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# Development of Patch Ketoprofen Using Chitosan as Polymer Matrix

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**Abstract**

Patch is a transdermal dosage form that has increasing number of applications for its simplicity with controlled release profile of drug. The ability to provide controlled release manner of drug is developed by the use of polymer as the matrix. In this research, patch of ketoprofen were formulated using various concentrations of chitosan as matrix. Preparation of the transdermal patch were conducted by using solvent evaporation method. Characterization of patch were included physical characteristic, homogeneity, drug assay, drug permeation and stability study. Permeation test were performed in vitro by using Franz diffusion cells with shed snake's skin of Phyton reticulatus as diffusion membrane for 24 hours. The result showed that Chitosan is a potential polymer to be used as matrix for patches since it was stable and gave peel off ability. Permeability test showed that a decrease in permeation of ketoprofen was in line with the increase of chitosan as matrix. Formula containing chitosan 1% and tween 80 0,3% as permeation enhancer gave the highest permeation number as much as 99,15%.

**Keywords:** Chitosan, Transdermal patch, Ketoprofen

## INTRODUCTION

Analgesics are used to relieve pain without causing loss of consciousness. Analgesics are divided into two groups, namely peripheral analgesics and narcotic analgesics. The peripheral analgesics consists of drugs which are not narcotic and not central working. While narcotic analgesics consists of drugs that are used to banish the pain like fracture and cancer.[1]

Ketoprofen, a derivative of propionic acid, is one of peripheral analgesic. Ketoprofen has the effectiveness in the treatment of rheumatoid arthritis, osteoarthritis, gout, dysmenorrhea, and other painful circumstances.[2] Currently, ketoprofen preparations is sold widely in the market include tablets, capsules, injectiones, suppositories, and topicals. Various forms of these preparations has not been felt quite practical for use by patients and raises some issues.

Tablets or capsules dosage form has drawbacks, especially for patients who have difficulty swallowing tablets or capsules, as well as the existence of a first pass effect in liver.[3] The use of injection preparations in need of experts in assisting the process of granting preparations. Suppository preparations less comfortable because that need administration through rectal. While topical preparations only give local effect on the location of the grant.[4] The options that can be use to overcome these problems is a drug made in the form of transdermal preparations so that the system transfers more controlled drugs. In addition, the transdermal preparations are also more practical and comfortable, and can be faster with systemic effects.[5]

Development of medicinal preparations is currently more focused on transdermal preparations because of these reasons. One kind of transdermal form is patch. Patch preparations provide concentration uniformity of the drug to diffuse so that guarantees constant drug release.[6]

Matrix is an important component for the transdermal system in terms of release and permeation of drugs, as well as in the mechanical properties of a formula that is designed.[7] One of the substances that can be used as a matrix in the form of the polymer is chitosan. Chitosan is a natural polysaccharide that is used in various systems delivering drugs for its biocompatible bonding agent, non-toxic, biodegradable, and their ability to form a gel.[8] Chitosan has the ability to increase the penetration of the mucous membranes by reducing skin impermeability for a while. Chitosan will interact with intracellular lipids and improve hydration at the stratum corneum which will cause the stratum corneum more polar and certain compounds would more easily pass through the stratum corneum in the skin.[4]

Chitosan produces rigid and brittle patch structure. The addition of the plasticizer can improve the mechanical properties of the formula so that it is more flexible and elastic.[9] Chitosan also has better capabilities as a bioadhesif polymer on in vitro permeation test compare with sodium carboxymethylcellulose, gum, poloxamer 407, and carbopol 934P.[10] Bioadhesif properties of chitosan can cause interactions between positive charges and negative charges on the skin so it can formulated into transdermal.[11]

This research aims to formulate ketoprofen patch preparations by using chitosan as a matrix and release profiles observed on in vitro ketoprofen patch preparations using UV-Vis spectrophotometer.