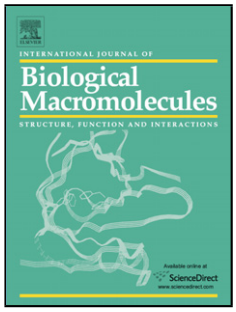

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Authors: Amtul Jamil Sami, Madeeha Khalid, Tahir Jamil, Saira Aftab, Sermad Ahmad Mangat, A.R. Shakoori, S. Iqbal

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Formulation of Novel Chitosan Guargum based Hydrogels for Sustained Drug Release of Paracetamol

Running head: Amtul Jamil Sami*

Amtul Jamil Sami[1*], Madeeha Khalid[1], Tahir Jamil[2], Saira Aftab[3], Sermad Ahmad Mangat[4], A. R. Shakoori[3], S. Iqbal[1]

Institute of Biochemistry and Biotechnology, University of the Punjab, Quaid-i-Azam Campus, Lahore, 54590, Pakistan.

amtuljamilsami@yahoo.com*; madeeha.kh@gmail.com

*Corresponding author's email: amtuljamilsami@yahoo.com

Author for correspondence;

Prof. Dr. Amtul Jamil Sami
Institute of Biochemistry and Biotechnology
University of the Punjab
Quaid-i-Azam Campus, Lahore 54590, Pakistan
Tel: 92-42-99231596
Fax: 92-42-9923980
Email: amtuljamilsami@yahoo.com

Abstract

The report presents the formulation of hydrogel based on biopolymers chitosan and guar gum after cross-linking for sustained release of a commonly used orally prescribed analgesic Paracetamol. The oral ingestion of Paracetamol is associated with complications of the gastric tract and liver metabolism that can be effectually avoided by using transdermal drug delivery systems. The formulated transdermal patch was characterized by physicochemical properties including swelling, bonding pattern (using FTIR Fourier Transform Infra-Red and Scanning Electron Microscopy SEM) and antimicrobial activity. Biocompatibility and cytotoxicity was examined *in vitro* using cell culture in HeLa cell lines. After characterizing the novel formulated hydrogel were employed for the preparation of drug encapsulated in alginate beads as a transdermal patch. After formulation of the transdermal patch, the drug release was studied using an avian skin model. The results followed zero order kinetics and Non-Fickian law for diffusion. Paracetamol due to its small molecular mass (151.163 g/mol) released in a sustained manner. The released drug successfully retained its biological effects including anti-inflammatory and anti-protease activity, indicating no interaction between the drug and the formulated hydrogel. It was shown that the formulated hydrogels could be safely used as a dermal patch for the sustained drug release of Paracetamol.

Keywords: Chitosan; Guargum; Paracetamol; Drug release; Cytotoxicity; Dermal patch

1. Introduction

Transdermal drug delivery system is a modernized vehicle for drug delivery in living systems. Transdermal drug delivery patches use a path through Stratum corneum to release the drug into the systemic circulation evading the first pass metabolism. During last two decades, various drug delivery methods including transdermal, nanoparticles, micellar systems, nano-capsules, and liposomes have been used for site-specific and time controlled delivery of medicines and therapeutic agents (1). Transdermal drug delivery is utilized to maximize the flux of drug to systemic circulation at the same time avoiding drug retention and metabolism that occur in oral route delivery (2-3).