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# Formulation And Evaluation Of Antimicrobial Ointment Containing *Lantana Camara* And *Piper Betel* Ethanolic Extract

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***Abstract:*** Ethanolic extracts of Piper betel (betel leaf) and Lantana camara (lantana) were used in the formulation and evaluation of an antibacterial ointment. Due to their medicinal qualities, which include antibacterial qualities, both of these plants have long been utilized in traditional medicine. Lantana camara and Piper betel ethanolic extracts were made for this study and added to a base ointment. A variety of bacterial and fungal strains were tested for the ointment's antibacterial efficacy using conventional microbiological methods. The physicochemical characteristics of the ointment, such as its stability, pH, consistency, and spreadability, were evaluated. The formulation showed potential efficacy against common infections, and the results showed significant antibacterial activity. In order to verify the ointment's biocompatibility, the study also evaluated its safety profile. The creation of the ointment by mixing these plant extracts offers a natural substitute for antibacterial therapy, which adds to the increasing demand for plant-based pharmaceuticals.

**Keywords*:*** *Lantana Camara, Piper betel,* Antimicrobial Ointment, Ethanolic Extract

**Introduction:** The effectiveness of traditional antibiotics and antifungal medicines has come under scrutiny worldwide due to the rising incidence of antimicrobial resistance (AMR). Natural goods and herbal medications have gained popularity again as a potential alternative to treat infections in response to this growing dilemma. Since ancient times, plants have been used in traditional medicine as a source of bioactive chemicals having antibacterial qualities. These include Lantana camara (lantana) and Piper betel (betel leaf), which have drawn interest because to their many medicinal uses, such as their antibacterial, anti-inflammatory, and antioxidant qualities. Commonly found in tropical areas, Lantana camara is a member of the Verbenaceae family and is well-known for its many pharmacological

properties, including antimicrobial ones. The plant has a number of bioactive substances that contribute to its therapeutic qualities, including phenolic acids, terpenoids, and flavonoids. Because of its analgesic, antibacterial, and anti-inflammatory qualities.[1]

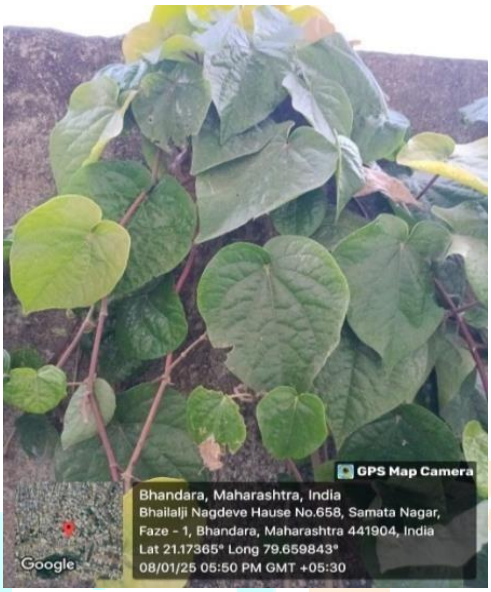



Figure 1: *Piper betel* plant


Figure 2: *Lantana camara* plant

**1. Lantana leaves:**

**Synonym: -** Ghaneri.

**Botanical Name: -** *Lantana camara.*

**Family: -** *Verbenaceae*

**Chemical Constituents: -** Triterpenoids, Flavonoids, Essential oils, Phenolic compounds, Alkaloids, Glycosides, Saponins, Carotenoids, Fatty acids, Phenolic acids.

**Uses:-** Anti-inflammatory, Antimicrobial, Antioxidant, Wound healing.

**2. Betel Leaves**

**Synonym: -** Betel vine, Pan.

**Botanical Name: -** *Piper betel.*

**Family: -** *Piperaceae.*

**Chemical Constituents: -** Essential oils, Alkaloids, Flavonoids, Tannins, Steroids, Phenolic compounds, Carbohydrates, Vitamins and Minerals, Saponins, Fatty acids.

**Uses: -** Antimicrobial, Antiseptic, Anti-inflammatory, Antioxidant, Antibacterial, Antifungal.[2]

**Experimental Work:-**Collection and Identification:-The leaves of *L. camara* and *P. betel* were collected from Bhandara region.

**Authentication of *L. camara* and *P. betel* plant:-***Lantana camara* and *Piper betel* plant was authenticated from J.M. Patel College –Department of Management Science by Dr. Padmavatti Rao

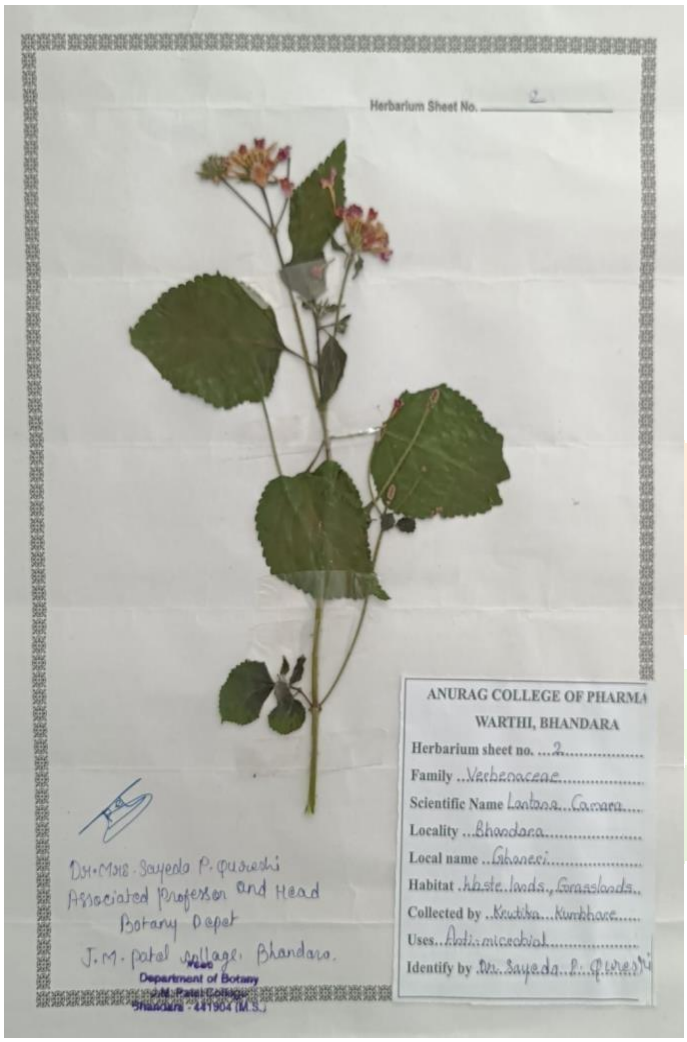



Figure 3: Authentication of *Lantana camara*

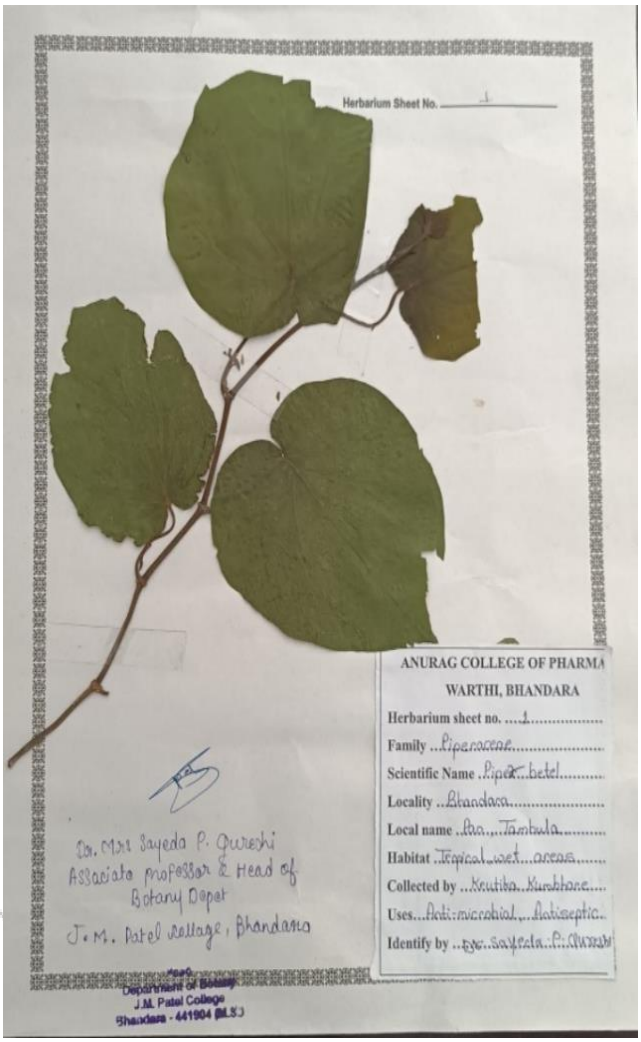



Figure 4: Authentication of *Piper betel*

**Materials and Methods:**

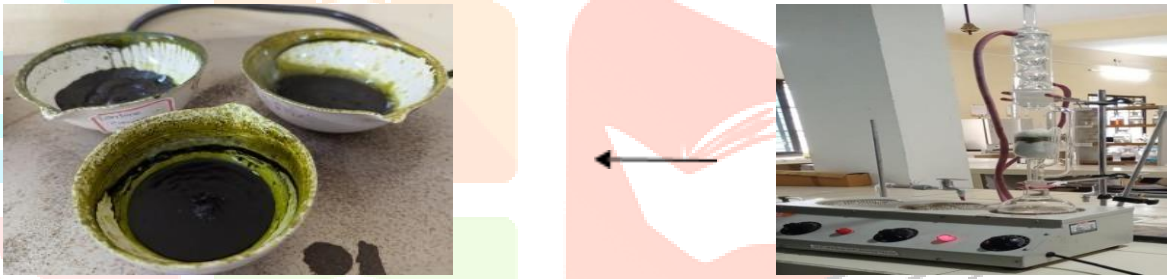
Chemicals:-

1. Wool fat (Lanolin)
2. Hard Paraffin
3. Cetosteryl Alcohol
4. White Soft Paraffin
5. Extract

**Preparation of Extract:-**

1. Collection of leaves and washed with distilled water
2. Shade dried for 2-3 days Leaves were pulverized
3. About 25gm of powder placed in thimble
4. Extract with 250 ml of ethanol in Soxhlet apparatus at 75ºC
5.The extract was evaporated to dryness using hot plate[3]

Fresh Green Leaves Dried betel Leaves Dried Leaves Powder



Leaves Extract Soxhlet Assembly

## Extraction Using Soxhlet Method

Various parts utilized in Soxhlet extraction, such as the condenser, by-pass tube, siphon tube, and thimble water cooling system

• Take 25 grams of firm leaf material.

• Store in a thimble that is placed into a Soxhlet vessel with an extractor solvent flask.

• A portion of non-volatile chemicals dissolve in solvent; solvent vapor ascends to the column and floods into the chamber containing the solvent thimble.

• The procedure is repeated multiple times until the desired concentrated chemicals are obtained in the flask. The extraction was carried out in 250 mililiters of alcoholic solvent at the solvent's boiling point.[4]

**Phytochemical Analysis:-**The alcoholic extract of *Psidium guajava* leaves were subjected to phytochemical analysis by using various chemical tests to identify the constituents present in it. The various test performed are as follows:

**Alkaloid Test:-** Wagner's test – leaf extract + H2O + dil. HCl + Wagner's reagent reddish brown precipitate

**Flavonoid Test:-** 0.5 ml extract + few drops of 10% NaOH Bright yellow colour

**Phenol Test:-** 0.5 ml extract + few drops of 10% FeCl3 Bluish black colour

**Saponin Test:-** Extract + shake vigorously Stable foam

**Tannin Test:-** 0.5 ml extract + few drops of 10% NaCl with 1% gelatine solution White precipitate

**Anthraquinones Test:-** 0.2 ml extract + 2ml chloroform + shake & filtered + 10% ammonia solution presence of bright pink precipitate

**Triterpene Test:-** Extract + chloroform + conc. H2SO4 presence of golden yellow colour[5]

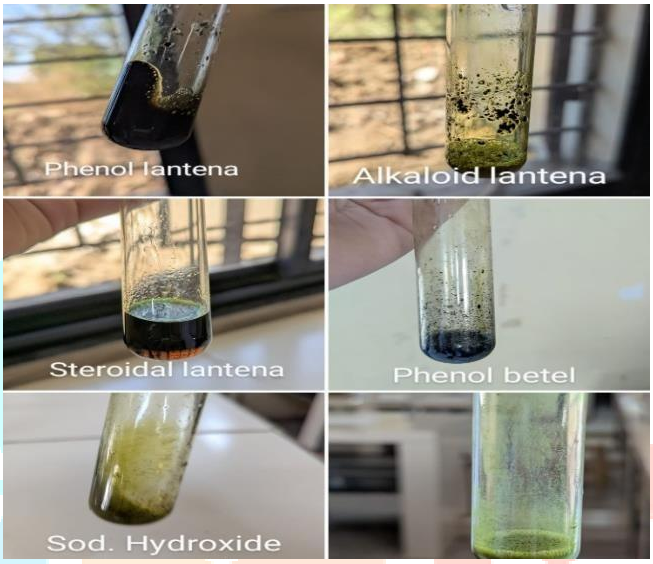



Figure 5: Chemical Test

**Formulation of Antimicrobial ointment:**[6]

| Ingredients | Quantity For 20 g |
|---|---|
| Wool fat (Lanolin) | 1 gm |
| Hard Paraffin | 1 gm |
| Cetosteryl Alcohol | 1 gm |
| White Soft Paraffin | 17 gm |
| Extract | 1 gm |

Table No :1 Formulation of Ointment

**Procedure for Formulation of Ointment:**

Grated hard paraffin was first precisely weighed to create the ointment base, which was then put in an evaporating dish on a water bath. Once hard paraffin had melted, the additional ingredients were added and gently agitated to facilitate homogenous melting and mixing. The ointment base was then allowed to cool. By using the levigation process to mix precisely weighed extract with the ointment base, a smooth paste with two or three times the base's weight was created. Additional base was added gradually until the ointment was homogenous, and it was then transferred to an appropriate container.[7&8]


**Evaluation of Antimicrobial ointment**[9&10]

**pH:**A digital pH meter (alpha-01d) was used to measure the ointment's pH after it had been diluted with hot water (1:10) and allowed to cool to 27°C.

**Spreadability:** When a load is applied between two slides, the spread ability is expressed in terms of the number of seconds it takes for the slides to separate from the ointment. The spread ability improves with less time spent separating the two slides.

It was calculated using the formula: S = m.l/t

Where, S=spreadability m= weight tied to upper slide,

t= time taken in separate two

**Homogeneity and Texture:**A tiny amount of the prepared ointment was pressed between the thumb and index finger to test for homogeneity and texture. The texture and homogeneity of the formulation were assessed based on its consistency and the presence of coarse particles.

**Phase separation:**The prepared ointment was stored at room temperature, out of direct sunlight, in a covered container. Phase separation was then monitored for 24 hours during a 30-day period, and any changes were noted.

**Skin irritation:** The model was exposed to a test chemical or substance for forty-two minutes. After the chemical was removed, the model was incubated for an additional forty-two hours.

**Washability:** After applying a tiny bit of ointment, the hand was cleaned with tap water. Verify whether it can be washed.

**Greasiness:** A smear of the ointment was put to the skin's surface, and its oiliness or grease-like consistency was examined. Make sure it's not too greasy.

**Results:**

**Phytochemical Test:-**

| Sr. No. | Chemical Test | Inference | Result | |
|---|---|---|---|---|
| 1 | Alkaloid Test | Presence of reddish-<br>brown precipitate | Positive | Positive |
| 2 | Flavonoid Test | Presence of bright<br>yellow colour | Positive | Positive |

| | | | | |
|---|---|---|---|---|
| 3 | Phenol Test | Presence of bluish black Colour | Positive | Positive |
| 4 | Saponin Test | Presence of stable foam | Negative | Negative |
| 5 | Tannins | Presence of white precipitate | Positive | Negative |
| 6 | Anthraquinone | Presence of bright pink precipitate | Negative | Negative |
| 7 | Triterpines | presence of golden yellow colour | Negative | Positive |

Table No. 2: Phytochemical Screening

**Physical Parameter:-**

| **Physical Parameter** | **Observation** |
|---|---|
| Colour | Light Brown |
| Odour | Aromatic |
| Appearance | Semisolid |
| pH | 7.72 |
| Texture | Smooth |
| Homogeneity | Homogenous |
| Washability | Not Easily Washable |
| Phase separation | No |
| Skin irritation | No |

Table No:3 Physical Parameter

Figure 6: pH Meter

Figure 7: Spreadability apparatus

**Spreadability Test:-**

| OINTMENT FORMULATION | DISTANCE (cm) | TIME (sec) | SPREADABILITY (g.cm/s) |
|---|---|---|---|
| Lantana | 11 | 6 | 9.16 |
| Betel | 10 | 7 | 7.14 |
| Combination | 11 | 7 | 7.85 |

Table No 6: Spreadability Test

**Microbial Assay of Antimicrobial ointment:-**

| Microorganism Tested | Lantana | Betel | Combination | Standard (Neomycin) |
|---|---|---|---|---|
| Staphylococcus aureus | 3.2 mm | 2.6 mm | 4.1 mm | 5.2 mm |
| Pseudomonas aeruginosa | 2.4 mm | 1.6 mm | 3.7 mm | 4.9 mm |
| Escherichia coli | 3 mm | 5.3 mm | 5.5 mm | 6.2 mm |

Table no.7: Antibacterial Activity of Ointment

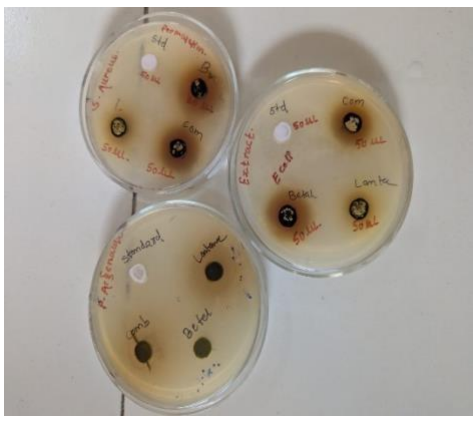



Figure 8: zone of Inhibition

**Conclusion:-**

The antibacterial ointment made with ethanolic extracts of Piper betel and Lantana camara shown significant antimicrobial action against a range of harmful microbes .The promise of both plant extracts as natural agents in topical preparations was supported by their notable antibacterial qualities. The ointment was suited for practical usage due to its favourable physicochemical features, which included appropriate consistency, spreadability, and stability. The ointment is safe and well-tolerated for dermatological uses, according to skin irritation testing. The study demonstrates that Piper betel and Lantana camara have the potential to be useful ingredients in the creation of topical antibacterial compositions.

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