

Abstract

# Development and Characterization of Calcium Carbonate-Quince Bio-Composite for pH Triggered Release of Darfenacin Hydrobromide in Lower GIT: A Green Chemistry Approach <sup>†</sup>

Wafa Umair <sup>1,‡</sup>, Attia Afzal <sup>1,‡</sup>, Muhammad Farooq <sup>1,\*</sup>, Muhammad Sarfraz <sup>1,\*</sup>, Sherjeel Adnan <sup>1</sup>, Hammad Ahmad <sup>2</sup> and Muhammad Waqas <sup>3</sup>

<sup>1</sup> HUST-UOL International Joint Nanomedicine Centre for Cancer Research, Faculty of Pharmacy, The University of Lahore, Lahore 54600, Punjab, Pakistan; wafaumair6@gmail.com (W.U.); attiapharm@gmail.com (A.A.); sharjeel.adnan@pharm.uol.edu.pk (S.A.)

<sup>2</sup> Imran Idrees College of Pharmacy, Sialkot 51311, Punjab, Pakistan; drhammadahmad@live.com

<sup>3</sup> School of Engineering, Institute for Materials and Processes, The University of Edinburgh, Edinburgh EH9 3FB, UK; waqas.mme08@gmail.com

\* Correspondence: muhammad.farooq@pharm.uol.edu.pk (M.F.); chiefpharm@gmail.com (M.S.); Tel.: +92-42-32300865 (ext. 3105)

<sup>†</sup> Presented at the 2nd International Electronic Conference on Biomolecules: Biomacromolecules and the Modern World Challenges, 1–15 Nov 2022; Available online: <https://iecbm2022.sciforum.net/>.

<sup>‡</sup> These authors contributed equally to this work.

**Citation:** Umair, W.; Afzal, A.; Farooq, M.; Sarfraz, M.; Adnan, S.; Ahmad, H.; Waqas, M. Development and Characterization of Calcium Carbonate-Quince Bio-Composite for pH Triggered Release of Darfenacin Hydrobromide in Lower GIT: A Green Chemistry Approach. *Biol. Life Sci. Forum* **2022**, *2*, x. <https://doi.org/10.3390/xxxxx>

Academic Editor(s):

Published: 1 November 2022

**Publisher's Note:** MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



**Copyright:** © 2022 by the authors. Submitted for possible open access publication under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

**Abstract:** A green chemistry approach was employed to develop gastric pH resistant bio-composites for colon targeted oral delivery of darfenacin hydrobromide. The FTIR, XRD, DSC and TGA results showed good drug-polymer compatibility. The SEM images showed calcite formation in the quince hydrogel system. The drug release of 80% and 34% were observed in a phosphate buffer 6.8 pH and an acidic media, respectively. The restricted drug permeation (approx. 21.8% only) was observed through gastric membrane in an acidic media. The developed formulation significantly inhibited the development of testosterone induced prostatic hyperplasia. No organ toxicity was observed against all the developed formulations.

**Keywords:** darfenacine hydrobromide; calcium carbonate-quince bio-composite; green chemistry; benign prostatic hyperplasia; colon targeted delivery system

**Author Contributions:**

**Funding:**

**Institutional Review Board Statement:**

**Informed Consent Statement:**

**Data Availability Statement:**

**Conflicts of Interest:**