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Formulation and Development of Anti-Arthritic Tablet from Nyctanthes arbor-tristis Leaves

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ABSTRACT:

The present study focuses on the formulation and development of an anti-arthritic tablet using Nyctanthes arbor-tristis (commonly known as Night Jasmine or Parijat) leaf extract, which has been traditionally employed in Ayurvedic medicine for its potent anti-inflammatory and analgesic properties. Arthritis, particularly osteoarthritis and rheumatoid arthritis, remains a prevalent global health challenge characterized by chronic inflammation, joint stiffness, and pain. While conventional therapies provide symptomatic relief, they are often associated with side effects upon prolonged use, necessitating safer herbal alternatives. In this study, fresh leaves of Nyctanthes arbor-tristis were collected, shade-dried, coarsely powdered, and subjected to aqueous extraction. The extract was then standardized and used for tablet formulation employing the wet granulation technique. A combination of pharmaceutical excipients such as microcrystalline cellulose, starch, talc, lactose, and magnesium stearate was utilized for optimal flow, compressibility, and tablet stability.

Keywords: Nyctanthes arbor-tristis, Anti-arthritic, Herbal tablet, Wet granulation, Dissolution, Disintegration

Introduction:

Arthritis, a chronic inflammatory joint disorder, affects millions globally, leading to joint pain, stiffness, and reduced mobility. Conventional synthetic drugs for arthritis often cause gastrointestinal and renal side effects, creating a need for safer, plant-based alternatives. Nyctanthes arbor-tristis, commonly known as Night Jasmine or Parijat, is traditionally used in Ayurvedic medicine for treating various inflammatory disorders. Its leaves possess proven anti-inflammatory and analgesic properties, attributed to active compounds like iridoid glycosides and flavonoids. This research focuses on the formulation and evaluation of anti-arthritic tablets developed from Nyctanthes arbor-tristis leaf extract.

Objectives:

The primary objective of this study is to formulate and develop an effective anti-arthritic tablet using the aqueous extract of Nyctanthes arbor-tristis leaves. This includes: Extraction and standardization of active constituents from Nyctanthes leaves. Granulation and formulation of herbal tablets using suitable excipients. Evaluation of physical parameters such as disintegration time, dissolution profile, and weight variation. Establishing the feasibility of Nyctanthes-based herbal formulation for anti-arthritic therapy.

Materials and Methods:

1. Extraction of Nyctanthes arbor-tristis Leaves:

Fresh leaves were collected, washed thoroughly, and shade dried for 7–10 days. The dried leaves were coarsely powdered and subjected to aqueous extraction using the maceration technique for 48 hours. The extract was filtered and concentrated using a rotary evaporator, then dried at 40°C to obtain a semi-solid extract.

Ingredient Table:

S. No.	Ingredient	Quantity per Tablet (mg)	Total Quantity for 100 Tablets (g)	Function
1	Nyctanthes arbor-tristis Extract	200	20.0 g	Active pharmaceutical ingredient (API)
2	Microcrystalline Cellulose (MCC)	100	10.0 g	Diluent / Binder
3	Starch (Binder + Disintegrant)	80	8.0 g	Binder / Disintegrant
4	Lactose Monohydrate	95	9.5 g	Filler
5	Talc	15	1.5 g	Glidant
6	Magnesium Stearate	10	1.0 g	Lubricant
Total		500 mg	50.0 g	

2. Steps of Granulation:

2.1 Standardization of Extract:

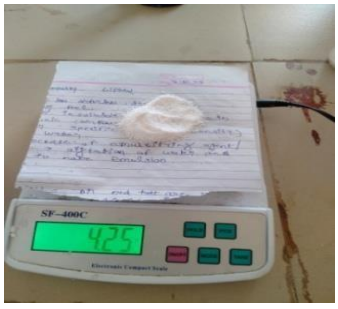
The extract was standardized based on total phenolic content and flavonoid content using spectrophotometric methods to ensure batch-to-batch consistency.

2.2 Formulation of Granules:

Step1:Weighing and Mixing

Required quantities of extract, microcrystalline cellulose (as diluent), starch (as disintegrant), and talc (as lubricant) were accurately weighed and mixed uniformly.

Fig:1.1 Weighing of ingredient



Step 2: Binder Preparation

A 5% starch paste was prepared by heating starch in distilled water. This acted as the binding agent.

Step 3: Granulation

The dry mix was blended with starch paste to form a wet mass.

Step 4: Wet Sieving

The wet mass was passed through sieve no. 12 to form uniform granules.

Step 5: Drying

Granules were dried in a hot air oven at 45°C for 1 hour.

Step 6: Sieving

Dried granules were passed through sieve no. 20 to ensure uniform particle size.

Fig:1.2 compression of tablet

Step 7: Final Blending
Magnesium stearate and talc were added to the granules and mixed thoroughly.
Step 8: Compression of Tablet
The final blend was compressed into tablets using a single punch tablet compression machine.

Fig;1.3 final product after punching

Evaluation of Tablets:

The formulated anti-arthritic tablets were evaluated for various physical parameters as per standard pharmacopoeia guidelines:

1. Disintegration Test:

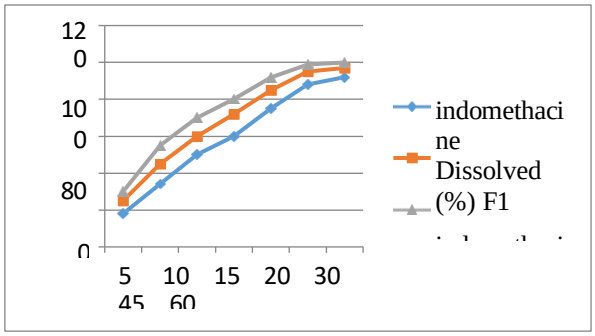
The disintegration time was determined using a USP disintegration test apparatus. Six tablets were placed in each tube, and the basket rack was positioned in a beaker containing distilled water at 37±0.5°C. The tablets disintegrated within 8–10 minutes.

Fig:1.4 Disintegration Test

Test	**Formulation**			
	F1	**F2**	**F3**	**Reference**
Disintegration test(minute)	**11.6**	**11.45**	**12.36**	**11.8**

2. Dissolution Test:

The dissolution study was carried out using USP Type II (paddle) apparatus. The medium used was phosphate buffer (pH 6.8) maintained at 37±0.5°C. The paddle was rotated at 50 rpm. Samples were withdrawn at 5, 10, 15, 30, and 45 minutes and analyzed using a UV spectrophotometer. The cumulative drug release was found to be more than 85% within 30 minutes.



3. Weight Variation Test:

Twenty tablets were randomly selected and weighed individually. The average weight was calculated, and the percent deviation from the average was determined. All tablets passed the test, indicating uniformity of weight within acceptable limits (±5%).

Fig:1.5 weight variation test

Test	**Formulation**			
	F1	**F2**	**F3**	**Reference**
Weight variation	**0.015gm**	**0.019mg**	**0.021mg**	**0.0183(±0.03)**

Results:

The formulated anti-arthritic tablets showed acceptable physical characteristics. The disintegration time was within 10 minutes, and the dissolution profile exhibited more than 85% drug release within 30 minutes. The weight variation was within pharmacopeial limits, indicating uniformity of tablet content and formulation stability.

Conclusion:

The study successfully developed an anti-arthritic tablet formulation using Nyctanthes arbor-tristis leaf extract. All evaluation parameters were within acceptable limits, demonstrating the effectiveness of the formulation. This herbal formulation presents a promising natural alternative for managing arthritis and warrants further in vivo and clinical evaluation.

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