SHORT COMMUNICATIONS

FORMULATION AND EVALUATION OF TRANSDERMAL PATCH OF *CARICA PAPAYA*

ABSTRACT

Pharmacological studies have shown that *Carica papaya* possessed anti-inflammatory, antioxidant and wound healing properties. The present study was outlined to extract, formulate and evaluate *C. papaya* transdermal patches. Transdermal patches were made by solvent casting method utilizing HPMC as rate controlling polymer and glycerine as plasticizer. Polysorbate 80 was used as penetration enhancer. It was assessed for various characteristics, such as thickness, surface pH, folding endurance, weight variation, % moisture uptake, % moisture loss and stability studies. The prepared patches showed good folding endurance, hence low chances of patch to break. The thickness, surface pH, weight variation values gave satisfactory results. The % moisture uptake and moisture loss indicated good stability of film. From all evaluation parameters, formulation F2 was finalized as optimized patch. The prepared patches showed satisfactory results.

Keywords: Transdermal, *Carica papaya*, solvent casting, extract

INTRODUCTION

Transdermal drug delivery systems (TDDS) are dosage forms invented to administer a therapeutic medicament through a patient's skin. They are characterized as discrete dosage forms that are applied to skin and releases drugs at a controlled rate into the blood circulation. *Carica papaya* Linn is an herbaceous plant renowned for its therapeutic and nutritional properties worldwide. The principle ingredients in *C. papaya* leaf which are responsible for its medicinal effects encompass alkaloids, saponins, glycosides, tannins and flavonoids. Anti-inflammatory, antifungal, antioxidant, antibacterial and wound healing activities are some of the pharmacological effects of *C. papaya.* This study's primary focus was to develop a novel drug delivery system, specifically a transdermal patch of *C. papaya* for wound healing[1,8,5] .

Preparation of *C. papaya* leaf extract

The fresh leaves of *C. papaya* were procured. The leaves were cleaned, washed, sun dried and made into small pieces. The leaves of *C. papaya* were extracted using (99%) ethanol in Soxhlet extractor for about 2 days. The extracted solution was filtered and concentrated[5].

Composition of transdermal patches

Table I: Composition of transdermal patches

Ingredient	F1	F2	F3
HPMC (mg)	550	600	650
Glycerine (%)	15	15	15
Polysorbate 80 (mg)	30	30	30
Dichloromethane & Methanol (mL)	10	10	10
Alcoholic extract of *C. papaya* (mL)	1.5	1.5	1.5

Fabrication of herbal transdermal patches of *C. papaya* leaf extract

Three batches of transdermal patches were prepared with HPMC (hydroxypropyl methyl cellulose) by solvent evaporation technique (Table I). Weighed quantity of polymer was dissolved in equal mixture of dichloromethane and methanol. Calculated amount of glycerine, Polysorbate 80 and alcoholic extract of drug was added to the above mixture and stirred well until a homogeneous mixture was formed. The resultant mixture was poured into a glass petridish and allowed to air dry at room temperature. The patches were then peeled off and kept in a desiccator for further evaluations[2,3,7].

EVALUATION OF TRANSDERMAL PATCH

Organoleptic evaluation

Organoleptic properties of patch like colour, odour and shape were observed[6].

Uniformity of weight

Uniformity of weight was studied by weighing individually the selected area of (2 cm × 2cm) patches. Each film unit was weighed individually; the average weight was calculated[4,9].

Patch thickness

The thicknesses of the drug-loaded polymeric films were measured at 3 different points using vernier caliper. The average of 3 readings was calculated for each patch[8].

Folding endurance

This was determined by repeatedly folding one film at the same place until it broke. The number of times the film could be folded at the same place without breaking gave the value of folding endurance[1].

Moisture uptake

The pre-weighed film was kept in a vacuum desiccator at room temperature for 24h, taken out and then exposed to 84% relative humidity using a saturated solution of potassium chloride in a vacuum desiccator until a constant weight for the film was obtained. The moisture uptake was then calculated[3].

Surface pH

The patch to be tested was moistened with phosphate buffer pH 7.4 in a petri plate and kept for 30 sec. The pH of formulation was noted after bringing the electrode of pH meter in contact with surface of patch and allowed to equilibrate for 1 min[9].

Moisture loss

The prepared films were weighed individually and kept in a desiccators containing calcium carbonate at room temperature for 24h. The films were weighed again and again individually after specified interval until it showed a constant weight. The moisture content was calculated[3].

Stability studies

Stability studies were conducted according to the ICH guidelines by storing the patch at 40±0.5°C and 75±5% RH for 6 months. The samples were withdrawn at 0, 30, 60, 90 and 180 days and analyzed suitably for the drug content[10].

RESULTS AND DISCUSSION

The prepared patch was circular in shape with faint green colour. The average weight of the patches was determined, and it was in range 0.65 to 0.652 g. Lesser standard deviation value indicates that films were uniform in weight. The uniformity of film thickness is a measure of accuracy of dose in the patch. The patch thickness lay in the range of 0.355 to 0.371mm. Thickness is an important factor as it influences the rate of release of the main constituent as well as efficiency of the patch. The folding endurance value lay in the range of 305 to 315. The measures of folding endurance indicates less chances of measure of patch.

The moisture uptake of formulation was found to be less, which keeps formulation safe from microbial contaminations. Surface pH value of film was in the range of 6.02 to 6.15, which is suitable for topical application. % Moisture loss was determined and ranged from 5.8 to 7.2%, which indicates stability nature of patch. The optimal film F2 was subjected to stability study and further evaluated for its performance like weight variation, folding endurance and surface pH. It did not show much variation.

CONCLUSION

Transdermal patches of *C. papaya* were made by solvent casting method. The prepared patches showed good folding endurance, hence there are low chances of patch to break. The thickness, surface pH, weight variation values gave satisfactory results. The % moisture uptake and moisture loss indicated good stability of film. From all evaluation parameters, formulation F2 was finalized as optimized patch. The stability studies for F2 did not show much variation. Further studies are required to investigate this formulation for its performance.

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