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Article

Design and evaluation of dental pastes Containing anti-inflammatory drugs

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Periodontitis is an oral disease associated with inflammation and pain with swollen and bleeding gums. In the present study, dental pastes containing NSAIDs, namely, diclofenac sodium and nimesulide (1 % w/w) were prepared to treat periodontitis. Dental pastes of diclofenac sodium and nimesulide (1 % w/w) were prepared with/without mucoadhesive hydrocolloid polymers such as sodium carboxy methyl cellulose (NaCMC), hydroxyl ethyl cellulose (HEC) and methyl cellulose (MC) by conventional trituration method. The pH, drug content, viscosity, tube spreadability and tube extrudability of these prepared dental pastes were measured. These dental pastes of diclofenac sodium and nimesulide (1 % w/w) were characterized by FTIR analyses for drug-excipient compatibility. The *in vitro* drug releases from these dental pastes in 6.4 pH phosphate buffer solution displayed sustained release over longer period and the drug release rate was found to be decreased when the concentration of mucoadhesive polymer was increased. These dental pastes displayed good adhesion to the oral mucosa revealing more retention time in mouth when tested for *ex vivo* mucoadhesion using bovine cheek pouch. The stability study results reveal that the DC3 and NC3 dental paste formulations were found stable enough over a longer period in different storage conditions. The present study revealed that the prepared mucoadhesive dental pastes of diclofenac sodium and nimesulide (1 % w/w) had good adhesion with the oral mucosa to maintain consistent release of drugs over prolonged time.

Keywords: Periodontitis. Nimesulide. Diclofenac. Mucoadhesive.

INTRODUCTION

Periodontitis is an oral disease affecting a significant proportion of people in all groups, races, ethnicities and genders (Barat *et al*., 2007; Patel, Patel, 2013). The early stage of periodontal disease leads to a painful suffering associated with swollen and bleeding gums (Pataquiva Mateus, Ferraz, Monteiro, 2007). If untreated, it can destroy both bone and soft tissues that support teeth and eventually may produce tooth loss (Ferraz *et al*., 2007; Lindhe, Haffaiee, Socransky, 1983; Seymour, Heasman, Macgregor, 1992). Historically, the etiology of periodontitis has focused on the bacterial plaque, microbial by-products, and the host immune response (Lindhe, Haffaiee, Socransky, 1983). Bacterial plaques are considered as the primary etiologic factor of periodontitis (Seymour, Heasman, Macgregor, 1992). The current periodontitis treatment includes the delivery of anti-inflammatory drugs and antibiotics (Ali *et al*., 2012; Barat *et al*., 2007; Ferraz *et al*., 2007; Pataquiva Mateus, Ferraz, Monteiro, 2007; Patel, Patel, 2013; Seymour, Heasman, Macgregor, 1992). Recently, various local drug delivery approaches to treat periodontitis have been investigated to reduce the side-effects associated with systemic drug administration for a

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