

5th International Conference and Exhibition on

Pharmacology and Ethnopharmacology

March 23-25, 2017 Orlando, USA

Development of novel dry powder formulations of triamcinolone acetonide for pulmonary delivery

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Introduction: The introduction of corticosteroids revolutionized the treatment of asthma in the 1950s' and inhaled corticosteroids subsequently produced further substantial benefits for many asthmatics by reducing or abolishing the need for regular oral corticosteroid treatment (1). Some asthmatic patients continue to have symptoms with persistently poor ventilator function despite continuous oral corticosteroid treatment (2). In spite of this, Inhaled Corticosteroids (ICSs) are effective in controlling inflammation and improving lung function and asthma symptoms and are recommended as first-line therapy for asthma patients.

Aim: The objective of this study was to develop Triamcinolone Acetonide (TA) dry powder inhalers containing chitosan using spray drying technique and characterize the powder in terms of aerolization, flow properties in order to determine which formulations could be the most suitable for pulmonary delivery.

Materials & Methods: Trehalose and leucine were dissolved in distilled water. TA and chitosan was dissolved in methanol, added into mannitol and leucine solution. The mixture was then spray-dried with constant stirring using a Büchi Nanospray dryer B-90 (3). The *in vitro* aerosolization performance was investigated using Next Generation Impactor (Copley).

Results & Discussion: SEM images of TA-DPI formulations showed almost good structures with particle size 1-5 µm. Encapsulation efficiency changed significantly with 30% leucine. Encapsulation efficiency values for F1, F2 and F3 formulations were 76.1±2.2%, 88.9±2.7% and 85.4±3.1% respectively. On the other hand, the process yield increased in F3 formulation with 40% leucine. Process yield values for F1, F2 and F3 formulations were 72.99±2.6%, 74.53±3.4% and 83.58±2.9%, respectively.

Conclusions: The optimized formulation developed in this study exhibited good *in vitro* aerosolization properties (4). The Carr's Index was decreased in F3 formulation with 40% leucine (5). F3 formulation showed the best flow properties among all formulations.

Biography

Aysu Yurdasiper has been working as a Researcher in the Department of Pharmaceutical Technology, Ege University. Her work is focused on dry powder inhalers, dermal delivery (topical, transdermal drug systems), controlled release formulations (nanoparticles, microparticles) for drug delivery and nanomedicine in pulmonary delivery. Her current research interests focus on development of novel nanomedicine including polymers and *in vitro-in vivo* evaluation for treatment of asthma.

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