WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

A REVIEW ON THE COMPARISON OF FORMULATION AND EVALUATION OF ANTIBACTERIAL ACTIVITY IN HERBAL GELS

Santhosh. R[1], Mariyappan. G[2]

UG Student, Department of Pharmaceutics, Pallavan pharmacy, college, Kanchipuram.

ABSTRACT :

The creation and assessment of herbal gels made from plants known for their anti-inflammatory qualities—Clerodendron infortunatum, Cassia tora, and Murraya koenigii—were examined in this work. The goal of this study was to create and describe stable, efficient herbal gel formulations in response to the growing need for safer substitutes for synthetic anti-inflammatory medications and the extensive usage of traditional medicine. Preservatives and humectants were added to Carbopol-based gels along with methanolic and ethanolic extracts of the chosen plants. The homogeneity, spread ability, pH, and viscosity of gel compositions were assessed. The acute and chronic stages of the formalin-induced rat paw edema paradigm were used to evaluate anti-inflammatory efficacy. During a three-month stability assessment, the produced gels showed little changes and displayed ideal physical properties, such as an acceptable pH (6.15-7.0), good spread ability, and suitable viscosity.

Keywords: Herbal gels, Clerodendron infortunatum, Cassia tora, Murraya koenigii, Anti-inflammatory activity.

INTRODUCTION :

Medicinal plants have been an essential source of healing for human maladies throughout history. It should come as no surprise that a sizable section of the world's population—roughly 1.42 billion people—use traditional medicine to treat a range of medical conditions. According to research, traditional medicines—especially those derived from plants—are used by a large number of people globally for primary healthcare. Since the majority of practitioners in Indian medical systems create and disseminate their own formulations, it is imperative to record and investigate these activities further. Both synthetic and herbal medications are still based on natural components, which are essential to contemporary healthcare. Although several anti-inflammatory medications, such as corticosteroids and NSAIDs, have been developed.

ANTI-INFLAMMATORY ACTIVITY

A number of variables, such as the drug's pharmacokinetics (absorption, distribution, metabolism, and excretion), the dosage, the mode of administration, and the existence of underlying conditions (like liver or kidney function), can affect the blood concentration of anti-inflammatory medications and how they affect the body.

MATERIALS AND METHODS :

PLANT COLLECTION

In November, the plant Clerodendron infortunatum Linn. was collected from the Midnapore forest area in West Bengal, India. The Botanical Survey of India, located in Shibpur, India, conducted its taxonomical identification.

In August, Cassia tora leaves were gathered from the Hingna region of MIDC, Nagpur. Fresh leaves of Murraya koenigii were obtained for extraction from the adjacent agricultural region of the NGSMIPS college campus in Mangalore.

CHEMICALS

Methyl paraban, propyl paraben, propylene glycol-400, sodium carboxymethyl cellulose, carbopol 934, and triethanolamine.

PREPARATION OF EXTRACT

The fresh leaves of C. alata were gathered and dried at 40°C in a hot air oven to prevent phytoconstituent degradation. Plant materials were dried, then ground coarsely in a Willey mill and stored in a tightly sealed container. In a Soxhlet device, approximately 185, 100, and 125 g of powder from each specimen were defatted using Pet. ether (60–80°). Following defatting, methanol was used to extract it further. A rotary evaporator was used to concentrate the collected extracts, which were then stored in a vacuum drier until they were needed.

Fresh Murraya koenigii leaves were gathered, cleaned with water, and allowed to dry in the shade. Following drying, the plant leaves were ground into a coarse powder and stored in a well sealed container. Approximately 100 grams of coarse leaf powder were weighed and steeped in 500 milliliters ofethanol and allowed to macerate for four to five days. The extract was concentrated after maceration and utilized in subsequent formulations. The preparation of the extract from C. infortunatum leaves was done in the same way.

HERBAL GEL FORMULATION

After being weighed, the powder was immersed in 500 milliliters of ethanol and allowed to macerate for four to five days. The extract was concentrated and reserved for future formulations following maceration. The gel was made by dispersing 1 g of Carbopol 934 in 50 ml of distilled water while stirring constantly. The necessary concentrations of propyl and methyl paraben were dissolved in 5 milliliters of distilled water that had been heated in a water bath in a different container. Propylene glycol 400 was added once the fluid had cooled. The right quantity of C. The Carbopol 934 gel was well mixed with the other materials, and triethanolamine was added drop by drop to obtain the necessary gel consistency and bring the pH down to the appropriate range (6.8–7).

The gel was made using the dried methanolic extracts of Cassia tora. In order to make 100 g of the blank gel, the gel contains enough Carbopol 940 (1%), propylene glycol 400, ethanol, methyl paraben, propyl paraben, EDTA, triethanolamine, and distilled water. Two components of the formulation's water were separated. Propylene glycol 400 and ethanol were added after the exact amount of extract had been dissolved in one section. Methyl paraben, propyl paraben, and EDTA were added to the other section after Carbopol 940 had been dissolved. To acquire the gel consistency, triethanolamine was added dropwise to a beaker containing both solutions.

Carbopol 940 was dissolved in distilled water with glycerine, propyl paraben, and methyl paraben for the gel preparation, and it was left overnight. Propylene glycol and Murraya koenigii leaf extract were combined and added to the polymer dispersion. After adding the remaining water, triethanolamine was used to neutralize the liquid to a pH of 7, stirring constantly for ten minutes.

FACTORS INFLUENCING CONCENTRATION CHANGES OF ANTI-INFLAMMATORY DRUGS

1. **Kidney and Liver Function:**Drug metabolism and excretion are significantly influenced by the liver and kidneys. Particularly for NSAIDs, methotrexate, and certain biologics, impaired kidney function (such as in older patients or those with renal illness) can raise medication levels and prolong their effects.
2. **Age and Body Composition:**Because of changes in liver and renal function, as well as changes in body fat content, older persons may have slower metabolisms and changed distributions. Higher plasma concentrations of several medications, especially DMARDs and corticosteroids, may result from this.
3. **Drug Interactions:**Anti-inflammatory drugs' metabolism or excretion may be impacted by the co-administration of other medications (such as diuretics or anticoagulants), which could change the body's concentration of these drugs.
4. **Dosing Regimens:**Concentration changes may result from frequent dosage (NSAIDs, for example, several daily doses) as opposed to long-acting formulations (biologicals, for example). For instance, while immediate-release medications have more noticeable peaks and troughs, extended-release versions keep blood concentrations more constant.
5. **Immune Response (for Biologics):**When it comes to biologics, the formation of antibodies against the medication may change its efficacy and clearance, eventually resulting in decreased bloodstream concentrations.

EVALUATION :

HOMOGENEITY

Visual examination was used to assess each generated gel's homogeneity and physical appearance.

SPREADABILITY

Carbopol 940, methyl paraben, propyl paraben, and glycerin were first dissolved in distilled water to create the gel formulation, which was then left to set overnight. Propylene glycol and Murraya koenigii leaf extract were combined and added to the polymer dispersion. After adding the remaining water, the mixture was continuously stirred for ten minutes while triethanolamine was added to neutralize it to a pH of 7. By measuring the spreading diameter of 1 g of gel sandwiched between two horizontal plates (20 cm x 20 cm) after a minute, the spread ability of the gel formulations was evaluated. The upper plate was given a standard weight of 125 g.

pH

A pH meter was used to measure the gel's pH. To track any changes over time, the pH of the polyherbal gel formulation was tested at 1, 30, 60, and 90 days after production.

VISCOSITY

A Brookfield viscometer fitted with the proper spindle was used to measure the gel's viscosity. The Brookfield viscometer (Model RVTDV II) was

used to measure the viscosity of the produced polyherbal gel at 100 rpm with spindle number 6. Using spindle number 64, a Brookfield rotating viscometer was used to take another measurement at 100 rpm.

ANIMAL STUDY

The rat paw edema model caused by formalin was used to study both acute and chronic inflammation. In a chronic model, 2% formalin in saline was given. The following formula was used to determine the percentage inhibition of edema:

% Inhibition = 1 - (α - x) / (b - y) × 100

where:

α = paw thickness of the test animal after treatment,
x= initial paw thickness of the test animal,
b = paw thickness of the control animal after treatment,
y = initial paw thickness of the control animal.

RESULT :

Desirable physical characteristics of the manufactured herbal gels were a smooth texture, a greenish hue, and an appropriate pH range (6.15-7.0). Following stability testing, the gels showed good viscosity and spreadability with few fluctuations. Rat paw edema models generated by formalin and carrageenan were used to assess the gels' anti-inflammatory properties, and the results demonstrated a considerable reduction in edema.

DISCUSSION :

According to the findings, the synthesized herbal gels have appropriate pharmacological and physical characteristics, which makes them promising topical formulations for anti-inflammatory uses. The inclusion of bioactive chemicals in the plant extracts is responsible for the gels' notable anti-inflammatory efficacy. According to the stability experiments, the gels' physical characteristics barely alter over a three-month period. These results imply that the created herbal gels may be a viable substitute for traditional topical anti-inflammatory formulations.

CONCLUTION :

The concentration of anti-inflammatory drugs in the body can vary due to a number of factors, including the drug's pharmacokinetics, method of administration, dosage, and individual patient characteristics (e.g., age, liver and kidney function, and pre-existing conditions). While biologics generally have more predictable pharmacokinetics, their concentration can still vary based on patient-specific factors and immune response. The global market is seeing an increase in demand for herbal formulations because they are thought to be safer and have fewer side effects than synthetic alternatives**.**

REFERENCES :

1. Sudipta Das, Pallab K. Haldar, Goutam Pramanik, 2011, Formulation and Evaluation of Herbal Gel Containing Clerodendron infortunatum Leaves Extract, Vol. 3, No.1, pp 140-143, IJPRIF, Corpus ID: 212460971
2. Misal, G., Dixit, G., Gulkari, Vijay. 2012, Formulation and evaluation of herbal gel. Indian Journal of Natural Products and Resources. 3. 501-505.
3. Rituraj Rajjan Singh, Somprabha Madhukar, Shruti Rathore, 2024, Formulation And Evaluation Of Herbal Gel, Vol 2, Issue 6, 644-655, IJPS00, 10.5281/zenodo.11610300
4. Priyanka A. Raut,* Subodh U. Bansod ,Vaishali H. Bawankar, 2023, Formulation and Evaluation of Antibacterial Herbal gels of Murraya koenigii, Psidium guajava, Musa acuminate Leaves Extract, Volume 8, Issue 3, pp: 2655-2668, ijprajournal.
5. K.Shobana, M. Muthu kumar, B.Pon sudar jyothi, 2023, Formulation And Evaluation Of Herbal Gel Containing Murraya Koeniijii (Fruit) Extract, Volume 10, Issue 7, JETIR