug delivery system is a fresh method of delivering drugs that highlights the shortcomings of the conventional method. Phytosomes outperformed botanical extract in terms of pharmacokinetic and pharmacodynamic reaction. This study aims to confirm the therapeutic effectiveness of a particular plant extract (Cassia fistula) against particular bacterial strains. To investigate its antibacterial qualities against E. coli, S. aureus, Bacillus subtilis, and Bacillus cereus, the methanolic extract of C. fistula (Amaltas) was used at several concentrations, temperatures, and pH levels The current study's findings support the idea that plant extracts have antibacterial properties and demonstrate that using more natural antibacterial agents instead of pharmaceuticals might help lower the rising prevalence of antibiotic resistance. The study's goal is to create a polyherbal phytosome gel utilizing an extract from amaltas (Cassia fistula). Using a soxhlet device and ethanol, the amaltas are extracted. The formulation of phytosomes is examined for in-vitro drug release studies, Particle size and zeta potential measurements, drug content, % yield, and drug entrapment efficiency. Next, add this phytosomal complex to the gel's composition. The spreadability, drug content, pH measurement, homogeneity, and rheological analyses are then used to assess the phytosomal gel formulations.

Keywords - Amaltas, Cassia fistula, antibiotic.

INTRODUCTION

Vesicular drug delivery systems are called phytosomes. that create phospholipids with plant extracts or water-soluble phytoconstituents to create lipid-compatible molecular complexes.The Greek words "phyto" (plant) and "soma" (body or cell) are the origins of the phrase "phytosomes."1 Phytosomes are a novel and sophisticated type of herbal extracts made by a specialized technique called phytosome technology. Their purpose is to improve the absorption and bioavailability of plant-based phytoconstituents. Plants play a vital part in both human and animal existence on our planet, and products produced from plants are widely used to treat and cure various illnesses. Plants include useful components that are employed in research, and their outputs, whether synthetic, pharmacopoeial, or non-pharmacopoeial medicines, contain a multitude of components used in medicine. The fact that natural goods are less damaging to the human body and that they all work with human physiology is one of the justifications for using them.Medicinal plants are precursors of plants used to make important drugs. Alternative medicine is the use of plants to achieve therapeutic goals.

Native to India and Sri Lanka, Cassia fistula, often called "golden shower," is a deciduous shrub with complex leaves and yellow blooms that is used as a model for western medications. This fast-growing, ornamental tree with enormous flower parts is a member of the legume family and is also known as Indian laburnum in some places. In Chinese traditional medicine and Ayurveda.Yellow shower is the term given to the medicine and extracts of C. fistula that are used to treat illnesses. It was once employed in its raw form in ancient therapeutic practices. This plant's therapeutic qualities have led to its overuse in the modern world. Research highlights their significance because of their biological characteristics. Several species of Cassia have laxative properties. One essential source of naturally occurring bioactive chemicals is C. fistula. Phytosome formulations aid in overcoming the drawbacks of traditional herbal extracts, which frequently have limited body absorption and poor water solubility. Their distinct makeup improves the active chemicals' absorption and distribution to the intended cells and tissues [1].

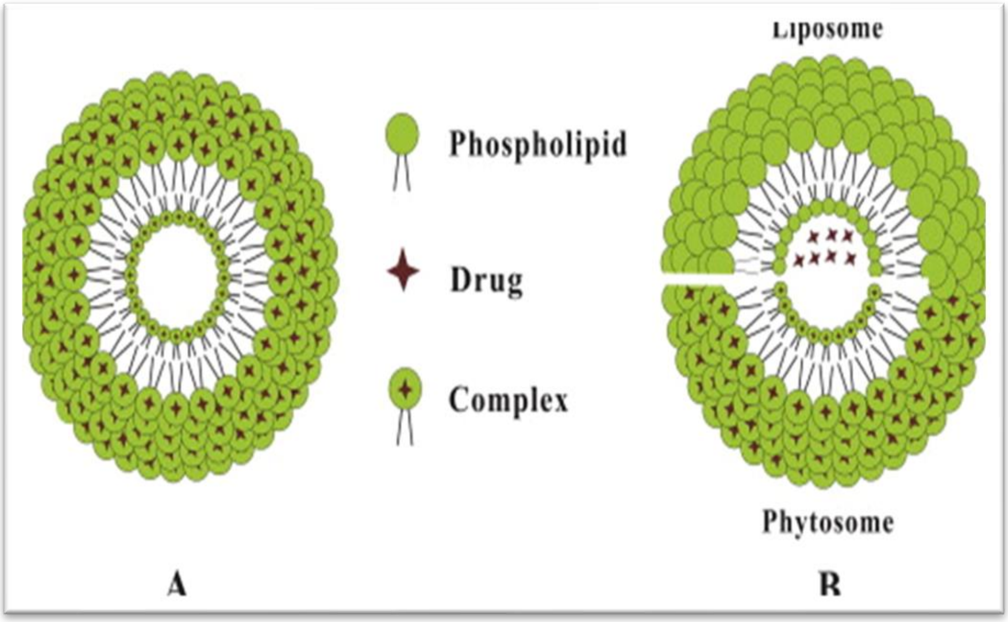

Figure 1**:** *Schematic Representation of the Structure of Phytosome*

Application of phytosome

Antioxidant characteristics
Anti-cancer characteristics
Properties that protect the liver
Anti-mutogenic characteristics
Anti-inflammatory properties
The modulation of the immune system
Minimal risk profile
Delivery of vast and varied medication**s.**

Gels

Gels are semisolid compositions that are applied to the skin or mucosal membrane.It is a semi-rigid structure where a three-dimensional particle system that weaves together restricts the mobility of the dispersing medium in the dispersed phase. A system of colloidal solid particles is entangled with a significant volume of aqueous or hydroalcoholic fluid.This might comprise inorganic or organic polymers derived from natural materials.

Structure of gel

A gelling agent that creates a network of particles by binding them together gives the gel its rigidity. The system's layout and gel characteristics are determined by the type of force that creates the kind and degree of particle adhesion. An aggregation or spherical collection of tiny molecules isometrically shown by single particles [2].

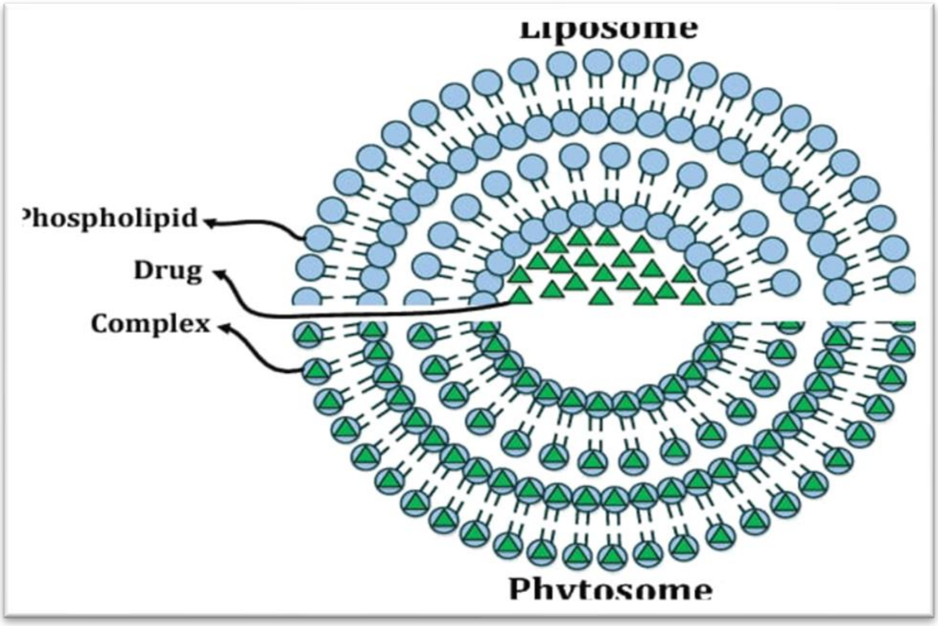

***Figure 2**: Structure of Liposome and Phytosome*

Application of gel

Continuous release formulations are made with gels.
The food and cosmetics industries utilize them extensively.
Dental treatment uses phosphoric acid and sodium fluoride gel.
Used in both hard and soft gel tablets.
Making the suppositories

Amaltas

Also referred to as golden shower tree or cassia fistula, this plant is widely used in Ayurvedic medicine and is said to be beneficial for a number of ailments. There are several names for this tree, but the most popular ones are Indian laburnum, argvadha, golden shower, and piping pipe. The stunning Amaltas (Cassia fistula), often called the Golden Shower Tree, is indigenous to Southeast Asia and the Indian subcontinent. It is well-known for its stunning golden-yellow blooms, which usually appear in long, tumbling clusters throughout the summer. Growing to a height of 10 to 20 meters, this beautiful tree is a common ornamental in parks, gardens, and along roadsides because of its vibrant blossoms.[3]

The Amaltas fruit is a long, cylindrical pod with sticky flesh and seeds within. For generations, the pulp has been utilized in conventional medicine. Amaltas is prized in Ayurvedic medicine for its laxative qualities, and the fruit is frequently eaten to ease constipation. The tree's leaves, bark, and roots are also used medicinally to treat a variety of illnesses, including fever, skin conditions, and stomach issues. In many places, amaltas has cultural value in addition to its therapeutic applications. The tree is linked to wealth and pleasure in India. During the Baisakhi celebration, its colorful flowers blossom, signifying rebirth and fresh starts. Because of its beauty and practicality, the tree has come to represent celebration and spring. Because it provides nectar for bees and other pollinators, amaltas is also significant ecologically, supporting local fauna. It is a widespread tree in tropical and subtropical regions due to its broad distribution and simplicity of cultivation. In conclusion, Amaltas is more than simply a lovely decorative tree; it is a plant with ecological, cultural, and medicinal significance that contributes to its surroundings in a variety of ways [4].

Activities

Properties of amaltas

The leaves, seeds, roots, pulp, fruit, and bark of amaltas all offer unique potential qualities. They are in charge of its many applications. Additionally, it can aid in calming the body's vata, pitta, and kapha energies.

Leaves

The leaves may have skin diseases and laxative properties.

Perhaps it has antipyretic qualities.

Seeds

The seeds may have laxative properties.

Additionally, it could have carminative qualities.

Flower

Amaltas flowers may have astringent qualities.

It could have the ability to cure wounds.

Pulp

Amaltas pulp may serve as a safe laxative for youngsters and pregnant people.

It could possess antimicrobial qualities.

Bark

It could have anti-oxidant qualities.

It could possess anti-inflammatory qualities.[5]

Medicinal Application

Antibiotic

Amaltas, often referred to as Cassia fistula or Indian laburnum, is a plant that has historically been used to treat a number of ailments in Ayurvedic medicine.It may be used as a laxative and to treat skin disorders, fever, and digestive issues.Studies have looked at its antibacterial qualities, despite the fact that it is not frequently found in contemporary antibiotics. According to research, some of the substances in the Amaltas tree's leaves, bark, and pods may have antiviral, antifungal, and antibacterial properties. In experimental settings, these bioactive substances have demonstrated potential against a variety of diseases, including some bacterial strains. Amaltas is not commonly used in traditional medicine to formulate antibiotics, and further investigation and clinical testing are required to ascertain its efficacy and safety in this regard.

Antibacterial

While distilled water, acetone, and leaf extracts from Cassia fistula show good antibacterial action against Gramme negative bacteria like E. coli, only ethanolic extracts and distilled water were found to be inhibitory against Gramme Positive bacteria like Bacillus subtilis.

Anti-fungal

Research conducted in vitro supports the traditional medical usage of cassia fistula to treat certain fungal infections. To guarantee their suitability as a source of contemporary medications, research on the toxicity of the chemicals and crude extracts extracted fromse plants is necessary.

Laxative

Cassia fistula is a common moderate laxative in traditional Persian medicine. After the age of sixty, the prevalence of persistent constipation rises.

Antioxidants

methanolic pulp extract, methanolic seed extract, and hexane seed extract all show the same sequence of antioxidant activity, from high to low levels, as does cassia fistula extract.Other pursuits: Cassia fistula L. possesses anti-tussive and hepatoprotective qualities. It has antifungal and antibacterial qualities. Cassia fistula Lis applied to gastrointestinal conditions. and wounds. It is a great source of flavonoids, tannins, and glycosides [6].

Skin Health

The bark, leaves, and flowers are used to cure a variety of skin conditions, including psoriasis and eczema.

Fever and Cough

The herb has long been used in traditional medicine to treat respiratory conditions like fever and cough.

Diabetes Management

According to certain research, amaltas may be able to control blood sugar levels, which would make it helpful in the treatment of diabetes.

Detoxification

Amaltas is said to help cleanse the kidneys and liver.

Fruit Pulp

Although the Amaltas fruit's main use is medicinal rather than culinary, its pulp is occasionally used to make jams and other food items [7].

Methods of Preparation of Phytosome

Phytosomes are complexes made by combining natural or synthetic phospholipids, such as phosphatidylcholine or phosphatidyl ethanolamine, with herbal extracts in an organic solvent that is aprotic. The phytosomes are then precipitated using an anti-solvent. After this is finished, it is dried.

Method of preparing anti-solvent

This technique involves mixing organic solvents like dichloromethane with plant extracts and phospholipids like soy lecithin in a round-bottom flask, then refluxing the mixture under specific experimental conditions and at a set temperature then combined with an anti-solvent while being constantly stirred, when n-hexane is introduced, a precipitate is created. of phytosome, after which it is filtered and desiccated.

Method of rotary evaporation

This process creates a thin film by mixing a certain quantity of plant extracts and phospholipids, such as soy lecithin, with an organic solvent that dissolves in water, such as acetone, in a in a flask with a circular bottom. The flask is then maintained in a rotary evaporator at a certain temperature while being constantly stirred. n-hexane-treated forms.

Method of Solvent Evaporation

This approach involves mixing phospholipids and plant extracts with an appropriate solvent, such as tetrahydrofuran, placing the mixture in a round-bottom flask, refluxing it at a certain temperature, and then evaporating the solvent is completed under vacuum, after which it is dried and condensed. It produces phytosomes.

The process of co-solvent lyophilization

Using this procedure, phospholipids and plant extract or medication are combined with an appropriate solvent, allowed to dry freely under vacuum, and then sealed in an airtight container. As an instance, rutin phytosomal Using the co-solvent lyophilization process, the preparation was made. [8]

Formulation of Phytosomes

The solvent evaporation method can be used to prepare phytosomes.

Take 100 ml round-bottom flask was filled with the precise proportions of soy lecithin and cassia fistula extract, and 50 ml of methanol was added as the reaction medium.

After the liquid had reacted and refluxed, 20 milliliters of n-hexane was added while stirring

A tiny quantity of solvent was eliminated from the precipitate by filtering and vacuum-drying it. After being collected.

After being collected, the dry residue was put in desiccators and kept overnight at room temperature.

The resulting dry residue was weighed, and its physical appearance was noted.[9]

Preparation of Phytosomal Gel

Using a mechanical shaker, carbopol 934 was individually dissolved in distilled water and continuously stirred at a medium speed to create gel bases. Using triphenolamine, the pH of each formulation was brought to between 5.5 and 6.5 [10].

Characterization of Phytosomal Complex

Microscopic perspective

The complex was characterized using optical microscopy. The complex was suspended in buffer after a drop was placed on a slide and covered with a cover slip.45X magnification of the complex in a microscopic perspective.

Entrapment efficiency

To separate the phytosome from the unentrapped medication, 100 mg of phytosomal complex was spun using a Rami centrifuge for 30 minutes at 2000 rpm. The amount of free medication present Using a UV visible spectrophotometer, the absorbance at 268 nm in the supernatant was measured. The proportion of drug entrapment was calculated using the formula.[11]

Entrapment effectiveness (%) = (total drug amount) -(free drug quantity) x100/total drug amount.

Content of drugs

After precisely weighing a phytosome equal to 10 mg of medication, it was transferred into a 100 ml volumetric flask, diluted in a little amount of ethanol, and sonicated for 30 minutes. The volume was changed. The flask's ethanol content was filtered down to 100 ml, and the drug concentration was ascertained. utilizing a UV Spectrophotometer for spectrophotometry following the proper dilutions.

Practical yield as a percentage

To determine the percentage yield or efficiency of any process, which aids in choosing the best production technique, the % practical yield is computed.Seven prepared phytosomes were gathered and weighed using the following formula to calculate the practical yield: (%) yield = (theoretical yield) x 100 / (practical yield)[12]

Analysis of Scanning Electron Microscopy

SEM of the complexes utilised a scanning electron microscope to conduct the study. in order to identify the surface shape of the phytosome. The tape was sprayed with powdered phytosome samples. The aluminum stubs were positioned within the scanning electron microscope's vacuum chamber to observe the morphological characterisation with scanning electron microscopy and a secondary electron detector.

Characterization of Phytosomal Gel

Physical assessment

To look for any differences in the formulation's color, texture, and odor, it was carefully inspected.

pH measurement

A pH meter was used to measure the pH of each composition. This was previously calibrated using pH 4, 7, and 9 buffer solutions.

Viscosity determination

A Brookfield viscometer was used to assess the viscosity of phytosomal gels.

A 50ml beaker containing 30g of gel preparation was left at room temperature and spun at 5, 10, 20, 50, and 100 rpm.

In vitro release studies

Using 250 ml of phosphate buffer (pH 7.4) as the receptor media, a phytosomal gel sample (0.5 g) was put on the membrane and a diffusion study was conducted at 37 °C.

Five milliliters of each sample were taken out at 15, 30, 60, 120, and 240 minutes.

The same volume of brand-new receptor media was added to each sample.

Using phosphate buffer, samples were analysed with a UV spectrophotometer to determine their drug content.[13]

Spreadability

0.1g of each formulation's gel sample was sandwiched between two slides and allowed to sit for around five minutes.

The enlarged circles' diameter was expressed in centimetres.

These were used as spreadability comparison values (S= M.L/T).

Homogeneity

After being placed in containers, all produced gels were examined visually for homogeneity. Their appearance and the existence of any aggregates were examined [14]

CONCLUSION

Amaltas (Cassia fistula) offers promising natural remedies for skin conditions and may be a viable alternative to conventional antibiotics. Its wide variety It has well-known anti-inflammatory, antibacterial, and antioxidant qualities due to its abundance of bioactive substances, such as flavonoids, saponins, and anthraquinones. By lowering inflammation and hastening the healing process, these qualities make it a helpful treatment for a number of skin disorders, such as eczema, acne, and fungal infections.

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