

Journal of Drug Discovery and Therapeutics

Available Online at www.jddt.in

CODEN: - JDDTBP (Source: - American Chemical Society)

Volume 12, Issue 04; 2024, 34-39

Formulation of Gandhak in Form of Cream for Antimicrobial and Antifungal Activity

Dr. Abhishek Pandey, Akshita Ojha, Apoorva Tiwari, Harsh Upadhyay, Siddharth Shukla

Department of Chemistry and Pharmacy Rani Durgavati Vishvavidhyalaya Jabalpur (M.P.)

Received: 09-05-2024 / Revised: 27-05-2024 / Accepted: 20-06-2024

Corresponding author: Dr. Abhishek Pandey

Conflict of interest: No conflict of interest.

Abstract:

Gandhak rasayan was chosen for this investigation because of wide spectrum action as anti-microbial and anti-fungal infection. The cream was formulated in order to use it externally as well, to treat infection. To enhance its effect neem oil as well as kalonji oil were used. Most importantly the main objective was to prepare low cost, herbal cream with lesser side effects and greater benefits as anti-fungal agent as compared to those allopathic medication present in market.

Keywords: Gandhak, Cream, Antifungal, Antibacterial.

INTRODUCTION

Gandhak has fungicidal and anti-parasitic effect and mainly used in various skin disease like dermatitis, psoriasis, eczema and more. It was chosen as model drug. Gandhak is soluble in coconut oil, neem oil, kalonji oil and insoluble in water. It shows excellent result with coconut oil, neem oil shows synergistic effect with Gandhak. Kalonji oil and seed powder exhibit anti-bacterial properties and can effectively fight certain types of bacteria. Topical application of Kalonji oil on the skin infection caused due to streptococcal bacteria heals the skin and reduces redness. Neem oil is rich in fatty acids Trusted Source, such as palmitic, linoleic, and oleic acids, which help support healthy skin Trusted Source. The oil is, therefore, a popular ingredient in skin care products. In the present work, herbal antifungal and antimicrobial cream of Gandhak was prepared by trituration method, using coconut oil, neem oil, kalonji oil, turmeric and aloe vera gel ¹.

Materials and Method:

Gandhak, Aloe vera, Turmeric, Coconut oil, Neem oil, Kalonji oil, Borax, Paraffin wax, Propyl paraben, Polyethylene glycol, Distilled water and Rose water were taken of analytical grades.

Methods

Preformulation study

a) Organoleptic evaluation

Organoleptic evaluation means the study of drugs using organs of senses. It refers to the methods of analysis like colour, odour, taste, size, shape and special features, such as touch, texture, etc. Obviously, the initial sight of the plant or extract is so specific that it tends to identify itself. If this is not enough, perhaps the plant or extract has a characteristic odour or taste. The study of form of a crude drug is morphology while description of the form is morphography. In organoleptic evaluation, four senses are used: taste, smell, sight, and touch.

Taste assesses flavours profiles, smell focuses on aroma, sight evaluates appearance, and touch measures texture, including factors like crunchiness. Each sense offers unique insights into a product's overall quality and consumer appeal.

b) Solubility

Drug specific behaviour towards solvents is taken into consideration. Typically, equilibrium solubility assays have been determined with limited throughput by shaking the drug and target together at a constant temperature for at least 24 hours and measuring the concentration of drug in solution (shake-flask method).

c) Melting point

The melting point (or, rarely, liquefaction point) of a substance is the temperature at which it changes state from solid to liquid. At the melting point the solid and liquid phase exist in equilibrium. The melting point of a substance depends on pressure and is usually specified at a standard pressure such as 1 atmosphere or 100 kPa. The most common MP procedure (Class Ia, Apparatus I) requires inserting the capillary with the sample into the heating block 5°C below its expected MP and ramping at 1 +/- 0.5 °C/minute until the melt is complete. The MP range is recorded at the end of the melt.

d) Boiling point

Boiling point, temperature at which the pressure exerted by the surroundings upon a liquid is equalled by the pressure exerted by the vapor of the liquid; under this condition, addition of heat results in the transformation of the liquid into its vapor without raising the temperature. A liquid's boiling point can be determined using the capillary method, where an inverted capillary is placed in the liquid of interest and the liquid is heated. As the temperature increases, the air in the capillary escapes and is replaced by the vapor of the liquid.

e) pH

pH is defined as the negative logarithm of H^+ ion concentration. Hence the meaning of the name pH is justified as the power of hydrogen. The determination of pH value of drug solution

is generally performed by pH meter with glass electrode as the indicator electrode and a cell composed of glyceryl electrode as the reference electrode.

f) Viscosity

Most fluids offer some resistance to motion, and we call this resistance "viscosity." Viscosity arises when there is relative motion between layers of the fluid. More precisely, it measures resistance to flow arising due to the internal friction between the fluid layers as they slip past one another when fluid flows. Viscosity can also be thought of as a measure of a fluid's thickness or its resistance to objects passing through it. In order to accurately measure the viscosity of a material or product, a viscometer or a rheometer is typically used. These instruments exert a shear force on the material being tested.

g) Density

The density of material shows the denseness of that material in a specific given area. The SI unit of density is kg/m^3 . For convenience, we use g/cm^3 for solids, g/ml for liquids and g/L for gases. Pass a quantity of powder sufficient to complete the test through a sieve with apertures greater than or equal to 1.0 mm, if necessary, to break up agglomerates that may have formed during storage; this must be done gently to avoid changing the nature of the material. Into a dry graduated cylinder of 250 mL (readable to 2 mL), gently introduce, without compacting, approximately 100 g of the test sample (m) weighed with 0.1 percent accuracy. Carefully level the powder without compacting, if necessary, and read the unsettled apparent volume (V_0) to the nearest graduated unit. Calculate the bulk density in g per mL by the formula m/V_0 . Generally, replicate determinations are desirable for the determination of this property. If the powder density is too low or too high, such that the test sample has an untapped apparent volume of either more than 250 mL or less than 150 mL, it is not possible to use 100 g of powder sample. Therefore, a different amount of powder has to be selected as test sample, such that its untapped

apparent volume is 150 mL to 250 mL (apparent volume greater than or equal to 60 per cent of the total volume of the cylinder); the mass of the test sample is specified in the expression of results. For test samples having an apparent volume between 50 mL and 100 mL a 100 mL cylinder readable to 1 mL can be used; the volume of the cylinder is specified in the expression of results.

h) Moisture content

Moisture content (or water content) refers to the weight of the water contained in a certain object or material. It is usually expressed as a percentage of weight. For instance, soil moisture pertains to the water content of the soil. The standard method for measuring moisture in pharmaceuticals is loss on drying using a drying oven and a laboratory balance. However, this is a time-consuming and labour-intensive process. A halogen moisture analyser is a viable alternative for determining moisture content that

meets regulations and provides fast, precise and reliable measurements ².

Formulation of cream

Trituration (Latin, grinding) is the name of several different methods used to process materials. In one sense, it is a form of comminution (reducing the particle size of a substance). In another sense, it is the production of a homogeneous powdered material by mixing and grinding component materials thoroughly. Trituration is a mixture of one or more finely ground powdered drugs. The trituration is a mix of a finely ground drug and lactose. By triturating the grinding of a solid substances is done to fine powder by continuous strike in or rubbing the particles in a mortar with a pestle. The term trituration is also employed to designed the process by which two or more powders are intimately mixed with each other. For this purpose, a pestle and mortar made of, porcelain or glass is used. For hard materials steel mortar and pestle may be used ³.

S.no.	Ingredients (for 30 ml)	F1	F 2
1	Gandhak	4 gm	4 gm
2	Aloe vera	3 gm	-
3	Turmeric	2 ml	2ml
4	Coconut oil	5ml	5ml
5	Kalonji oil	3ml	3ml
6	Neem oil	2ml	2ml
7	Paraffin wax	5gm	5gm
8	Borax	0.4 gm	0.4 gm
9	Propyl paraben	0.08 gm	0.08 gm
10	Polyethylene glycol	3 ml	3 ml
11	Distilled water	q. s.	q. s.
12	Rose water	q. s.	q. s.

Procedure of herbal anti-fungal cream

There are 2 formulations of herbal anti-fungal cream has been prepared.1 consist of aloe vera gel and other does not.

Preparation for oil phase

- a) Take purified Gandhak Rasayan, weigh the quantity needed to prepare cream, triturate it using mortar pestle followed by size reduction using mechanical sieve shaker to get fine particle.

- b) Take the fine powder of Gandhak in mortar pestle triturate it using weighed quantity of coconut oil simultaneously add neem oil and kalonji oil with continuous trituration.
- c) Add paraffin wax to the above mixture and continue triturating it to get homogenous product. Add preservative propyl paraben.
- d) Before mixing the two phases add polyethylene glycol in oil phase.

Preparation of Aqueous phase

In a beaker heat weighed quantity of borax and distilled water until it gets dissolved. Cool it.

Mixing of two phases

- a) Add aqueous phase slowly to the oil phase with continue stirring or triturating (without heat). Add turmeric extract with continuous stirring and add fresh aloe Vera gel (only in one formulation). Continue mixing of two phases until a smooth consistency of cream is obtained
- b) Last step is to add rose water as fragrance and mix it uniformly.
- c) Fill in a container and label it.

Evaluation of antifungal cream

a) pH

To determine pH of anti-fungal cream formulation a pH meter is used. Put 50.0 ml water in a beaker and dissolved the weighed amount of cream (5 g) in it and its pH was measured. The pH study of a cream formulation was determined in triplicate, and the average of three reading is recorded.

b) Washability

The cream was applied on the hand and observed under the running water.

c) Physical properties

The cream was observed for the colour, odour and appearance.

d) Spread ability test

The cream sample was applied between the two glass slides and was compressed between the two-glass slide to uniform thickness by placing 100 gm of weight for 5 minutes then weight was added to the weighing pan. The time in which the upper glass slide moved over the lower slide was taken as a measure of spread ability.

Spread ability= $m \cdot l/t$

M =weight tight to upper slide

L =length moved on the glass slide

T =time take

e) Acid value

Take 10 gm of the cream dissolved in accurately weighed in 50 ml mixture of the equal volume of alcohol and solvent ether. Then attached the flask with the condenser and reflux it with the slow heating until the sample gets completely dissolve then add 1 ml of methyl red and titrate it with 0.1 N NaOH until it gets yellow colour appears after shaking in 20 seconds.

Acid value= $n \cdot 5.61/w$

W =weight of the substances

N =the number of ml in NaOH required.

f) Dye test

The scarlet red dye is mixed with the cream. Place a drop of the cream on a microscopic slide then covers it with a cover slip, and examines it under a microscope. If the disperse globules appear red the ground colourless. The cream is o/w type. The reverse condition occurs in w/o type cream i.e. the disperse globules appear colourless.

g) Homogeneity

Homogeneity was tested via the visual appearance and test⁴.

Results & discussion**Preformulation studies****a) Organoleptic evaluation**

Drugs	Colour	Odour	Touch/ texture
Gandhak	Yellow	Original	Khar
Turmeric	yellow	Aromatic and Characteristics	Rough dull
Aloe vera	Greenish brown (leave)	Characteristics, pore	Soft and smooth
Coconut oil	Colourless, transparent	Natural Coconut aroma	Oily/ liquid
Kalonji oil	Dark amber to black	Herbaceous aroma	Oily/liquid
Neem oil	Beep yellow	Garlic like	Oily/liquid

b) Solubility, Melting point, Boiling point, pH, Density

Drugs	Gandhak	Turmeric	Aloe vera	Coconut oil	Neem oil	Kalonji oil
Melting point	110°C	183 °C	148-150°C	24°C	160°C	-5°C
Boiling point	444°C	109-113°C	442.5°C	232°C	200°C	230-232°C
pH	6.5	5.9	4.5-5.5	8-Jul	6.5-7.5	5.63
density	1.9-2.1	1.002	0.688	924.27	-0.85	0.91-0.93

Evaluation of Cream

Evaluation parameter	Formulation 1	Formulation 2
pH	9	11
Washability	Take some time	Take some time
Physical properties	Crayola yellow in colour, rotten egg like odour,	Crayola yellow in colour, rotten egg like odour,
	Light weight, smooth texture	Light weight, smooth texture
Spreadability test	5.66 ± 0.30 mm	6.15 ± 0.21mm
Acid value	8.415	9.46
Dye test	Water in oil type emulsion	Water in oil type emulsion
Homogeneity	Homogenous	Homogenous

Conclusion:

In the present work, formulation and evaluation of herbal antifungal cream of Gandhak Rasayan was carried out. In the project to formulations of creams were prepared one contains aloe vera gel while other lacks. In the above formulation the aloe vera gel containing cream showed best result. Gandhak has fungicidal and anti-parasitic effect and mainly used in various skin disease like dermatitis, psoriasis, eczema and more. It was chosen as model drug. Gandhak is soluble in coconut oil, neem oil, kalonji oil and insoluble in water. It shows excellent result with

coconut oil, neem oil shows synergistic effect with Gandhak. Kalonji oil and seed powder exhibit anti-bacterial properties and can effectively fight certain types of bacteria. Topical application of Kalonji oil on the skin infection caused due to streptococcal bacteria heals the skin and reduces redness. Neem oil is rich in fatty acids Trusted Source, such as palmitic, linoleic, and oleic acids, which help support healthy skin Trusted Source. The oil is, therefore, a popular ingredient in skin care products. Preformulation studies were carried out for drugs and excipients. Drug and

excipients were compatible with each other. The formulations were prepared by trituration method. In trituration the first step was particle size reduction followed by preparation of oil and aqueous phase and last step was mixing of two phases. The Gandhak was dissolved in coconut oil without heating because it formed crystals on heating. All the evaluation parameters of cream were done and cream showed good consistency, spreadability.

References:

1. Sheth SS, Asore GR, Tambe PA. Preparation of Gandhak Taila by Patalyantra method and Pharmaceutico-analytical Study of Gandhak Taila cream. *Journal of Ayurveda and Integrated Medical Sciences*. 2022 Jun 10;7(3):41-6.
2. Lau E. Preformulation studies. In *Separation science and technology* 2001 Jan 1 (Vol. 3, pp. 173-233). Academic Press.
3. Royle JF. *A manual of materia medica and therapeutics*. Cambridge University Press; 2014 Feb 13.
4. Dhase AS, Khadbadi SS, Saboo SS. Formulation and evaluation of vanishing herbal cream of crude drugs. *Am J Ethnomed*. 2014;1:313-8.