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Electrohydrodynamic atomization technologies for the preparation of fibrous NSAID buccal films

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The oral route of drug administration is the most commonly used route for the administration of drugs. However, it is limited considering patients with swallowing difficulties. The buccal route for drug administration has gained interest due to its accessibility, rapid onset of action, avoidance of first-pass effect, pre-systemic elimination by the gastrointestinal tract and limiting adverse drug reactions. Accordingly, this method is a good alternative to oral drug delivery without compromising compliance with treatment, particularly, for children and older adults. Thus, buccal permeability models are essential to determine the important permeation parameters. In this experiment, an *ex-vivo* buccal model (porcine) was utilised for drug permeability studies of PVP (polyvinylpyrrolidone) and NSAID (non-steroidal anti-inflammatory drug) fibrous films. The currently available rapid disintegrating buccal tablets have limitations related to the short residence time at the absorption surface. Therefore, the development of drug-loaded nanofibers may overcome such issues by enhancing the surface area for interaction based on grooves and total surface exposure. The object here was to evaluate film forming fibers in the preparation of muco-adhesive patches for the controlled release of NSAID. Fibrous films containing NSAID were prepared using the electrospinning technique. Film fibres comprised PVP and other selected co-polymers, penetration enhancers and surfactants (Methocel E15 Premium, Methocel E05, Ethocel E-10, HPMC and Tween® 80). Resulting fibres possessed mean diameters between ~10-1200 nm. NSAID was encapsulated in the amorphous state, at relatively high encapsulation efficiencies. FTIR and Raman spectroscopy analysis show that NSAID, PVP and selected co-polymers were well incorporated into the fibre matrix. The XRD and DSC analysis results confirmed the nature and interaction of selected NSAID (e.g. indomethacin). *In-vitro* release and *ex-vivo* behaviour comparison provides an insight into more reliable formulation and dosage form development.

Biography

Kazem Nazari is pursuing his final year of PhD studies and his expertise is in Nanotechnology. He obtained his BSc in Pharmaceutical and Cosmetic Sciences and MPhil degree in Pharmaceutical Technology (freeze-drying process control) using in-line process analytical technology for freeze-drying and developing a temperature map of the freeze-dryer shelf to predict the degree of temperature variation within the shelf at the De Montfort University before deciding to pursue a PhD in The Advanced Drug Delivery Group (specializing in EHDA systems) at De Montfort University, Leicester UK.

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