

Formulation and Evaluation of Transdermal Films of Terbutaline Sulphate

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Transdermal Films of Terbutaline Sulphate were Formulated using various polymers like HPMC, Sod. CMC, Cellulose Acetate and Ethyl cellulose. The drug release pattern, stability and skin irritancy of these films were studied.

TRANSDERMAL drug delivery systems provided means to deliver medication to systemic circulation in a convenient and effective way as compared to conventional dosage forms. Terbutaline sulphate is widely used in the treatment of Asthma. In the present study, an attempt is being made to formulate polymer Matrix type transermal films containing Terbutaline sulphate.

EXPERIMENTAL

Terbutaline sulphate USP (Astra - IDL Bangalore), HPMC and Sod CMC (Rohm and Haas laboratory, Bombay), Cellulose Acetate, Ethyl cellulose and PEG-400 (Loba chemicals), Poly isobutylene (Sigma) were obtained.

(a) Preparation of casting Solution

Polymer (2,3 and 4% w/w)

HPMC (15 Cps at 1% w/v solution) in distilled water, Sod CMC (16 Cps at 1% w/v Solution) in distilled water, Cellulose Acetate (3 Cps at 2% w/v solution) in Acetone, Ethyl cellulose (22 Cps at 5% w/v solution) in Alcohol : Toluene (1:4)

The polymers were dissolved in respective solvents using a mechanical stirrer. The drug Terbutal-

ine sulphate (0.2% w/v) and plasticiser PEG-400¹ (30% w/w of the polymer concentration) were added to the polymer solution and mixed well.

(b) Preparation of Films

Films were prepared according to a modified method of Chowdary and Naidu². Five ml of the casting solution was poured within the round aluminium foil cup (prepared by telescoping between 2 round plastic lids) of area 12 sq.cm. and dried at 40-50°C in air circulation drier for 12 hrs. The films were cut into 10 cm Squares. The films prepared with 2% w/v of polymer, 30% w/w PEG-400 and 7.5

Table-1: Drugs Release from different formulations across Rat Abdominal Skin

Each film contains 7.5mg/10 Sq. cm. of Terbutaline Sulphate

Formulation	Rate of Drugs Release mg/hr
F ₁	0.47
F ₂	0.21
F ₃	0.16
E ₄	0.10

*For Correspondence

Table-2: K Values for the samples of formulations stored at R.T. 37°C, 45°C and 65% R.H. + R.T.

Formulation	R.T.	K Values at (week ⁻¹)		
		37°C	45°C	65% R.H.+R.T.
F ₁	1.32x10 ⁻³	1.51x10 ⁻³	2.00x10 ⁻³	1.37x10 ⁻³
F ₂	0.69x10 ⁻³	2.50x10 ⁻³	1.59x10 ⁻³	0.94x10 ⁻³
F ₃	0.54x10 ⁻³	0.60x10 ⁻³	1.62x10 ⁻³	1.18x10 ⁻³
F ₄	0.52x10 ⁻³	0.69x10 ⁻³	1.38x10 ⁻³	1.41x10 ⁻³

mg/10 Sq.cm of Terbutaline sulphate were selected for evaluation.

The thickness of films were determined by a micrometer. F₁ -HPMC (115 ± 0.9 microns), F₂ - Sod. CMC (103 ± 0.3 microns), F₃ - Cellulose Acetate (93 ± 0.2 microns) and F₄ - Ethyl cellulose (60 ± 1 microns).

In Vitro Diffusion Studies

In Vitro diffusion studies of films were carried out across fresh rat abdominal skin³ using a polycarbonate feeding bottle modified as diffusion cell. The lid was modified to hold the film and the skin. Polysobutylene was used as adhesive to stick the film to the skin. A sampling port was provided by drilling a hole at the top on the right side. The whole assembly was kept horizontally over a magnetic stirrer to keep the receptor medium (normal saline 250ml), Under constant stirring at 37° ± 1°C. Five ml of the sample was withdrawn at hourly intervals for 8 hrs and analysed spectrophotometrically at 450 nm⁴.

Stability Studies

All four formulations were stored at various storage conditions like 28°, 37° and 45°, 65% R.H and R.T. for a period of 6 weeks. The samples were withdrawn at weekly intervals, analysed for the %

drug content and the K Values⁵ (specific decomposition rate) were calculated.

Skin Irritancy Test⁶

The films containing the drug and a piece of cottonwool soaked in saturated drug solution were placed on the back of Albino rats, secured it firmly in place with adhesive plaster. Aqueous solution of 0.8% Formalin was applied as standard irritant. The animals were observed for 7 days for any sign of oedema and erthema.

RESULTS AND DISCUSSIONS

The formulations prepared using different polymers can be arranged in the following increasing order according to their permeation rates (**Table1**). Ethyl cellulose <Cellulose Acetate <Sod CMC <HPMC. The results indicate that the film prepared with HPMC as polymer was found to be the best. T.L.C. was carried out for all the four formulations and drug was found to be intact in the film⁷.

The formulations exhibited good stability at all storage condition after 6 weeks. The K values are shown in Table 2. However, the hydrophilic polymers (F₃ and F₄) had become slightly soft due to moisture absorption at higher R.H. The animals subjected for the primary skin irritancy test did not show any sign of erythema or oedema on observing for a period

of 7 days. Thus, it is possible to design suitable transdermal films containing the drug Terbutaline sulphate for the treatment of Asthma with more effectiveness and more patient compliance.

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