RESEARCH ARTICLE

Formulation and Evaluation of Brucine Sulphate Transdermal Patch for Anti-Inflammatory Activity

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ABSTRACT

This study was designed to develop and evaluate a transdermal patch containing brucine sulphate, a herb-based ingredient. Because of its potential to treat a wide range of illnesses with fewer side effects and higher efficacy, herbal medicines are gaining popularity in today's society. Researchers in the field of phytoformulation have shown that there are a lot of benefits to enhancing the pharmacological activity of herbal drugs by creating nano dosage forms such as nanoparticles, nano-capsules, liposomes, nano-emulsion, and transdermal patches. Drugs can be delivered to patients in a regulated manner through transdermal drug delivery systems. It decreases systemic side effects and, in some cases, provides efficacy compared to other dose forms by enabling a consistent blood level profile. Patch preparation done by using naturally occurring polymers. Thickness, moisture content, folding endurance, and content homogeneity are some of the evaluation measures that are carried out. The transdermal patches evaluated successfully. Average weight of patch was 2.65 g, having folding endurance 94 times and pH of patch was 5.69, moisture content was 7.9%.

Keywords: Anti-inflammatory, Transdermal patches, Brucine sulphate, Formulation, Evaluation.

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INTRODUCTION

Brucine sulphate is phytoconstituent having anti-inflammatory activity.[1] Other NSAIDs having side effects like skin irritation and itching.[2] Brucine sulphate is obtained from Strychons nux-vomica tree. As compare to other drugs it has less side effects.[3] Most TDDS methods favour microneedles, drug-loaded patches, backing films, and thermal, mechanical, or electrical ablation.[4] A few transdermal patches are available for the treatment of muscle pain, but most of them include methyl salicylate (Salonpas) or opioids (Fentanyl), which can cause toxicity or respiratory problems.[5] The TDD devices allow for the self-administration of strong drugs while simultaneously increasing therapeutic efficacy.[6] When live tissue is damaged, this condition develops. It includes the four primary symptoms of inflammation: redness, heat, swelling, and pain.[7] More people are aware of the aggressive role that inflammation plays in healing and restorative processes.[8]

MATERIALS AND METHODS

- Polymer Matrix --- Eudragit RS-100, HPMC K4M.
- The drug ---Brucine sulphate (Alkaloid).
- Permeation enhancer --- Propyleneglycol.
- Plasticizer --- Polyethylene glycol 400.
- Solvent --- Methanol and chloroform.

Method of Preparation

Solvent casting method

- The transdermal patch was prepared using solvent casting method. Where the drug (0.1 gm) was weighed and added to the mixture of methanol and chloroform in the ratio of 3:2.
- After that, the given amount of HPMC K4M and Eudragit RS 100 was added into the mixture and stirred continuously.

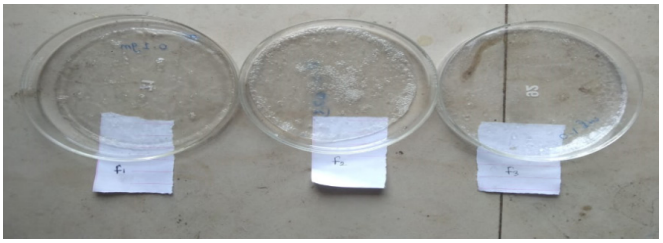

Figure 1: Batches of patch

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Table 1: Formula for transdermal patch

Formula	*Drug (Brucine sulphate) mg*	*HPMC K4M (mg)*	*Eudragit RS100 (mg)*	*PEG400 (% w/w)*	*Propylene glycol (w/w)*	*Methanol: Chloroform (3:2) mL*
F1	100	300	100	2	1	30
F2	100	400	100	2	1	30
F3	100	500	100	2	1	30

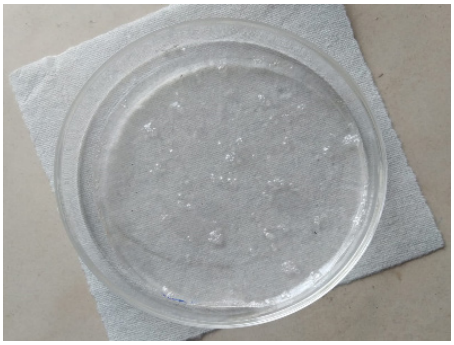

Figure 2 : Physical appearance of the transdermal patch

- Once the HPMC and Eudragit get mixed completely, the drug and PEG 400 and PG are added to the mixture and mixed properly,[9] batches of a patch are displayed in Figure 1.

Formula

The formula for preparation of transdermal patch is given in Table 1.

Evaluation of Transdermal Patch

Physical Appearance

The physical appearance[10] was studied for size, thickness, color and weight (Figure 2).

Size: Diameter: 8.8 cm
Thickness: 0.1 mm
Color: White
Weight: 2.65 gm

Weight variation

Three batches of transdermal patches have been formed and weighed individually.

The average weight of these patches was found to be 2.66 gm.

Folding endurance

Folding endurance of the transdermal patch was 94 times.

Surface pH determination

The pH of the formed transdermal patch was found to be 5.69.

Thickness uniformity

The average thickness uniformity of the transdermal patch was 0.1 mm**.**

%Elongation break test

$$\%elongation = \frac{Final\ length - initial\ length}{initial\ length} \times 100$$

%elongation of prepared patch was found to be 36.66%.

%Moisture content

$$\%Moisture\ content = \frac{Final\ weight - initial\ weight}{initial\ weight} \times 100$$

The percentage moisture content of the transdermal patch was found to be 7.9%

Content uniformity

Content uniformity was studied by using UV spectrophotometer (Table 2, Figure 3).

The graph is plotted for all concentrations to form an equation as Y= m x +C.

Here,
m is slope
Y is absorbance.
x is concentration.

The content uniformity of the patch was found to be 1.009 µg/mL.

RESULT AND DISCUSSION

To sum up, brucine is a powerful chemical isolated from nux vomica that has several medicinal and pharma cological uses,

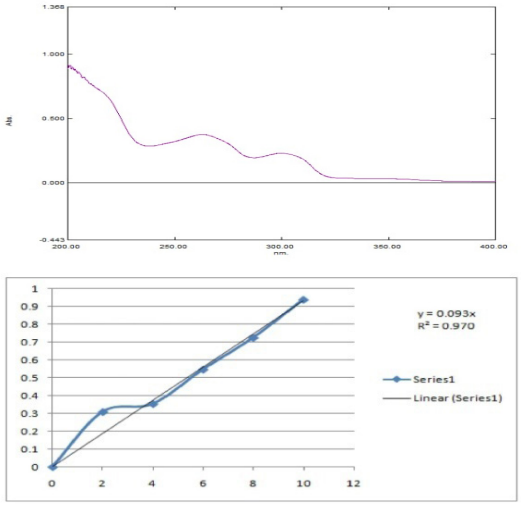

Figure 3 : Graphs obtained during UV-vis spectroscopic study

Table 2: UV-vis spectroscopic study

Concentration (µg/mL)	*Wavelength(nm)*	*Absorbance*
2	311.60	0.309
4	311.60	0.354
6	311.60	0.547
8	311.60	0.725
10	311.60	0.939

including properties that reduce inflammation, alleviate pain, and fight against microbes.[11] Transdermal preparations, such as nanoparticles and liposomes, are among the few brucine formulations available at the moment. Many oral medications have poor bioavailability,[12] while injectables are painful and inconvenient.[13] Transdermal drug administration presents attractive alternatives. Expanding transport capabilities for small compounds are being made possible by first-generation transdermal patches, second-generation chemical enhancers, and iontophoresis.[14] On the other hand, third-generation physical enhancers have the potential to make transdermal delivery of macromolecules and vaccinations a reality. An anti-inflammatory medication with many uses is brucine sulphate.[15] Solvent casting process was used to make three batches of brucine sulphate patches (F1, F2, and F3), and then each of them was tested according to the specified parameters.[16] The popularity and usefulness of this medication delivery method are expected to rise as it offers improved delivery and a wider selection of analgesics.[17]

CONCLUSION

The following evaluation characteristics were confirmed: moisture content, surface pH, percentage elongation break test, folding endurance, weight variation, patch thickness, and surface pH. The obtained results were satisfactory and as a result, it can be concluded that there is still a long way to go before brucine can be used in clinical settings with the same level of safety and efficacy that allows for future research into the compound.

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