

FORMULATION AND EVALUATION OF HERBAL ANTI-ARTHRITIC CREAM CONTAINING CISSUS QUADRANGULARIS AND NYCTANTHES ARBOR – TRITIS.

BHOSALE SAYALI SANTOSH¹, SRUSHTI HANUMANT CHORAMALE¹, JAGATAP BALASAHEB POPAT¹, PRIYANKA ASHOK SUDRIK¹, BARGUJE DHANSHRI SANTOSH¹, ASST. PROF. GARUD NEHA SUNIL^{2*}, ASST. PROF. PAWAR PRATIKSHA BABUSHA³, ASST. PROF. WAGHAMODE VIJAYASHREE RAMACHANDRA⁴, ASST. PROF. SHINDE PRATIKSHA JALINDER⁵.

¹Student, Shri Dattakrupa Foundations, Saikrupa Institute of Pharmacy, Ghargaon, Shrigonda, Ahilyanagar, Maharashtra, India 413728.

^{2,3,4,5} Assistant Professor, Shri Dattakrupa Foundations, Saikrupa Institute of Pharmacy, Ghargaon, Shrigonda, Ahilyanagar, Maharashtra, India 413728.

*** Corresponding author:**

Prof. Garud Neha Sunil
Shri Dattakrupa Foundations,
Saikrupa Institute of Pharmacy, Ghargaon,
Shrigonda, Ahilyanagar, Maharashtra, India 413728.

ABSTRACT

Arthritis is a chronic inflammatory disorder characterized by joint pain, swelling, stiffness, and reduced mobility, significantly affecting the quality of life of patients. The present study aimed to formulate and evaluate a herbal anti-arthritic cream containing extracts of *Cissus quadrangularis* and *Nyctanthes arbor-tristis*, two medicinal plants traditionally used for the management of inflammatory and musculoskeletal disorders. *Cissus quadrangularis* is known for its anti-inflammatory, antioxidant, and bone-healing properties, while *Nyctanthes arbor-tristis* possesses analgesic and anti-inflammatory activities. The herbal cream was prepared using a suitable oil-in-water emulsion base with varying concentrations of plant extracts. The formulated batches were evaluated for physicochemical parameters including appearance, homogeneity, pH, spreadability, washability. The synergistic action of *Cissus quadrangularis* and *Nyctanthes arbor-tristis* may help reduce inflammatory mediators associated with arthritic conditions and provide symptomatic relief from pain and swelling.

Keywords: Anti-arthritic cream, *Cissus quadrangularis*, *Nyctanthes arbor-tristis*, Herbal formulation, Anti-inflammatory activity, Topical drug delivery, Arthritis.

INTRODUCTION

Herbal creams are semisolid preparations used for topical application on the skin for the treatment of various skin disorders, pain, inflammation, wounds, and infections. Nowadays, herbal formulations are becoming more popular because they are prepared from natural sources and usually produce fewer side effects compared to synthetic medicines. Herbal creams are easy to apply, spread smoothly on the skin, and provide localized therapeutic action. The present study deals with the formulation and evaluation of a herbal anti-inflammatory cream containing extracts of *Cissus quadrangularis* and *Nyctanthes arbor-tristis*. Both plants are well known in traditional Ayurvedic medicine for their medicinal and healing properties. *Cissus quadrangularis*, commonly known as Hadjod, belongs to the family *Vitaceae*. This plant contains phytochemicals such as carbohydrates, alkaloids, steroids, tannins, saponins, and flavonoid. It is traditionally used for bone fracture healing, swelling, pain, and inflammation. Also used to heal broken bones and injured ligaments and tendons. *Nyctanthes arbor-tristis*, commonly known as Parijatak or Night Jasmine, belongs to the family *Oleaceae*. The leaves and flowers of this plant possess anti-inflammatory, analgesic, antioxidant, and antimicrobial properties. It has been widely used in Ayurvedic medicine for the treatment of arthritis, fever, skin diseases, and joint pain.

Mechanism of anti-arthritis activity:

The anti-inflammatory activity is mainly mediated through inhibition of the arachidonic acid pathway. Cell membrane phospholipids release arachidonic acid, which is subsequently metabolized by cyclooxygenase enzymes (COX-1 and COX-2). COX-1 is a constitutive enzyme responsible for the synthesis of prostaglandins and thromboxanes involved in normal physiological functions such as gastric mucosal protection, platelet aggregation, and maintenance of renal blood flow. COX-2 is an inducible enzyme that is expressed during inflammation and is responsible for the production of prostaglandins associated with pain, swelling, redness, and fever. Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) inhibit both COX-1 and COX-2 enzymes, thereby reducing prostaglandin synthesis and decreasing inflammation, pain, and fever. However, inhibition of COX-1 may lead to gastrointestinal adverse effects. Selective COX-2 inhibitors (Coxibs) preferentially inhibit the COX-2 enzyme, reducing inflammation while minimizing the gastrointestinal side effects associated with COX-1 inhibition.

MATERIAL AND METHODS**Materials****1. *Cissus quadrangularis***

The biological source of *Cissus quadrangularis* is the fresh or dried stem of the plant *Cissus quadrangularis* Linn. Belongs to family *Vitaceae* and is commonly known as Hadjod. Distinctly four-angled, fleshy, succulent, and jointed at regular intervals. Nodes are heavily constricted; internodes measure 8–10 cm long and 1.2–1.5 cm wide.



Fig.1.Cissus Quandragularis

2.Nyctanthes arbor –tritis

The biological source of *Nyctanthes arbor-tristis* Linn. consists of various parts—most notably the fresh or dried leaves of the plant *Nyctanthes arbor-tristis* Linn. Simple, broadly ovate, measuring 6–12 cm in length and 2–6.5 cm in width. Acute to acuminate tip; rounded or slightly oblique base with an entire to distantly serrated margin. The plant contains flavonoids, glycosides, tannins, and phenolic compounds. It exhibits anti-inflammatory, antioxidant, analgesic, antimicrobial, and wound-healing activities. Therefore, it is considered a valuable medicinal plant for the treatment of inflammatory disorders and skin diseases.



Fig.2.Nyctanthes Arbor-Tritis

Table 1: Ingredient and Category

Sr.No	Ingredients	Category
1	Cissus quadrangularis	Anti-arthritic activity
2	Nyctanthes Arbor-Tritis	Anti-arthritic activity
3	Steric Acid	Stiffening Agent
4	Bees Wax	Thickening Agent
5	Propyl Parabean	Preservative
6	Methyl Parabean	Preservative
7	Propylene Glycol	Humectant
8	Triethanolamine	Emulsifying Agent
9	Coconut Oil	Emollient
10	Water	Quantity Suffcient

Method

A. Collection Of Plant

1.Cissus Quandragularis:

The stem of hadjod were collected from Botanical garden of saikrupa institute of pharmacy college ghargoan and authenticated at Department of Botany, Radhabai kale mahila mahavidyalaya ahilyanagar

2.Nyctanthes Arbor-Tritis:

The leaf of parijatak were collected from Botanical garden of saikrupa institute of pharmacy college ghargoan and authenticated at Department of Botany, Radhabai kale mahila mahavidyalaya ahilyanagar

B. Preparation of Cissus arbor- tritis powder

To remove the contaminants, the mature leaf were gathered and given a complete water wash. The leaf were broken down into tiny bits and dried for a week in the shadow. The dried material was then ground into a coarse powder with a motorized blender

C.Preparation for Extraction:

Take a *Cissus Quandragularis* stem and *Nyctanthes Arbor – Tritis* leaf grind it equally then 0.5 g of *Cissus Quandragularis* stem powder and *Nyctanthes Arbor – Tritis* leaf powder accurately. Take that weighed 0.5 g powder and boil it with 5 ml of water on water bath at 100 °C up to 2 ml extract. Filter the extract using filter paper. Take the both extract we have formulated, mix them together and boiled until they get concentrated until 2 ml

Phytochemical Screening:

1) Test for Alkaloid:

Dragendorff's Test

Dragendorff's test is a qualitative chemical test used for the identification of alkaloids in a sample. In this test, the addition of Dragendorff's reagent to the test solution produces an orange precipitate, which confirms the presence of alkaloids.

2) Flavonoid test:

Shinoda Test

Shinoda test is a qualitative chemical test used for the identification of flavonoids in a sample. In this test, the addition of magnesium turnings and concentrated hydrochloric acid to the extract produces a red color, which confirms the presence of flavonoids.

3) Flavonoid Alkaline Test:

The alkaline reagent test was performed for the identification of flavonoids in the formulation. In this test, a small quantity of the cream extract was treated with sodium hydroxide solution, which produced an intense yellow color.

4) Tannin Test:

The tannin test was performed for the identification of tannins in the sample. In this test, a few drops of ferric chloride solution were added to the extract, and the formation of a greenish-black color confirmed the presence of tannins.

5) Saponin Test:

The saponin test was performed for the identification of saponins in the sample. In this test, the extract was shaken vigorously with distilled water, and the formation of stable persistent foam confirmed the presence of saponins. Formulation of herbal cream.



Fig.3 .Identification Test

Formulation Table

Table no:2 Formulation table

Sr.No	Ingredient	Batch F1	Batch F2	Batch F3	Batch F4	Batch F5
1	<i>Cissus Quadrangularis Extract</i>	0.25 g	0.50 g	0.75 g	1.00 g	1.25 g
2	<i>Nyctanthes Arbor-Tritis Extract</i>	0.25 g	0.50 g	0.75 g	1.00 g	1.25 g
3	Stearic Acid	1.50 g	1.50 g	1.50 g	1.50 g	1.50 g
4	Bees Wax	0.80 g	0.80 g	0.80 g	0.80 g	0.80 g
5	Propyl Paraben	0.02 g	0.02 g	0.02 g	0.02 g	0.02 g
6	Methyl Paraben	0.10 g	0.10 g	0.10 g	0.10 g	0.10 g
7	Propylene Glycol	0.50 g	0.50 g	0.50 g	0.50 g	0.50 g
8	Triethanolamine	0.20 g	0.20 g	0.20 g	0.20 g	0.20 g
9	Coconut Oil	1.30 g	1.30 g	1.30 g	1.30 g	1.30 g
10	Vitamin E	0.20 g	0.20 g	0.20 g	0.20 g	0.20 g
11	Water	q.s to 10 g	q.s to 10 g	q.s to 10 g	q.s to 10 g	q.s to 10 g

Batch F4 is optimized batch.

Evaluation parameters:

1) Physical Appearance :

The physical appearance of the antimicrobial cream was evaluated by observing its color, odor, texture, and overall consistency.

Color: The color of the cream was checked by **visual observation under normal daylight or white light background.**

Odour : The odour of the cream was evaluated by **sensory evaluation (smelling method).**

Consistency: The consistency of the cream was assessed by **tactile examination.**

2) Measurement of pH:

The pH meter was calibrated using standard buffer solutions of pH 4.0, 7.0, and 9.2 to ensure accuracy. A small quantity of the cream was then accurately weighed and dispersed in a measured amount of distilled water to form a uniform suspension. The electrode of the pH meter was rinsed with distilled water and gently blotted dry before immersion into the sample solution. The electrode was then dipped into the prepared dispersion, and the reading was allowed to stabilize.

3) Spreadability: The spreadability of the cream was determined by measuring the time required for two glass slides to slide over each other when a cream sample was placed between them under a specific weight. A fixed amount of cream was placed on one glass slide, and another slide was placed over it. A known weight was applied on the upper slide to form a uniform layer of cream. The time taken for the upper slide to move a fixed distance over the lower slide was recorded.

Spreadability (S) was calculated using the formula:

$$S = (M \times L) / T$$

Where:

S = Spreadability

M = Weight tied to the upper slide

L = Length of glass slide moved

T = Time taken to separate the slides

4) Homogeneity: The homogeneity was evaluated by visually examining the formulation after preparation to ensure uniform distribution of all ingredients. A small quantity of cream was spread on a glass slide and observed for the presence of any lumps, aggregates, or phase separation.

5) Stability Test:

The stability of the cream was evaluated to determine its physical integrity and performance under different storage conditions. The formulated cream was stored at various temperature conditions such as room temperature, refrigeration temperature, and elevated temperature for a specific period of time. The samples were periodically observed for any changes in color, odour, consistency, phase separation, or precipitation.

6) Irritancy Test:

The **irritancy test** is an important evaluation parameter used to determine whether the formulated cream causes any skin irritation such as redness, swelling, itching, or inflammation after application.

8) Washability Test:

The washability test was performed to evaluate the ease with which the formulated antimicrobial cream can be removed from the skin surface using normal tap water. This parameter is important for topical formulations as it reflects user convenience, cleanliness, and patient compliance during routine application.

9) Phase Separation Test:

The phase separation test is performed to determine the physical stability of a cream formulation by checking whether the oil phase and aqueous phase remain uniformly mixed or separate over time under different storage conditions.

10) Zone of Inhibition test:

The zone of inhibition of the antimicrobial cream was determined by the agar well diffusion method. After incubation of the inoculated agar plates, a clear circular area was observed around the sample application site, which indicated inhibition of microbial growth. The diameter of the zone of inhibition was measured in millimeters and used to evaluate the antimicrobial effectiveness of the formulated cream. A larger zone of inhibition indicated higher antimicrobial activity of the prepared formulation. The antifungal activity of the prepared antimicrobial cream was evaluated against *Candida albicans* by measuring the zone of inhibition using the agar diffusion method.

Anti-arthritis testing study:

Method: Protein Denaturation Inhibition Method

Media:

Phosphate Buffer (pH 6.3) Bovine Serum Albumin (BSA)

Test Sample:

Herbal Anti-Arthritic Cream Containing *Cissus quadrangularis* and *Nyctanthes arbor-tristis* Extracts

Incubation Temperature & time:

Temperature & Time: Temperature: 37°C Time: 20 minutes

Standard Drug:

Diclofenac Sodium

Result:**Phytochemical analysis of extract****Table no: 3 Phytochemical study**

Sr. no	Test	Observation	Inference
1	Alkaloid	Orange color is observed	Alkaloid is present
2	Flavonoid	Reddish brown precipitate was observed	Flavonoid is present
3	Flavonoid Alkaline	Yellow color precipitate was observed	Flavonoid is present
4	Tannin	Greenish black precipitate observed	Tannin is present
5	Saponin	Foam was formed	Saponin is Present

Evaluation of herbal Cream

1. Physical Evaluation of cream

The physical appearance of the anti-arthritis cream was evaluated by observing its color, odor, texture, and overall consistency.

Table no: 4 Physical evaluation

Formulation	Colour	Consistency	Odour
F1	Dark cream colour	Poor	Characteristic
F2	Cream Colour	Moderate	Characteristic
F3	Cream Colour	Good	Characteristic
F4	Cream Colour	Smooth	Characteristic
F5	Cream Colour	Moderate	Characteristic

2. Measurement of pH

The pH meter was calibrated using standard buffer solutions of pH 4.0, 7.0, and 9.2 to ensure accuracy.

Table no: 5 Measurement of pH

Formulation	pH
F1	4.5
F2	4.7
F3	4.7
F4	6.7
F5	5.2

1. Spreadability Test

Formula

$$S = M \times L / T$$

Where:

S = Spreadability

M = Weight tied to upper slide (50 g)

L = Length moved by slide (6 cm)

T = Time taken (5 sec)

Calculation

$$S = 50 \times 6/5 = 60 \text{ g.cm/sec}$$

Result

Spreadability = 60 g . cm/sec

Observation

The formulated 10 g herbal anti-arthritis cream showed good spreadability and smooth application on the glass slide.

2. Washability Test

Table no: 6 Washability test

Formulation	Observation
F1	Easily Washable
F2	Easily Washable
F3	Easily Washable
F4	Easily Washable
F5	Easily Washable

3. Phase Separation Test

Table no: 7 Phase separation study

Formulation	Observation
F1	No Phase Separation
F2	No Phase Separation
F3	No Phase Separation
F4	No Phase Separation
F5	No Phase Separation

4. Irritancy Test

Table no: 8 Irritancy study

Sr. No	Parameter	Observation
1	Irritation	No
2	Mild Dryness	No
3	Swelling	No
4	Itching	Yes
5	Redness	No

Anti-arthritis testing study:

The anti-arthritis activity of the formulated herbal cream was evaluated using the protein denaturation inhibition method. Five batches were prepared and tested, and the percentage inhibition of protein denaturation was recorded.

Table no: 9 Anti-arthritis activity

Batches	Extract %	% of inhibition
F1	1%	42-45%
F2	2%	55-58%
F3	5%	74-77%
F4	7%	70-73%
F5	10%	66-69%

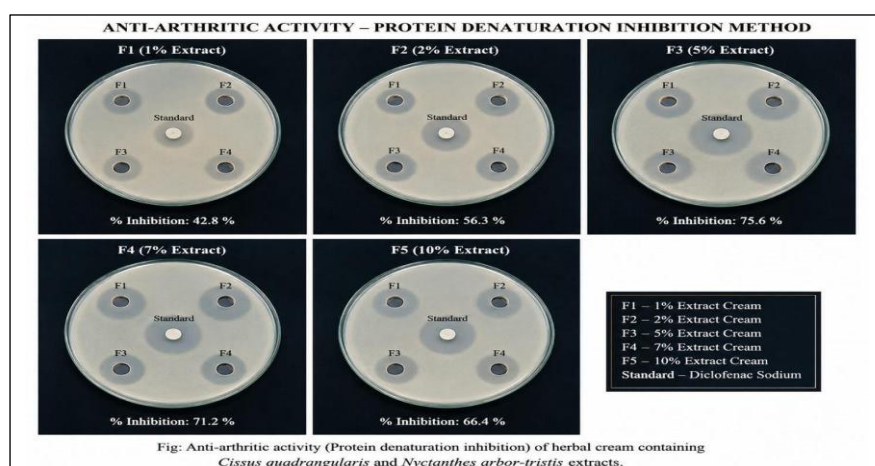


Figure no: 4. Anti-arthritis activity

DISSCUSION:

The present study focused on the formulation and evaluation of an anti-arthritis herbal cream containing extracts of *Cissus quadrangularis* and *Nyctanthes arbor-tristis*. Herbal formulations have gained significant attention due to their safety, effectiveness, and reduced side effects compared to conventional therapies. The selected plant extracts are well known for their anti-inflammatory, analgesic, and antioxidant properties, making them suitable candidates for the management of arthritis.

Preliminary phytochemical screening of the extracts revealed the presence of flavonoids, phenolic compounds, tannins, alkaloids, and glycosides. These bioactive constituents are reported to exhibit anti-inflammatory activity by inhibiting inflammatory mediators and reducing oxidative stress. The presence of these phytoconstituents may be responsible for the observed therapeutic potential of the formulated cream.

The prepared cream exhibited satisfactory physicochemical properties including smooth texture, homogeneity, good consistency, acceptable pH, and ease of application. No phase separation, grittiness, or skin irritation was observed during evaluation. The spreadability, washability, and extrudability studies confirmed that the formulation was suitable for topical administration.

The anti-inflammatory and anti-arthritis evaluation demonstrated promising activity of the formulated cream. The results suggest that the synergistic action of *Cissus quadrangularis* and *Nyctanthes arbor-tristis* extracts contributes to the reduction of inflammation and pain associated with arthritic conditions. Stability studies indicated that the formulation remained stable under storage conditions without significant changes in appearance, pH, consistency, or homogeneity. Overall, the developed herbal cream showed good pharmaceutical characteristics and potential anti-arthritis efficacy.

CONCLUSION:

From the present study, it was concluded that the anti-arthritis cream containing *Cissus quadrangularis* and *Nyctanthes arbor-tristis* extracts was successfully formulated and evaluated using suitable pharmaceutical excipients. The prepared cream exhibited satisfactory physicochemical properties such as smooth texture, good consistency, homogeneity, acceptable pH, spreadability, washability, and stability.

The formulation demonstrated promising anti-inflammatory and anti-arthritis activity, which may be attributed to the presence of bioactive phytoconstituents such as flavonoids, phenolic compounds, tannins, and glycosides in the plant extracts. The cream was found to be safe for topical application and showed no signs of irritation.

Therefore, the developed herbal anti-arthritis cream may serve as a safe, effective, and economical alternative for the management of arthritis and associated inflammatory conditions. Further preclinical and clinical studies are recommended to establish its therapeutic efficacy and long-term safety.

REFERENCES:

1. Rajasekaran A., Govindarjan A., Ramasamy A. (2016), "Formulation and Evaluation of Topical Herbal Gel for the Treatment of Arthritis in Animal Model." *Brazilian Journal of Pharmaceutical Sciences*, 52(3), pp. 493–507.
2. Neha Rana, Piyush Gupta, Vijender Singh, Mohammed Ali. (2023), "Investigating Antiarthritic Potential of Polyherbal Emulgel." *Journal of Ayurveda and Integrative Medicine*, 14(6), Article 100828.
3. Mahendra A. Giri, Rasika D. Bhalke. , (2019). "Formulation and Evaluation of Topical Anti-Inflammatory Herbal Gel." *Asian Journal of Pharmaceutical and Clinical Research*, 12(7), pp. 252–255.
4. Pratyush Jain, Anjana Bhardwaj, Alok Pal Jain. , (2019). "Formulation and Evaluation of Etoricoxib Herbal Gel for Analgesic Activity." *Journal of Drug Delivery and Therapeutics*, 9(2), pp. 628–631.
5. Neha Rana, Piyush Gupta, Vijender Singh, Mohammed Ali. , (2023). "Formulation, In-Vitro and In-Vivo Evaluation of Polyherbal Emulgel for Rheumatoid Arthritis." *Journal of Ayurveda and Integrative Medicine*, 14(6), Article 100828.
6. Khatoon S., Hossain M.S., Islam M.S. (2019). "Analysis of Anti-Rheumatic Activity of *Nyctanthes arbor-tristis* via In Vivo and Pharmacovigilance Approaches." *Frontiers in Pharmacology*, 10(1).
7. Sasmal P., Das A., Roy S. (2021). "*Nyctanthes arbor-tristis*: A Traditional Herbal Plant with Miraculous Potential in Medicine." *International Journal of Botany Studies*, 6(3),
8. Verma R., Sharma N., Singh P. (2023). "A Review on *Nyctanthes arbor-tristis* Leaves: A Potential Medicinal Plant." *Molecules*, 28(4),
9. Sharma M., Patel P., Yadav R. (2022). "Formulation and Evaluation of Herbal Cream Containing *Nyctanthes arbor-tristis*." *WJPMR*, 8(7),
10. Prasad K., Kumar A., Patil S., (2022), "In vitro anti-arthritic activity of *Cissus quadrangularis* stem extract", *WJPMR*, 8(5)

