Research Article

FORMULATION AND EVALUATION OF DENTAL GEL USING LANTANA CAMARA LINN.

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ABSTRACT

The aim of this study is to develop and evaluate a herbal gel containing Lantana leaf extract. Plant extracts were placed in the gel matrix and their pH, viscosity, diffusivity, etc. Physicochemical properties such as were determined. Physicochemical tests of the samples showed no agglomeration, uneven color and no fibers or particles. It also features easy cleaning and good conduction. The aim of this study is to investigate the antibacterial and antifungal properties of Lantana (Verbenaceae) leaf extract. Analysis of methanol extract of Lantana camara (MELC) for acetic acid production, hot plate analgesic activity, and anti-inflammatory activity in carrageenan and histamine-induced foot edema. The results showed that the leaves and bark of MELC (100 mg/kg and 200 mg/kg) had significant anti-inflammatory properties, and the 200 mg/kg dose of MELC leaves and bark showed greater activity than the 100 mg/kg dose. Preliminary phytochemical analysis has revealed the presence of various phytochemicals that may be responsible for its anti-inflammatory and antibacterial properties. The results show that MELC has a good ability to reduce inflammation and prevent infection and may be useful for treatment.

KEYWORDS
Lantana Camara, Herbal gel, Analgesic activity, Anti-inflammatory activity.

1. INTRODUCTION:

Many countries have used this plant as traditional medicine for thousands of years. Many systems in India (Ayurveda, Unani and Siddha) use medicinal plants and their extracts to treat various ailments. [1] The chemical diversity of plants makes them important for the isolation of active substances. Pain is usually treated with opioids and nonsteroidal anti-inflammatory drugs (NSAIDs). Both classes of drugs can cause serious side effects, including kidney damage, stomach upset, and difficulty breathing. Plants are always used for many purposes. [2,3] Although there are many types of analgesic and anti-inflammatory drugs on the market, the search for new effective drugs from plants to eliminate their side effects still continues. [4] There are approximately 150 species of Lantana camara from more than 50 countries. It is an evergreen plant commonly known as wild sage and lantana plant. For many years, various forms of Lantana have been used to treat and treat ailments such as stomach ulcers, cuts, tumors, and eczema. [5] Many plants have been reported for their medicinal properties such as anti-lymphocyte and anti-inflammatory, hepatoprotective, anti-peristaltic, anti-filarial, in vivo cytotoxic and antibacterial activities. A large number of medicinal plants in India possess many photochemical substances and therefore have many pharmacological activities. Opioids, or nonsteroidal anti-inflammatory drugs, are commonly used to relieve many types of pain, but they can have serious side effects, such as rash and itching. Therefore, it seems necessary to find a better way.

Gel formulations are used for topical and oral application due to their ease of use, increased contact time, and fewer side effects than other topical and oral applications. Lantana plant has been found to be used traditionally for its many medicinal properties such as anti-cancer, oral health, anti-inflammatory, antioxidant activity, dermatological study and wound healing. [6] On the basis of above findings, the present work was performed to formulate the herbal dental gel of analgesic and anti-inflammatory potential of L. camara leaves methanol extract.

MATERIALS AND METHODS

Plant Materials:
Leaves of Lantana Camara were collected from the residential areas of Saswad, Pune, Maharashtra, India.

Preparation of Plant extract:
Shade drying was done for almost a month as to avoid chemical degradation due to sunlight. Grinding of the dried material was done, with the aid of a grinder and converted into coarse powder. The powder was sieved. 50 gm defatted powdered; material was extracted at 50°C with a volume of 500 ml aqueous methanolic (70:30 methanol: water) in the Soxhlet apparatus.
Chemicals: Lantana camara extract, Carbapol940, Polyethylene glycol, Glycerin, Methyl Paraben, Propyl Paraben , Honey, Distilled Water.
Apparatus: Apparatus such as beaker, glass slide, measuring cylinder, test tube, volumetric flask
Instruments: pH meter, Mechanical stirrer, Viscometer

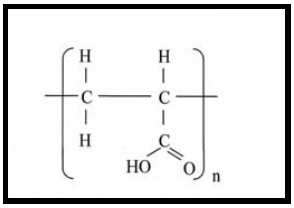
Figure 2: Ingredients for Formulation

Formulation Table:
Table no.1: Formulation Table

Sr.no.	Materials	Quantity	Functions
1	Lantana Camara Extract	1ml	Active Pharmaceutical Ingredient
2	Carbopol 940	0.3gm	Gelling Agent
3	Methyl Paraben	0.18gm	Preservatives
4	Propyl Paraben	0.02gm	Preservatives
5	Propylene Glycol	5ml	Co- Solvent
6	Glycerin	5ml	Drug Solubiliser
7	Triethanolamine	0.5ml	Neutralizer
8	Honey	1ml	Sweetening agent
9	Distilled Water	q.s	Vehicle

Excipient profile:

1)Carbapol940:
Carbopol940 polymer is a white powder, crosslinked polyacrylic acid polymer. It is an extremely efficient rheology modifier capable of providing high viscosity and forms sparkling clear gels or hydro-alcoholic gels and creams. Its short flow, non-drip properties are ideal for applications such as clear gels, hydroalcoholic gels, and creams.
Structure:

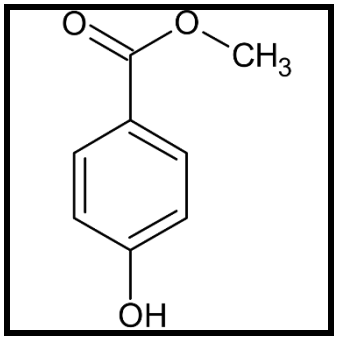


IUPAC Name: Poly (acrylic acid)
Other Names: PAA, PAAC, Acrysol, Acumer.
Chemical Formula: (C3H402)
Molar Mass: variable
Uses: Polyacrylic acid and its derivatives are used in disposable diapers ion exchange resins and adhesives. They are also popular as thickening,

dispersing suspending and emulsifying agents in pharmaceuticals.

2) Methyl Paraben:
Methylparaben is a 4-hydroxybenzoate ester resulting from the formal condensation of the carboxy group of 4-hydroxybenzoic acid with methanol. It is the most frequently used antimicrobial preservative in cosmetics. It occurs naturally in several fruits, particularly in blueberries. Structure:

Structure:



IUPAC Name: Methyl 4hydroxybenzoate
Other Names: Methyl Paraben
Chemical Formula: C8H803
Molar Mass: 152.15g mol-1
Uses: Methyl paraben is an antifungal agent often used in a variety of cosmetics and personal care products.

3) Propylene glycol:
Propylene glycol is a viscous, colorless liquid, which is nearly odorless but possesses a faintly sweet taste. Its chemical formula is CH_3CHCH_2OH. Containing two alcohol groups, it is classed as a diol. It is miscible with a broad range of solvents, including water, acetone, and chloroform.
Structure:

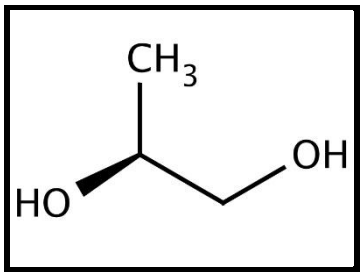


Figure 5: Structure of Propylene glycol

IUPAC Name: propane-1,2-diol
Other Names: 1,2-dihydroxypropane, 1,2-propanediol, methyl glycol, and trimethyl glycol
Chemical formula: C3H8O2
Molar mass: 76.09 g/mol
Uses: It is used to absorb extra water and maintain moisture in certain medicines, cosmetics, or food products. It is a solvent for food colors and flavors, and in the paint and plastics industries. Propylene glycol is also used to create artificial smoke or fog used in fire-fighting training and in theatrical productions.

4) Propyl paraben:
Propylparaben is the benzoate ester that is the propyl ester of 4-hydroxybenzoic acid. Preservative typically found in many water-based cosmetics, such as creams, lotions, shampoos and bath products. Also used as a food additive.
Structure:

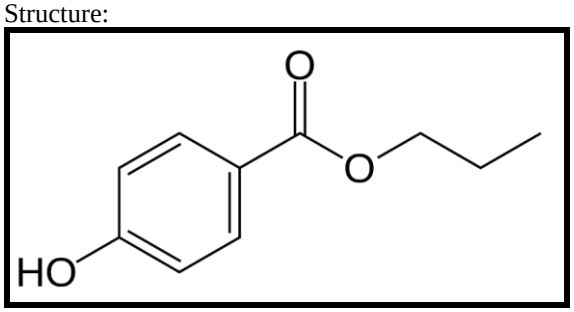


Figure 6: Structure of Propyl paraben
IUPAC Name:4-hydroxybenzoic acid
Other Name: n-propyl paraben, isopropyl paraben
Chemical formula:C10H12O3
Molar Mass:180 gm/mol
Uses: It is widely used as preservatives by pharmaceutical and cosmetics industry. They are effective. These compounds and their salts are used mainly for their antifungal and antibacterial properties.

5) Glycerin:
Glycerol, also called glycerine or glycerin, is a simple triol compound. It is a colorless, odorless, viscous liquid that is sweet-tasting and non-toxic. The glycerol backbone is found in lipids known as glycerides.
Structure:

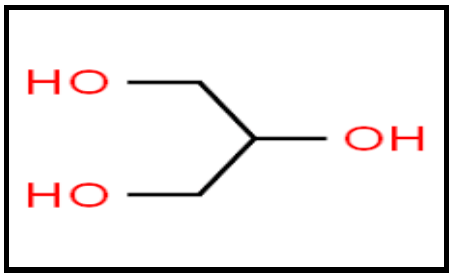


Figure 7: Structure of Glycerin
IUPAC Name: propane-1,2,3-triol
Other Name: Glycerol.
Chemical formula: C3H8O3
Molar Mass: 92.09 gm/mol
Uses: In addition to being a humectant, glycerin is used in a variety of food and drink products, including various beverages, nutrition and energy bars, cake icings, soft candies, chewing gum, condiments, creams, diet foods, dried fruits, fondant, fudge and marshmallows.

Procedure for the preparation of dental gel:

1)Soaking: Soaked carbapol 940 in water.
2) Neutralization: Neutralize with triethanolamine to pH 9.4.
3) Addition of preservative: Addition of propyl and methyl Paraben.
4) Addition of co-solvent and API: Addition of propylene glycol and clove oil in another test tube.
5) Addition of sweetener: Finally, honey is added.
6) Stirring: Stirring is done until a homogeneous product is formed. [19]

Evaluation Parameters:

Appearance:

All the formulations of lantana gel were pale yellow in colour.

Consistency:

The consistency was checked by applying on skin.

Greasiness:

The greasiness was assisted by the application on to the skin.

Determination of pH:

pH of gel was determined using digital pH meter by dipping the glass electrode completely into the gel system.

Determination of viscosity:

Viscosities of the formulated gels was determined using Brooke field viscometer, spindle no. 7 and spindle speed 60 rpm at 25-C was used gels, the corresponding dial reading on the viscometer was noted**.**

Determination of spreadability:

Spreadability was measured by this method on the basis of the slip and the drug characteristics of the gel put on the ground slide and the excess gel (approximately 2 g) under analysis. The gel was then placed between the slides and 200 g weighted for 5 minutes was placed on the top of 2 slides to expel air to provide a uniform gel film between the slides where excess gel was scrapped off the edges. The time noted by the top slide (in seconds) to cover a distance of 7.5 cm must be noted. Spreadability was determined using following formula,

S=M.L/T

Where M = Wt. tied to upper slide

L = Length of glass slides

T = Time taken to separate the slides

Determination of extrudability:
It was determined by sign a tube filled with the gel having a tip of sim opening and by measuring the amount of gel that extruded through the tip when a pressure was applied on the tube was noted down.

Stability study:
Physical stability study tests of the formulation was carried for one weeks at temperature of 37℃. The formulation was found to be physically stable at temperatures of 37℃. Within one weeks [18]

RESULT AND DISCUSSION:

Evaluation of Herbal gel
All results of different parameters of evaluation are recorded. The physical parameter such as color, appearance, feel on application are observed and shown in Table 2. The color of prepared herbal gels was yellowish. The color of extracts was greenish yellow. Appearance of gel was translucent and it was smooth on application. So, it shows significant physical evaluation parameters. The subjective properties mention in Table 2 such as consistency was good and texture of prepared herbal gel was found to be smooth. All the prepared herbal gel formulations show desirable spreadability values.

Observation table of Evaluation Parameter:

Table No.2 Physicochemical characteristics of Lantana Gel:

Sr.no	Parameters	Result
1	Appearance	Pale Yellow
2	Odour	Characteristics
3	Taste	Sweet
4	PH	6.72
5	Spreadability	17.30 g_cm
6	Extrudability	93.40%
7	Homogeneity	Very Good

Table No.3 Stability study (Evaluation Test After One Week):

Sr.no	Parameters	Result
1	Appearance	Pale Yellow
2	Odour	Characteristics
3	Taste	Sweet
4	PH	6.72
5	Spreadability	17.4 g_cm
6	Extrudability	93.58%
7	Homogeneity	Very Good

CONCLUSION

It is concluded, on the basis of the results obtained in the present analysis, that the herbal formulation of Lantana Camara extracts gel shows satisfactory physicochemical parameters. Herbal products are assumed to be safe for longer periods of time. However, quality control for efficacy and safety of herbal products is of paramount importance; and quality control tests must therefore be carried out for these preparations. The extract of this plant shows analgesic as well as anti-inflammatory properties. A study on the effects of formulated gels has shown that further studies are needed to confirm the role of each of these phytoconstituents activity. Thus, our research shows that herbal gel has good analgesic and anti-inflammatory activity.

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