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FORMULATION AND EVALUATION OF POLY HERBAL ACNE PATCH

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ABSTRACT

Acne is the most common problem at any age. Acne patches can be helpful for mild to moderate acne, but they may not be sufficient for more severe cases. Ethanolic extract of *Bougainvillea Spectabilis, Tagetes Erecta, and Cinnamomum Verum* are used in cosmetic patches. These extracts have good Anti-inflammatory activity. The patches were prepared by solvent evaporation technique using HPMC (hydroxyl propyl methyl cellulose) as polymer and ethanol as a solvent for dissolving polyherbal acne patches. Formulation and evaluation procedures were done and it was selected for further anti-inflammatory studies. The patches potentially inhibit and prevent acne contain fluids and reduce inflammation. Two patches were formulated by using ethanol as a solvent system (2 % & 4%). The formulated Poly herbal acne patches F1 (2%) & F2(4%) show surface pH, percentage moisture content, uptake moisture content, flatness, folding endurance, and drug content. Overall, evaluation studies have shown that the two concentrations are more active in F2 (4%). Many natural products have been used for the treatment of bacterial infection and they inhibit the growth of bacteria.

KEYWORDS: *Bougainvillea spectabilis, Tagetes Erecta, Cinnamomum Verum*, HPMC.

INTRODUCTION

Acne is one of the common skin disorders that may present at any age. Acne is a chronic inflammatory disease of sebaceous units. Clinical presentations of acne include seborrhea, comedones, erythematous papules and pustules, nodules, deep pustules, or pseudocysts. Acne has main pathogenetic mechanisms are more sebum production, follicular

hyperkeratinization, colonization, and the products of inflammation. Acne patches are nowadays a more popular skincare product designed to treat acne blemishes. They are small, adhesive patches that are placed directly onto pimples.

When using acne patches, cleanse the affected area and apply the patch directly onto the pimple, leaving it for the night. The patch will adhere to the skin and it will work on the night. The acne patches are a more convenient and effective method for treating acne vulgaris without irritation. Acne patches can be used for mild to moderate acne.

ADVANTAGES OF ANTI-ACNE PATCHES

- It helps to go away pimple overnight.
- Improved healing.
- It can protect the skin from bacteria or infection and irritation.
- It can absorb any fluid that leaks from a pimple.
- The skin gives constant serum drug level
- If the patch can be removed easily when toxicity occurs
- It is a very easy application of drugs.

DISADVANTAGES OF ANTI-ACNE PATCHES

- It can cause skin irritation.
- Redness.
- Dryness in the affected areas.

MATERIALS AND METHODS

PLANT PROFILE

The flower of *Bougainvillea spectabilis*, *Tagetes Erecta*, and bark of *Cinnamomum Verum* were collected in March from Palakkad district and was collected in March from Palakkad district. The plant was authenticated by Dr. M.U Sharief, scientist, Head of office, TNAU Botanical Garden, Tamil Nadu Agriculture University.

BOUGAINVILLEA SPECTABILIS

Bougainvillea spectabilis is a woody perennial vine or shrub (or small tree), erect or clambering, attaining a height of up to 12 m and a width of 7 m. Branches pilose, with straight, axillary, pilose spines.

Table 1: Taxonomical Classification of *Bougainvillea spectabilis.*

Kingdom	Plantae
Phylum	Spermatophyta
Class	Dicotyledonae
Order	Caryophyllales
Family	*Nyctaginaceae*
Genus	Bougainvillea
Species	*Bougainvillea spectabilis*

Constituents

The flower contains alkaloids, essential oils, flavonoids, glycosides, oxalates, phenolics, phlorotannins, quinones, saponins, tannins, and terpenoids.

Action

It is used for anti-inflammatory and antinociceptive activities, by inhibition of nociception induced by acetic acid and paw edema. The extracts have significant antioxidant capacity due to their phenolic compound.

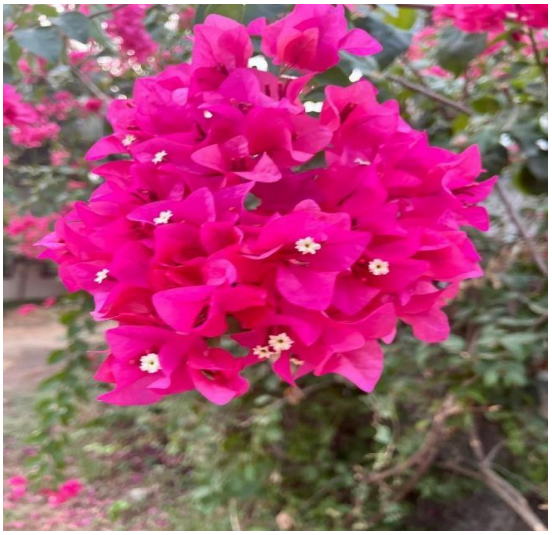


Fig No: 1 Bougainvillea Spectabilis.

TAGETES ERECTA

Tagetes Erecta is a herbaceous annual or perennial plant whose height ranges from 30–110 cm, and yellow to orange corollas, of 8 to 10 mm in length. The fruits and seeds are linear achenes 7 to 10 mm long, smooth, or slightly covered with stiff hairs at the corners.

Table 2: Taxonomical classification of *Tagetes erecta.*

Kingdom	Plantae
Phylum	Angiosperms
Class	Magnoliopsida
Order	Asrerales
Family	Calendula
Genus	Calendula
Species	Erecta

Constituents

Fresh petals contain lutein and lutein fatty acid esters and flower extract contains limonene, terpinolene, (Z)- myroxide, piperitone, piperitenone, piperitenone oxide, and b-caryophyllene.

Action

They are effective against piles, kidney troubles, muscular pain, and ulcers, to treat wounds for inflammation of skin and mucous membranes.

Fig No. 2: Tagetes Erecta.

CINNAMOMUM VERUM

Cinnamomum Verum trees are 10–15m tall. The leaves are ovate- oblong in shape and 7–18 cm (3–7 inches) long.

Table 3: Taxonomical classification of *Cinnamomum Verum.*

Kingdom	Plantae
Class	Magnoliopsida
Order	Laurales
Family	Lauraceae
Genus	Cinnamomum
Species	C. Verum

Constituents

Cinnamaldehyde and its derivatives are followed by linalool, caryophyllene, and eugenol.

Action

Astringent, antipruritic, rubefacient, and anti-septic agent, antioxidant, anti-inflammatory, antidiabetic, antimicrobial, anticancer.

Fig No: 3. *Cinnamomum Verum*.

METHODOLOGY

Preparation of *Bougainvillea* extract

The bougainvillea flower was collected, cleaned shade dried, and grained into fine powder. The 20g of bougainvillea fine powdered plant material was weighed out and extracted by using a solution with 200ml of ethanol and then loaded into the exhalation apparatus (after using 72 hours) the product was filtered and evaporated.

Preparation of *Tagetes erecta* extract

The Marigold flower was collected, cleaned shade dried, and grained into fine powder. The 10g fine powdered plant material was weighed out and extracted by using the Maceration technique with 100ml of ethanol and then loaded into the maceration chamber (after 72 hours) the product was filtered and evaporated.

Preparation of extract *Cinnamomum verum*

The cinnamon bark was collected, cleaned shade dried, and grained into finepowder. The 10g cinnamon fine powdered plant material was weighed out and extracted by using the Maceration technique with 100ml of ethanol and then loaded into the maceration chamber (after 72 hours) the product was filtered and evaporated.

PREFORMULATION STUDIES

A. Preliminary Phytochemical test

Table 4: Phytochemical studies.

Phytochemical	Method /reagent
Carbohydrates	Fehling's test
Flavonoids	Alkaline test
Protein	Biuret test
Cardiac glycosides	Keller killani test
Tannins	Ferric chloride test
Saponin	Salkowski reaction
Steroid	Liebermann Burchard's test
Alkaloid	Dragendorff's reagent test
Phenols	Folin Ciocalteau

B. Anti-inflammatory studies

Preparation of 1-2% egg albumin solution.

Mix 1g of egg albumin and 5 ml of distilled water slowly pour in 5 ml of distilled water while stirring continuously.

Preparation of phosphate buffer 6.4.

2.5g of disodium hydrogen phosphate,2.5g of sodium dihydrogen phosphate, and 8.2g of sodium chloride in 950ml of water.

Preparation of drug solution.

100ml of extracts was taken and added to 100ml of the standard flask from this o.1, 0.2, 0.3, 0.4, 0.5ml pipetted out and made to 10ml with distilled water.

Preparation of egg albumin denaturation assay

0.2ml egg albumin, 2.8ml of phosphate buffer, and 2ml of varying concentrations of drug. so that the final concentration becomes 10,20,30,40,50µg/ml. A similar volume of distilled water served as control then the mixture was incubated at 37±2ºC in a BOD incubator, for 15 minutes and then heated at 70ºC for 5 minutes. After cooling their absorbance was measured at 660nm, by using the vehicle as blank. Benzoyl peroxide at the final concentration of (10, 20, 30, 40, 50µg/ml) was used as referenced drug and treated similarly for determination of absorbance.

Formulation of Polyherbal acne patch

Table 5: Formulation of polyherbal acne patches.

SINO	INGREDIENTS	F1	F2
1	*Bougainvillea extract*	2ml	4ml
2	*Marigold* extract	2ml	4ml
3	*Cinnamon* extract	2ml	4ml
4	HPMC	1g	1g
5	Glycerol	0.5ml	0.5ml
6	Propylene glycol	0.5ml	0.5ml
7	Tween 80	0.1ml	0.1ml
8	Ethanol (70%)	8ml	6ml

- HPMC and glycerol were mixed in a motor until homogenous.
- Then three extracts (2,4ml) were added to propylene glycol.
- Added to Tween 80, the mixture was stirred until it was homogenous, and then added remaining ethanol (70%) was put into a Petri dish for 24 hours.

C. Evaluation studies

a. Organoleptic characters

Organoleptic characters of patches were color, odor, and texture observed.

b. Surface pH

The surface pH of the patch was determined by allowing them to swell in a closed Petri dish at room temperature for 30 minutes in 0.1 ml of double distilled water. The swollen device was removed and placed under a digital pH meter to determine.

c. Uniformity of Weight

Weight variation is studied by individually weighing randomly selected patches and calculating the average weight. The individual weight should not deviate significantly from the average weight.[11]

d. Moisture content Uptake

The prepared film was weighed individually and kept in a vacuum desiccator containing phosphorus pentoxide at room temperature for 24 h. The patches were weighed again individually until they showed a constant weight. The percentages of moisture content were calculated as a difference between the initial and final weight concerning the final weight.

e. Percentage Moisture Content

The percentage moisture content was determined for each formulation. A film of 1 × 1 cm was taken from each patch. These films were weighed individually by using a digital weighing balance. Polymeric films were placed in Petri dishes and stored in desiccators containing silica beads at 25 °C. The films were weighed until a constant weight. The percentage moisture content was calculated by;

$$\text{Percentage moisture content} = \frac{\text{initial weight} - \text{Final weight}}{\text{initial weight}} \times 100$$

f. Flatness

For flatness determination, one strip is cut from the center and two from each side of the patch. The length of each stripe is measured and variation in length is measured by determining percent constriction.

g. Drug content

The 12mm of patch is to be dissolved in a ethanol in specific volume. Then the solution is to be filtered through a filter medium and the drug contains Spectrophotometrically at 276 nm.

h. Folding Endurance

The patches were repeatedly folded in the same place till they broke.

RESULT AND DISCUSSION

PRE-FORMULATION STUDIES

A. Preliminary Phytochemical Screening

The Preliminary Phytochemical Studies of the extract revealed the presence of carbohydrates, flavonoids, cardiac glycoside, tannins, saponins, alkaloids, steroids, and phenols.

Table 6: Preliminary Phytochemical screening of *Bougainvillea* extract, *Tagetes Erecta,* and *Cinnamomum Verum*.

TEST	*Bougainvillea*	*Tagetes*	*Cinnamomum*
Carbohydrate			
Fehling's test	+	+	+
Flavonoids			
Alkaline test	+	+	+
Cardiac glycosides			
Keller killani test	+	-	-

Protein			
Biuret test	-	-	-
Tannins			
Ferric chloride test	+	+	+
Saponins			
Frothing test	-	-	+
Steroids			
Liebermann Burchard'stest	+	+	+
Phenol			
Folin Ciocalteau	+	+	+
Alkaloid			
Dragendorff's reagent test	+	+	+

Fig no: 4. Phytochemical screening of (A) *Bougainvillea* extract, (B) *Tagetes Erecta*, and (C) *Cinnamomum Verum* extract.

B. Anti-Inflammatory studies

Table 7: Anti-inflammatory studies.

No	Treatment	Concentration (µg/ml)	Absorbance at 660nm	Percentage (%)
1	Control	-	0.55	-
2	Extract of *Bougainvillea*	100	0.63	**14.54 %**
3	Extract of *Bougainvillea*	500	0.82	**49.09 %**
4	Extract of M*arigold*	100	0.69	**25.45 %**
5	Extract of Marigold	500	0.79	**43.63 %**
6	Extract of cinnamon	100	0.80	**45.45 %**

7	Extract of cinnamon	500	0.86	**56.36 %**
8	Aspirin	100	0.92	**67 %**

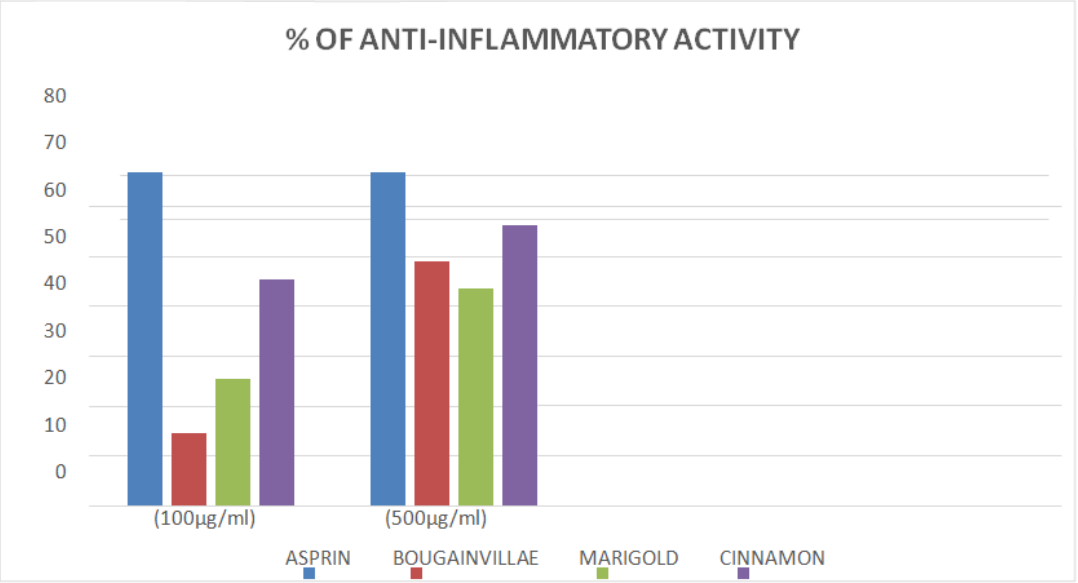
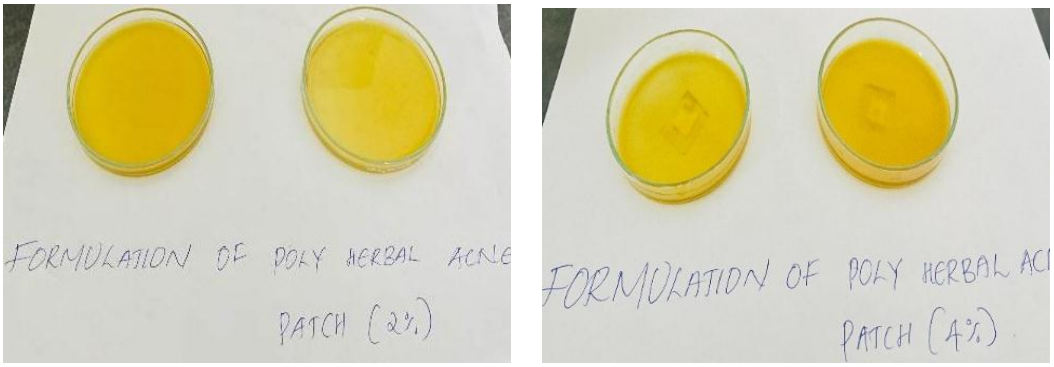


Fig no: 5 Anti-Inflammatory activity of different concentrations (100 & 500 µg/ml*) Bougainvillea spectabilis extract, Marigold extract & Cinnamon extract.*

EVALUATION STUDIES



(A) **(B)**

Fig No: 6 Polyherbal acne patches (A-2%) and (B-4%).

a. Organoleptic characters

Table 8: Organoleptic Characters.

Characteristics	F1	F2
Color	Pale yellow	Pale yellow
Texture	Smoothness	Smoothness
Odor	Astringent	Astringent

b. Surface pH

Table, 9: Surface pH was measured by using a digital pH meter.

Formulation code	Surface pH
F1	5.35
F2	5.56

c. Uniformity of weight

Table 10: Uniformity of weight of polyherbal acne patches.

Formulation code	Weight of patches in (mg)			Mean (mg)
	Trail 1	Trail 2	Trail 3	
F1	0.07	0.08	0.08	**0.077**
F2	0.08	0.09	0.08	**0.083**

d. Percentage of moisture uptake

Table 11: Percentage of moisture uptake.

Formulationn code	Day 1 weight (mg)				Day 2 weight(mg)				% of moisture uptake
	I	II	III	Avg. wgt	I	II	III	Avg. Wgt	
F1	91	89	89	89.66	96	94	93	94.33	**4.95**
F2	78	77	77	77.33	99	99	98	98.67	**21.63**

e. Percentage of Moisture Content

Table 12: Percentage of moisture content.

Formulation code	Day 1 weight (mg)				Day 2 weight(mg)				% of moisture content
	I	II	III	Avg Wgt	I	II	III	Avg wgt	
F1	56	57	56	56.3	55	55	55	55	**2.41**
F2	63	65	66	64.6	59	58	58	58.3	**10.86**

F. Flatness

Table 13: All the formulated patches showed 100% flatness.

Formulate ion code	Initial length (cm)				Final length(cm)				% constrict on	% flatness ss
	I	II	III	Avg	I	II	III	Avg.		
F1	12.2	2.9	7.3	7.4	12.2	2.9	7.3	7.4	0	**100**
F2	9.9	3.3	7.8	7	9.9	3.3	7.8	7	0	**100**

g. Drug content

Table 14: The drug content was analyzed Spectrophotometrically at 276 nm.

Formulation code	Drug content
F1	3.350
F2	3.527

h. Folding Endurance

Table 15: Folding endurance study.

Formulation code	Folding endurance			Mean ± S.D* (n=3)
	Trail 1	Trail 2	Trail 3	
F1	10	11	10	10.3±0.32
F2	13	14	14	14±0.52

SUMMARY AND CONCLUSION

In this study, Polyherbal acne patches were prepared by solvent evaporation method. Hence *Bougainvillea spectabilis, Marigold* extract, and *Tagetes Erecta* extracts were used for phytochemical screening, which showed the presence of Anti-inflammatory phytoconstituents. *Bougainvillea Spectabilis, Tagetes Erecta, and Cinnamomum Verum* are extracted by using 70% ethanol which works synergically to help reduce acne inflammation and acne lesions. The Anti-inflammatory agents present in the polyherbal ingredients *Bougainvillea* contains phenols, terpenoids, flavonoids, saponins, and tannins; *Marigold* contains flavonoids, and triterpenoids and *cinnamon* contains alkaloids, saponins, tannins, triterpenoids, and flavonoids to protect from acne vulgaris.

The patches help to prevent acne contain fluids and reduce inflammation. Two patches were formulated by using ethanol as a solvent system (2 % & 4%). Hence the combination contains extract and excipients like, Glycerol and propylene glycerol. HPMC 50 CPS is used as the polymer in this preparation. The formulated Poly herbal acne patches F1 (2%) & F2(4%) show surface pH, percentage moisture content, uptake moisture content, flatness, folding endurance, and drug content. Overall, evaluation studies have shown that the two concentrations are more active in F2 (4%). The poly herbal acne patches enrich and hold great potential for those seeking natural products for acne vulgaris, they can contribute to no side effects and it is natural.

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