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Research Paper

Formulation And Evaluation of Harbel Gel of *Berberis Aristata* for Anti-Psoriatic Activity

Nida Parveen, Dr. Sanjeev Kumar Saini

Department of Pharmacy, Bareilly International University, Bareilly (U.P.)

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ABSTRACT

Introduction: Psoriasis is a widespread chronic disease affecting 1-3% of total population and in most cases, treated by topical application of creams & gels. The oral route is evidence for harsh side effects because of systemic immuno suppression which can be avoided by topical route. Though, the topical route is very demanding because of the physicochemical nature of diseased stratum corneum and so no, single treatment works for every patient. **Method:** Berberis aristata loaded herbal gel was formulated by modified techniques and characterized by pH, stability, spreadability, viscosity, skin irritation, gelling property. Other formulations like ointment and cream are available in the market for the treatment of psoriasis so we prepared the gel which is not available in the market as it is most convenient to apply and cost-effective as it is herbal. **Result:** The gel was made using the fusion method, which ensured that the herbal extract and gel base were mixed uniformly and remained stable throughout storage. It helps to enhance spreadability, adhesion, viscosity and provides stability. The gel was made using the fusion method, which ensured that the herbal extract and gel base were mixed uniformly and remained stable throughout storage. It helps to enhance spreadability, adhesion, viscosity and provides stability. **Conclusion:** The present research work shows that, herbal gel of B. aristata is having effective antipsoriatic activity because of the presence of constituent berberine which has been proved on the basis of different evaluation parameters for gel. Gel was evaluated for different parameters such as appearance, feel on application, pH, and viscosity. It has concluded that the above-selected formulation was stable, effective and convenient with pleasant organoleptic properties.

INTRODUCTION

An autoimmune chronic skin condition known as psoriasis is characterized by well-defined, mildly elevated, dry, erythematous macules with silvery

***Corresponding Author:** Nida Parveen

Address: Department of Pharmacy, Bareilly International University, Bareilly (U.P.).

Email ✉: nida215788@gmail.com

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scales. The disease is estimated to afflict 2% of people in all age groups and both sexes, according to the modern medical system ^[1]. Psoriasis as diagnosed by modern medicine is compared to and recognised as Kibha from Ayurvedic literature. According to the traditional medical model, psoriasis is classified as a papulosquamous condition with scaly papules and plaques as a morphological hallmark. An autoimmune skin condition known as psoriasis causes excessive skin growth. The term "psoriasis" is derived from the Greek word "Psora" (spelt sora), which meaning "itch" whereas "Lepra" is derived from the Greek words "lopos" (the epidermis) and "lepo" (to scale) ^[2]. On the scalp, elbow, knees, lumbo-sacral region, and in the folds of the body, psoriatic lesions are distributed symmetrically ^[3]. Epidermal hyperplasia, excessive inflammatory cell infiltration into the dermis, and neovascularization are the hallmarks of the chronic, immune-mediated inflammatory dermatosis known as psoriasis. The scalp, trunk, extensor surfaces of the limbs, and the genital region are among the areas with the clinical appearance of erythematous scaly rash patches (itching and flaking skin). The prevalence rate is 2% to 3% worldwide ^[4].



Fig 1: Psoriasis

Psoriasis is influenced by a number of variables, including genetics, inflammation, metabolism, autoimmune, environment, and infection ^[5]. Skin flakiness and scale formation are symptoms of the

skin disorder psoriasis. On skin that is brown, black, or white, the patches may appear pink or red and the scales may be white or silvery. On black and brown skin, the scales may seem gray and the patches may also appear purple or dark brown. Although they can grow anywhere on your body, these patches typically develop on your knees, elbows, scalp, and lower back ^[6].

Symptoms of Psoriasis: Dry, scale-covered skin patches are a common symptom of psoriasis. The patches may seem pink or red and the scales may be white or silvery on skin that is dark, black, or white. Some patients have experience itching or soreness as a result of psoriasis.

Types of Psoriasis: The different types of psoriasis are; Plaque psoriasis (psoriasis vulgaris), scalp psoriasis, nail psoriasis, guttate psoriasis, inverse (flexural) psoriasis, Erythrodermic psoriasis and pustular psoriasis (Generalized pustular psoriasis or von Zumbusch psoriasis and Palmoplantar pustulosis) ^[9,10,11,12].

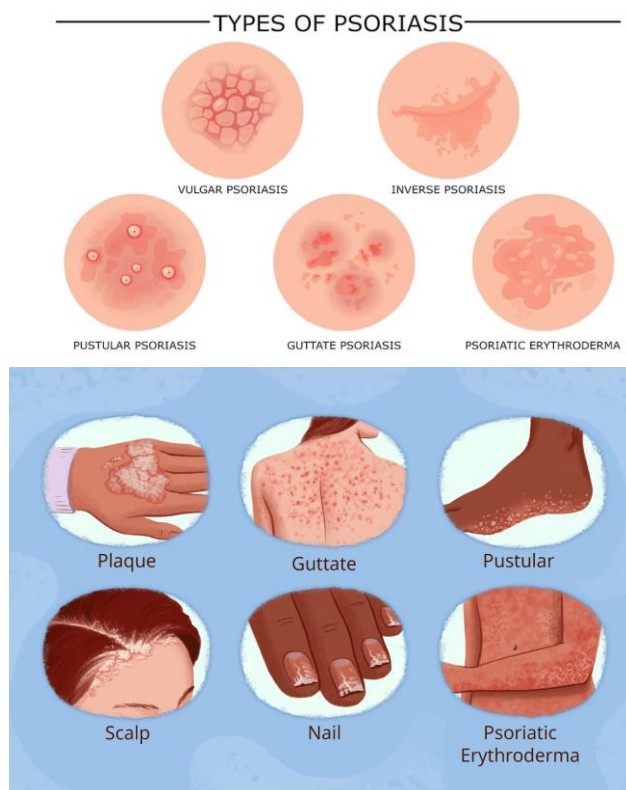


Fig 2: Types of Psoriasis

Herbs used in psoriasis:

Herbs used in psoriasis:-

- *Berberis aristata*
- *Mahonia aquifolium* (Oregon Grape)
- *Indigo naturalis*
- *Aloe vera*
- Apple cider vinegar
- neem
- extracts of sweet whey
- capsaicin
- curcumin
- witch hazel
- licorice extract
- dandelion tea
- *Trigonella arabica*
- *Catharanthus roseus*
- *Anthemis cotula*

1.2 BERBERIS ARISTATA

Berberis aristata commonly known as “**Daru haldi and chitra**” or **Tree turmeric** is a spinous shrub native to the northern Himalayan region. *Berberis aristata*, (family-Berberidaceae) plant is intended to be used in the herbal formulations because of its potent anti psoriatic action (anti inflammatory) due to the presence of active compound berberine. In Ayurveda it's known as **Daruharidra** which means plant having **yellow wood and flowers** ^[14]. Other synonyms of Daru haridra are Kusumbhala (flowers are utilized in making yellow dye), Katankateri, Kantakini (leaves have spinato's margin), Vishodhini (work as purifier), Krimihara (act as anthelmintic) and Pachampacha (improves liver functions).



Fig 3: Bark of *Berberis aristata*

B. aristata contains isoquinoline alkaloids mainly berberine which is responsible for anti-psoriatic activity. Other phytoconstituents includes oxyberberine, berbamine, aromaline, kakrachine, palmatine, oxycanthine, taxilamine, and jatrorrhizine, some of the alkaloids are reported as being found in the chloride salt form.

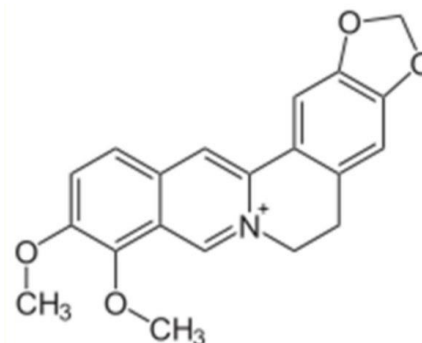


Fig 4: Structure of berberine

1.2.3 Botanical description

It is an erect spiny shrub, ranging between 2 and 3 meters in height wood, hard and yellow; bark, yellow to brown from outside and deep yellow from inside, removable in longitudinal strips by hand; spines (which, in fact, are modified leaves), three-branched and 1.5 cm long. The bark is covered with three-branched thorns, which are modified leaves, and can be removed by hand in longitudinal strips.

1.3 GEL

Topical gels are semi solid homogeneous preparation used to cure and treat topical diseases.

Gels are more hydrophilic in nature so the rate of released drug or active ingredient was fast. A gel consists of two components; three dimensional cross linked material which contains proportionally large amounts of liquid medium to form an adequate rigid network which immobilized the liquid continuous phase. Inorganic particles and organic macromolecules both are used to form a structural network of gel. In chemical gel the particles are associated with permanent covalent bonding while physical topical gels are associated by weaker and reversible secondary intermolecular forces like hydrogen bonding, electrostatic interactions, hydrophobic interaction and Van Der Waals forces [25, 26].

1.3.2 Method for Preparation of Gel

There are 3 methods for preparation of gels.

1. **Fusion method:-** In this method the vehicles, gelling agents, additives and drug are blended at high temperature until a semi solid texture is formed.

2. **Cold method:-** In this method all the components excluding drug or active pharmaceutical ingredients are heated and blended simultaneously and then lower the temperature of formulation, then add drug and again blending was started until the gel was not formed.

3. **Dispersion method:-** In this method the gelling agent is stirred with water until the gelling agent swells up and then the drug is dissolved in medium and incorporated into it. Add a buffer solution to adjust the pH of the gel if necessary (**the method used for the formulation of gel for the treatment of psoriasis**).

3. MATERIALS AND METHODS

Table I: Role of excipients

Ingredients	Role of excipients
<i>Berberis aristata</i>	Active pharmaceutical ingredient

Xanthan gum	Thickening or gelling agent
Propylene Glycol	Humectant
Triethanolamine	pH stabilizer
Methyl paraben and Propyl paraben	Preservatives
Vitamin E oil	Moisturizer
Glycerine	Lubricant & humectant
Tea Tree Oil	Essential oil, provide soothing relief for aches, pains
Santalum album	It is sandalwood powder, used as coloring agent, perfume

3.2 METHODS

3.2.1 Collection of Bark of *Berberis aristata* and excipients: The bark of *Berberis aristata* is collected from the nearby nursery, Bareilly while the excipients are collected from SRMS CET (Pharmacy), Bareilly.

3.2.2 Extraction of *B. aristata*: The method used for extraction of mahonia *B. aristata* from it's bark is **ethanolic extraction of *Berberis aristata***. It is done in following steps ^[36]:

Dissolve berberis bark in ethanol (100 ml) in water bath and heat it for 1 hour



Filter the solution after 1 hour heating



Re-extract the bark in 50 ml ethanol for 2 consecutive times for 30 minutes respectively



Filter the above solution separately



Combine all 3 filtrates and concentrate it upto 50 ml by heating.

3.2.3 Preformulation studies of the Berberis extract:

Preformulation studies are needed to ensure the development of a stable as well as effective and safe dosage form. It is a stage of development



during which the pharmacist characterizes the physico-chemical properties of the drug substances and its interaction with various formulation components [37].

Goals of Preformulation study:

- To determine the necessary physicochemical parameter of a new drug substance.
- To establish its incompatibility with excipients of formulation.

The preformulation studies of *Berberis aristata* extract includes;

1. Solubility: The solubility of *Berberis aristata* extract depends on the specific solvent used and the concentration of the extract. The solubility can be determined by dissolving the extract in different solvents like water, ethanol, methanol and non-polar solvents like chloroform and ether.

2. pH:- The pH of *Berberis aristata* extract can be measured using a **pH meter** or **pH indicator paper**. The extract can be diluted in water or another suitable solvent to obtain a pH measurement. Typically, *Berberis aristata* extract has a slightly acidic to neutral pH, ranging from around 5.5 to 7.5.

3. Drug compatibility- Drug compatibility can be determined by keeping the mixture of the drug extract and xanthan gum for 30 days in a container.

4. UV spectroscopy:- UV spectroscopy is a commonly used analytical technique in preformulation studies of compounds. It provides valuable information about the electronic structure and functional groups present in the compound. Here are some of the key things that can be determined from UV spectroscopy by taking ethanol water as reference in preformulation studies is;

- Absorption maxima
- Beer's law limit

Preparation of Gel for the treatment of psoriasis:

The gel for the treatment of psoriasis is prepared with the help of **dispersion method** is as follows; Accurately weigh xanthan gum, taken in a beaker (labeled it as B1) and dispersed in 100 ml distilled water.

Keep aside the above B1 beaker to swell xanthan gum for half an hour and then stir it with a magnetic stirrer for another 30 minutes.



Take 5 ml propylene glycol and the required quantity of extract in another beaker and label the beaker as B2.



Again take 5 ml propylene glycol in another beaker labeled as B3 and add propylparaben, methyl paraben, triethanolamine and glycerine with proper stirring.



Now, add the ingredients of B2 and B3 to B1 with continuous stirring and lastly add vitamin E oil, tea tree oil, sandalwood and perfume to it with proper mixing.



Finally, transfer the prepared gel in a suitable container and label it.

Table II: Ingredients used for preparation of gel (100 ml)

S. No.	Ingredients	Quantity for F1 batch	Quantity for F2 batch
1.	Berberis aristata extract	1 ml	2 ml
2.	Xanthan gum	1 gm	1.5 gm
3.	Propylene Glycol	10 ml	10 ml
4.	Methyl paraben	0.2 g	0.2 g
5.	Propyl paraben	0.5 g	0.5g
6.	Triethanolamine	0.5 ml	1 ml
7.	Glycerine	0.5 ml	1 ml
8.	Vitamin E oil	0.5 ml	0.5 ml
9.	Tea tree oil	0.5 ml	0.5 ml
10.	Santalum album powder	q.s.	q.s.
11.	Distilled water	upto 100 ml	upto 100ml
12.	Perfume	q.s.	q.s.



4. EVALUATION

The evaluation parameters of the anti-psoriatic gel of *B. aristata* are;

1. Physical Parameters: It includes color, odor, homogeneity (degree of uniformity of the content of extract), phase separation and grittiness and these can be determined by **visual inspection in presence of light**.

2. pH- The pH can be calculated with the help of a **digital pH meter**. pH of the gels were determined by a digital pH meter by dipping the glass electrode entirely into the formulation to cover the electrode.

3. Viscosity (Brookfield viscometer)- Brookfield viscometer (Spindle type, S-62) at 10 rpm was used to determine viscosity of gel. The spindle of the **brookfield viscometer** was a dipped beaker containing 100g of gel. Run the instrument for 5 minutes and reading was noted in cps.

4. Stability- The stability can be determined by **visual observation** by observing its appearance over time (at least for 30 days).

5. Spreadability- The gel was transferred on a glass slide and covered with an equivalent slide. The slides are placed in such a way that gel is

sandwiched up to 7.5 cm. A weight of 50g was placed over the upper slide which helped in forming a uniform thin layer. The weight was removed and excess adhering gel was wiped. After that 20 g weight was coupled carefully to the upper slide. Time taken to travel a distance of 7.5 cm by upper slide under influence of weight was recorded. The procedure was repeated thrice and the mean was calculated. The following formula was used to determine spreadability.

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

Where, S - Spreadability

M - Weight coupled to the upper slide (50 g)

L - Length of the glass slide (7.5 cm)

T- Time taken to separate the slides in seconds

6. Skin irritation- This can be tested by applying the gel on a specific area of the skin and is monitored for several hours.

7. Gelling property - It can be determined by visual inspection of thickness of gel.

RESULT AND DISCUSSION

5.1 RESULT OF PREFORMULATION STUDIES OF BERBERIS EXTRACT

Table III: Result of Preformulation Studies of Berberis aristata extract

S. No.	Preformulation Parameter	Result
1.	Solubility	Berberine (the main constituent for anti-psoriatic activity) from Berberis aristata extract is soluble in water, ethanol, and methanol but has limited solubility in non-polar solvents such as chloroform or ether
2.	pH	6
3.	Drug compatibility	No color or odor change
4	UV Spectroscopy ● Absorption maxima ● Beer's law limit	350 nm 5-25 µg/ml

RESULT OF EVALUATION OF ANTI-PSORIATIC GEL

Table IV: Result of Anti-psoriatic gel

S.No.	Evaluation Parameters	F1 batch	F2 batch
1	Physical Parameters ● Color	Yellow-orange color	



	● Odor ● Homogeneity ● Phase Separation ● Grittiness	Alcoholic smell Partially homogeneous No Yes	Yellow-orange color Lemon lime alcoholic Homogeneous No No
2	pH	5.8	6
3	Viscosity	1310 centipoise	1320 centipoise
4	Stability	Not stable	Stable at room temperature
5	Spreadability	49.50 g.cm/sec	55.50 g.cm/sec
6	Skin Irritation	No irritation	No irritation
7	Gelling	Bad	Good

Hence, the formulation F2 found to be more appropriate, optimized, effective and better than F1 preparation as it has all the properties which are required for optimum topical gel preparation.

CONCLUSION

Psoriasis is a most common long lasting chronic autoimmune inflammatory skin disease. Topical approaches are the best way to cure such inflammatory diseases. In today's scenario, natural remedies are more acceptable in the belief that they are safer with fewer side effects than synthetic ones. So, the herbal anti-psoriatic formulation is safe, effective and improves patient compliance. The present study has undertaken to formulate and evaluate the herbal gel formulation prepared from ethanolic extract of bark of *B. aristata* for the treatment of psoriasis. Berberis has been utilized for its several therapeutic characteristics, including antibacterial, antifungal, and anti-inflammatory ones, since ancient times. As a result, this gel may be used as a simple dose form to make effective use of these medicinal characteristics. The gel was made using the fusion method, which ensured that the herbal extract and gel base were mixed uniformly and remained stable throughout storage. It helps to enhance spreadability, adhesion, viscosity and provides stability. Thus, the present research work shows that, herbal gel of *B. aristata* is having effective antipsoriatic activity because of the presence of constituent berberine which has been proved on the basis of different evaluation

parameters for gel. Gel was evaluated for different parameters such as appearance, feel on application, pH, and viscosity. It has concluded that the above-selected formulation was stable, effective and convenient with pleasant organoleptic properties. It can also be concluded that the proper selection of polymers and drugs is a prerequisite for designing and developing a transversal drug delivery. Xanthan gum based gel proved to have good homogeneity, no skin irritation, and good stability with significant anti-inflammatory activity. The batch F2 has been found to have better and more effective anti-psoriatic activity than the F1 batch.

REFERENCES

1. Non communicable diseases and their risk factors [homepage on the Internet]; [cited 2018 Feb 01]. Available from: <http://www.who.int/ncds/management/psoriasis/en/>.
2. Fox H (1915) Dermatology of the ancients. JAMA 65: 469.
3. Boehncke, W. H., & Schön, M. P. (2015). Psoriasis. The Lancet, 386(9997), 983-994.
4. Langley, R. G., & Krueger, G. G. (2015). Psoriasis: epidemiology, clinical features, and quality of life. Annals of the Rheumatic Diseases, 64(suppl 2), ii18-ii23.
5. Menter, A., Gottlieb, A., Feldman, S. R., Van Voorhees, A. S., Leonardi, C. L., Gordon, K. B., ... & Bhushan, R. (2008). Guidelines of



- care for the management of psoriasis and psoriatic arthritis: Section 1. Overview of psoriasis and guidelines of care for the treatment of psoriasis with biologics. *Journal of the American Academy of Dermatology*, 58(5), 826-850.
6. National Psoriasis Foundation. (2021). About Psoriasis. Retrieved from <https://www.psoriasis.org/about-psoriasis/>
 7. Schön, M. P., & Boehncke, W. H. (2015). Psoriasis. *New England Journal of Medicine*, 373(16), 1574-1575.
 8. Lowes, M. A., Suárez-Fariñas, M., & Krueger, J. G. (2014). Immunology of psoriasis. *Annual Review of Immunology*, 32, 227-255.
 9. Ortonne, J.; Chimenti, S.; Luger, T.; Puig, L.; Reid, F.; Trueb, R.M. Scalp psoriasis: European consensus on grading and treatment algorithm. *J. Eur. Acad. Dermatol. Venereol.* 2009, 23, 1435–1444.
 10. Nestle, F.O.; Kaplan, D.H.; Barker, J. Psoriasis. *N. Engl. J. Med.* 2009, 361, 496–509.
 11. Ko, H.C.; Jwa, S.W.; Song, M.; Kim, M.B.; Kwon, K.S. Clinical course of guttate psoriasis: Long-term follow-up study. *J. Dermatol.* 2010, 37, 894–899.
 12. Martin, B.A.; Chalmers, R.J.; Telfer, N.R. How great is the risk of further psoriasis following a single episode of acute guttate psoriasis? *Arch. Dermatol.* 1996, 132, 717–718.
 13. Rendon Adriana and Schäkel Knut, "Psoriasis Pathogenesis and Treatment", *Int. J. Mol. Sci.* 2019, 20, 1475; doi:10.3390/ijms20061475.
 14. The wealth of India publications and information Directorate. Vol 2 (B); CSIR, Delhi. 1985; Pg no.116-117.
 15. The Ayurvedic pharmacopeia of India, Government of India, Ministry of health and family Welfare department of AYUSH, New Delhi, 2007; 2(I): 34-6.
 16. The Wealth of India Publications and Information Directorate CSIR. New Delhi, 1985; 2:116-117.
 17. Saban SR. Medicinal plant of Chammba, India. 1964; 90: 50-63.
 18. Shah NC, Joshi MC. An Ethnobotanical study of the Kumaon Region of Indian economic botany. 1971; 25:414-422.
 19. Chauhan Narain singh, Medicinal and aromatic plant of Himachal Pradesh, Indus publishing company, New Delhi. 114-116.
 20. Kurian Alice and Sankar M. Ashe. Ed. Prof. KV Peter. Medicinal plant horticulture sciences. Series foreword by Pushpangandan, New India publishing agency, New Delhi, 2007; (2):299-300.
 21. Parmar C and Kaushal MK. *Berberis aristata: Indian: Wild Fruits*. Kalyani Publishers, New Delhi, India. 1982; 10–14.
 22. Rashmi, Rajasekaran A, Pant Jagdish. The genus berberis Linn: a review. *Pharmacognosy review* 2008 Jul-dec; 2(4):368-385.
 23. Berberis [home page on internet] [cited on 2010 Sep 15] available on <http://en.wikipedia.org/wiki/Berberis>
 24. Pushpagandha P. Quality control and standardization method of herbal drugs. [Cited on 2010 sep 2] Available on <http://www.riddhionline.com/quality-control-of-herbaldrugs.html>.

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