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Designing Oral Films Based on Beeswax: Comparative Assessment of 3D Printing and Solvent Casting

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ABSTRACT

Background: From the perspective of DDSs, OFs have received increased attention, mainly for pediatric and geriatric applications. Beeswax, a naturally derived and FDA-approved material, is often mixed with other polymers to enhance its mechanical properties. This study presented the first use of precisely controlled, solvent-free pressure-assisted micro-syringe printing to produce OFs.

Methods: Solvent casting and pressure-assisted micro-syringe printing were employed to produce hybrid film structures composed of beeswax, PVA, borax, and HPMC, loaded with betamethasone as a model drug. The films were characterized based on their physical appearance, mechanical attributes, surface structure, and ultrastructure morphology via SEM, drug content, and in vitro drug release.

Results: Films without the drug showed greater irregularities and roughness compared to the drug-loaded films. The physical properties of the formulations improved through 3D printing.

Conclusion: By using 3D printing methods in pharmaceuticals, the treatment procedurewould be very acceptable to the patient and increases the patient's adherence to treatmentand is useful for personal drug delivery. ***DOI: 10.61186/ibj.5055***

Keywords: Flagellin, Urinary tract infections, Uropathogenic *Escherichia coli*, Vaccines

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INTRODUCTION

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Chronic oral ulcerative lesions are characterized by discomfort and pain, w… lead to significant nutritional deficien… …t the These lesions can occur in various diseases, inclu… …re of the immunobullous disorders[2]. Currently, comm… …elps the drug therapies for oral ulcers involve mouthwashes, cream… …ulation via rapid or ointments. However, these methods often show … …e has been a significant limited effectiveness due to insufficient contact t… …y drug release systems. with the lesion. Moreover, existing buccal DDS … …iculate systems have attracted allow for simultaneous food and drink consun… …ong therapeutic potential and low …learance[7].

List of Abbreviations:
3D: there-dimensional; **DDS:** drug delivery system; **FDA:** …d and Drug Administration; **HPLC:** high-performance liquid chromatography; **HPMC:** hydroxypropyl methylcellulose; **OF:** …ral film; **PVA:** polyvinyl alcohol; **PVP:** polyvinylpyrrolidone; **SEM:** scanning electron microscopy; **SSE:** semi-solid extrusion; **SSF:** simulated saliva fluid; **USP:** United States Pharmacopeia

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