

**Republic of Iraq  
Ministry of Higher Education  
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College of Pharmacy**

**PREPARATION AND IN VITRO  
EVALUATION OF CHITOSAN FILM FOR  
TRANSDERMAL DRUG DELIVERY OF  
PROPRANOLOL**

**A THESIS  
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## **Abstract**

Transdermal drug delivery of drugs provides many advantages over the conventional oral dosage form particularly the avoidance of hepatic first-pass effect. It has been utilized for the delivery of many drugs.

In the present study, propranolol, a  $\beta$ -blocker, antihypertensive drug has short biological half-life and is subjected to extensive hepatic first-pass metabolism found to be a potential candidate for the transdermal use.

Recently, development of transdermal drug delivery systems has been focused on the formulation that can achieve the constant drug penetration into the systemic circulation, especially by employing polymers as matrices or membranes controlling the release of drugs.

In this study chitosan films preparation was utilized to deliver propranolol HCL for transdermal use.

Chitosan films loaded with propranolol HCL, and glycerin as plasticizer were developed and their release and permeation profiles were examined in vitro using Franz-type diffusion cell.

Different concentrations of chitosan polymer were prepared (1 % w/v, 2 % w/v, 3 % w/w, 4 % w/v), loaded with 2 mg/cm<sup>2</sup> propranolol HCL.

Propranolol release profiles showed that chitosan 2 % w/v gave the best release compared to others.

The study involved the release and permeation of propranolol HCL through excised rat skin using 2 % w/v chitosan with different penetration enhancers.

The effect of propranolol concentration on the release and permeation profile was also investigated and the data showed that an increase in release and permeation with increasing concentration of propranolol.

The results indicate that 2 mg/cm<sup>2</sup> were the best loading concentration of propranolol that achieves good release and permeation.

On the other hand the physical property of each film such as drug content uniformity, thickness, moisture uptake capacity and skin bioadhesion were studied.

In addition, different types and concentration of penetration enhancers (Propylene glycol, terpenes as menthol and cineole, Sodium lauryl sulphate, Benzalkonium chloride, Oleic acid and Tween 80) were used.

The results showed that, the best release and permeation from prepared chitosan films was achieved with 10 % w/w cineole.

Finally, the results showed that the chitosan film preparation containing 10 % w/w cineole was non irritant as confirmed by irritancy test.