



FORMULATION AND EVALUATION OF ANTIBACTERIAL HERBAL GEL CONTAINING BAMBUSA VULGARIS AND AZADIRACHTA INDICA LEAVES EXTRACT

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Article Received on 03/06/2024

Article Revised on 23/06/2024

Article Accepted on 13/07/2024

ABSTRACT

In the world, there are so many medicinal plants are available and they have beneficial to human and animals. From ancient time Neem and Bamboo leaves are used in treatment of several diseases. Now Neem and Bamboo leaves investigated as antibacterial, antifungal and antimicrobial property. The Neem and bamboo leaves were extracted in different solvents like ethanol, methanol, water and acetone. The Neem and Bamboo leaves extract shows strong inhibition against bacteria and fungus. Neem and bamboo leaves are widely contains alkaloid, flavonoid, tannin and components like triterpenes, anthraquinones, saponin. The Neem and Bamboo leaves have been reported to have antifungal, antioxidant, anti-inflammatory, anti-malarial. The findings give a view mainly on traditional uses phytochemistry and pharmacological action of neem and bamboo plant. Every component of Bamboo and neem plant including the rhizome, leaves, roots has potential medical uses.

KEYWORDS: Antibacterial, Antifungal, Azadirachta indica (neem), Bambusa vulgaris (bamboo), Herbal gel.

INTRODUCTION

Nature is always standing golden evidence for its medicinal activity. It is a complete storehouse of remedies to cure all elements of mankind. The accumulation of knowledge of drugs, over a thousand years, gives the effective means of ensuring health care. A warm climate, productive soil abundant moisture is the favorite condition for growing this plant.^[1] Screening of medicinal plants for bioactive compounds leads to development of less expensive new antimicrobial agents with improved safety and efficacy.^[2] All different plant parts, such as roots, rhizomes, shoots, stems, leaves, and seeds, exhibit their own unique properties that can be used in biomedical applications.^[3] *Azadirachta indica* also known as the neem tree has been used for millennia as a traditional remedy for a multitude of human ailments. Currently, the extensive antimicrobial activities of *A. indica* are being explored through research in the fields of dentistry, food safety, bacteriology, mycology, virology, and parasitology.^[4] Neem plant has excellent

biological activates such as Anti-feedant activity, Hepatoprotective activity, Anti-diabetic activity, anti-larvicidal activity, and Anti-bacterial activity. The results of the phytochemical screening of Neem leaves have shown the presence of alkaloids, flavonoids, tannins, steroids, and carbohydrates.^[5] In recent years, in-depth studies on bamboo have found that bamboo leaf was rich in a variety of bioactive components, including flavonoids, polysaccharides, amino acids, phenolic acids, volatile oil exhibit multiple pharmacological activities.^[6] Bamboo plants have an important place in traditional Asian medicine, particularly in China and Japan.^[3] The beneficial therapeutic effect of bamboo is scientifically proved. As a folk medicine, it is used in the treatment of cold cough, fever, leprosy. It was scientifically reported that bamboo shows anti-inflammatory activity, anti-ulcer, hypoglycemic, anticancer, anti-diabetic, antimicrobial activity.^[1]

Gel formulation are used to deliver the drug topically because of easy application, increase contact time and

minimum side effects as compare to other topical preparation and oral preparation.^[16]



Fig. 1: Bamboo Leaves.



Fig. 2: Neem Leaves.

Scientific Classification

Table 1: Scientific Classification of Bamboo and Neem Tree.

Parameter	Bamboo	Neem
Kingdom	Plantae	Plantae
Divison	Tracheophytes	Magnoliophyta
Order	Poales	Sapindales
Family	Poaceae	Meliaceae
Genus	Bambusa	Azadirachta
Species	B. vulgaris	A. indica

MATERIALS AND METHODS

Materials: Bambusa vulgaris, azadirachta indica, Carbapol, Propylene Glycol, Glycerine, Triethanolamine.

Methods

Collection of Plant materials

Collection of the plant material is essential component of the systematic research. The leaves of Bamboo and Neem plant collected from the plant grow in the surrounding area.

Preparation of Powder

Firstly collect fresh leaves of B.vulgaris and A.indica. Remove the dust from the leaves by washing with distilled water. Dried leaves for 6-7 days in darkness.

Preparation of extract

Take about 40-50 gm powder of neem and bamboo leaves.



Take separately both leaves powder in soxhlet apparatus with 200 ml of ethanol.



After completion of 6-7 cycle at a temperature 80-100°C.



The given extraction is poured in petri-plates for evaporation.



After Evaporation a semisolid mass is prepared.



Use the extract as active ingredient to prepare the gel of neem and bamboo as an antibacterial, antifungal property.



Fig. 3: Extraction process.

PREPARATION OF GEL

1. Accurately weigh Carbapol 934 was taken in beaker and dispersed in 15 ml distilled water.
2. Kept the beaker aside to swell the carbapol for half an hour and then stirring should be done using mechanical lab stirrer at 1200 rpm for 30 min.
3. Take propylene glycol and require quantity of extract.
4. Add weighed quantity of propyl paraben and methyl paraben to it and stirred properly.
5. After all carbapol dispersed 1 gm extract and preservative solution were added with constant stirring.
6. Finally volume made upto 25ml by adding remaining distilled water and triethanolamine was added dropwise to the formulation gel at required consistency.^[13]

FORMULATION TABLE

Table 02: Formulation table of Gel.

Sr. no.	Ingredients	Quantity	Property
1.	Carbapol 934	0.5gm	Gelling agent
2.	Methyl paraben	0.05gm	Preservative
3.	Propyl paraben	0.025gm	Preservative
4.	Propylene glycol	2.5ml	Humectant
5.	Triethanolamine	q.s.	Buffer
6.	Distilled water	Upto 25ml	Solvent



Fig. 04: Gel Preparation.

CHEMICAL TEST

1. Test for Alkaloids

The leaf extract of bamboo and neem were dissolved in ethanol. A small quantity of dissolved extract was treated with Hager's reagent.

Yellow colour indicates the presence of alkaloids.

2. Test for Flavonoids

0.5ml of neem and bamboo leaves extract was taken to which few drops of 10% NaOH was added.

The appearance of bright yellow colour indicates the presence of flavonoids.

3. Test for phenols

0.5ml of neem and bamboo extract was taken to which few drops of 10% ferric chloride solution added.

The presence of phenol would be confirmed the appearance of bluish black colour.

4. Test for Tannins

0.5ml of neem and bamboo leaves extract were taken to which 10% NaCl solution containing 1% gelatin solution was added.

The presence of tannins would be confirm with appearance of white precipitate.

5. Test for Anthraquinones

0.5ml extract was boiled with dil. Sulphuric acid and filtered. Benzene was added to the filtrate and shaken well.

The organic layer was separated to which ammonia solution was added slowly.

No pink colour was observed.

6. Test for triterpenes

To Neem and Bamboo extract chloroform was added and filtered. Few drops of conc. sulphuric acid was added, shaken and kept aside.

The presence of triterpenes was confirmed with appearance of golden yellow colour.



Fig 05: Chemical Test of Bamboo.

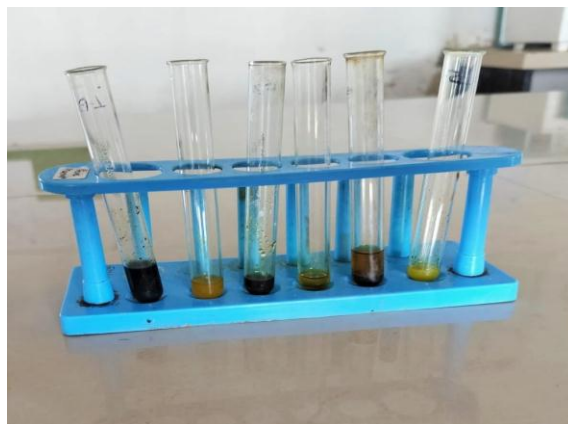


Fig 06: Chemical Test of Neem.

EVALUATION OF HERBAL GEL

1. pH measurement

With a digital pH meter, the gel formulation's pH conductivity was ascertained. The conductivity measurement was carried out in millivolts (mv), and the glass electrode was calibrated using the solutions that were specified for the equipment (pH of 4.00 and 7.00). About fifteen minutes were given to the preparation to reach equilibrium before measurement. The formulation's conductivity and pH were analyzed three times, and average results were determined.

2. Determination of viscosity

Using a Brookfield Viscometer Spindle No. 7 and spindle speed of 60 rpm at 25 degrees Celsius, the viscosities of the formed gel were measured. The matching dial reading on the viscometer was recorded. Next, the spindle was lowered one at a time. The viscometer catalog factor was multiplied by the dial reading.

3. Spreadability

By spreading 0.5g of the gel over a 2 cm diameter circle that had been pre-marked on a glass plate and then using a second glass plate, the spreadability of the BG5 was determined. A half kilogram of weight was allowed to rest for five minutes on the upper glass plate. After the gel was spread, the circle's diameter was measured.

4. Organoleptic character

It is possible to examine the gel's physical characteristics, color, texture, homogeneity, odor, and phase separation.

5. Presence of foreign particles

A small amount of cream should be spread out on a clean glass slide, and the sample should be examined under

diffused light to determine whether any foreign particles are present.

6. Homogeneity

Using centrifugation procedures, homogeneity can be verified. Centrifugal the gel through a centrifuge machine and appropriate speed the phase's rate Visual appearance is one way to detect separation.

7. Accelerated stability testing

Conduct quick stability tests for gel. Store the formulation at room temperature for 7 days and then refrigerate it at 40°C for 1 month. During this time, test all of the assessment parameters and draw the sample once a week.

8. Drug content

Blend 1g of ready-made gel with 25ml of purified water. Using a rotary shaker, agitate the mixture constantly for twenty-four hours. Utilizing a UV spectrophotometer, determine the drug content in percentage terms.

Bacterial activity

Preparation of culture media

1. Take 2.8gm of agar in 100 ml distilled water and heat until dissolving agar.
2. After heating add beef extract, sodium chloride, calcium, peptone.
3. Shake until ingredients are dissolved.
4. Then kept in autoclave for 15 min.
5. Transfer the media in petridish.
6. Incubate the media at 30°C.



Fig 07: Preparation of culture media.

RESULT AND DISCUSSION

In order to determine the antibacterial activity of the gel, the current study was conducted to formulate and assess a herbal antibacterial gel using the ethanolic extract of leaves. Phytochemical screening of ethanolic extract of *Bambusa vulgaris* and *Azadirachta indica* was assessed. The Screening of leaves extract shows the presence of

alkaloid, phenol, tannin, flavonoid, anthraquinone, triterpenes. A range of physicochemical parameters including colour, odour, consistency, pH, spreadability, washability, viscosity and stability testing was evaluated of the formulation. The Following are the outcome of the same.

Physiochemical parameters

Table 03: Physicochemical parameter of Gel.

Physiochemical Parameters	Observations
Colour	Light Green
Odour	Characteristic
Consistency	Smooth
pH	6.83
Spreadability	Easily Spreadable
Solubility	Soluble in alcohol, boiling water
Washability	Good
Non Irritancy	Non-irritant
Stability study (0°C,25°C,40°C)	Stable

CHEMICAL TESTS

Components	Test	Inference	
		Neem	Bamboo
Alkaloids	Hager reagent	+++	+++
Flavonoid	NaOH	+++	++
Phenol	Ferric Chloride	++	+
Tannin	Sodium Chloride	+	+
Anthraquinones	Chloroform	++	+
Triterpenes	Sulphuric acid	++	+

High concentration (+++), Moderate concentration (++), Low Concentration (+).

Antibacterial Activity

The study investigated the antibacterial activity of *azadirachta indica* (neem) and *Bambusa vulgaris*. Result shows the strong antibacterial activity, with extract

showing significant resistance. Culture media were prepared by cup agar diffusion method. The study concluded that the plant leaves of Bamboo and Neem on combination show a potent antibacterial activity.

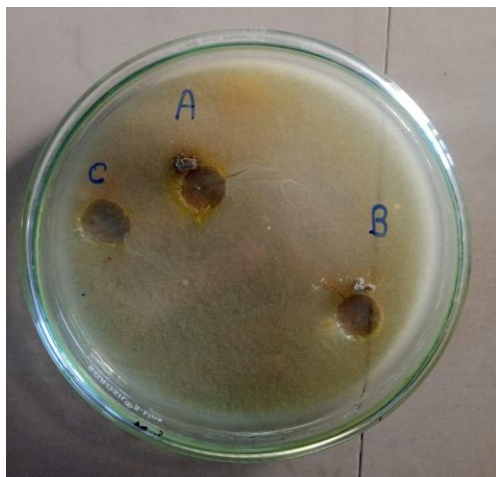


Fig 08: Antibacterial activity of gel.

A- Prepared Gel, B- Standard Gel, C- Combination of both prepared and standard gel.

CONCLUSION

Recently, Herbal formulation has high demand in the world market. It is very good attempt to established herbal gel containing ethanolic extract of *azadirachta indica* (neem) and *Bambusa vulgaris*. The plant have been reported in literature having good anti-bacterial, anti-Fungal, anti-microbial, refreshing activity formulation which are prepared using varied concentration of extract prepared formulation, where evaluated various parameter, such as colour, odour, consistency, washability, spreadability, pH, Non irritancy, solubility and stability. After evaluation study the formulation shows that good affect as antibacterial and antifungal and neither shows any side effect and adverse effect. Natural cures are beneficial for all illnesses. Herbal formulas are in high demand on the global market. It is thought that herbal remedies are safer than allopathic ones. Based on evaluation criteria such physical appearance, pH, spreadability. We may conclude that using *Bambusa Vulgaris* and *azadirachta indica* gel as a topical preparation for antibacterial and antifungal activity is safe and effective.

ACKNOWLEDGMENT

I am thankful to Padmini College of Pharmacy Dighanchi, Tal- Atpadi, Dist- Sangli for providing the necessary Facilities. I am also grateful to Dr. Panaskar Sir, Dr. Panaskar Mam, Mrs. Mane D.S, Mr. Nalawade S.P for guiding and supporting me throughout the process.

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