Journal of Bioactive and Compatible Polymers

Decision Letter (JBC-24-0059.R3)

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CC:

Subject: Journal of Bioactive and Compatible Polymers - Decision on Manuscript ID JBC-24-0059.R3

Body: 04-Jun-2025

Dear Dr. Bezerra:

It is a pleasure to accept your manuscript entitled "Preparation and Characterization of Chitosan and Aloe vera Blends by Co-precipitation for Potential Biomedical Applications" in its current form for publication in Journal of Bioactive and Compatible Polymers. The comments of the reviewer(s) who reviewed your manuscript are included at the foot of this letter.

Thank you for your fine contribution. On behalf of the Editors of Journal of Bioactive and Compatible Polymers, we look forward to your continued contributions to the Journal.

Sincerely,
Dr. Hamid Omidian
Editor, Journal of Bioactive and Compatible Polymers
omidian@nova.edu

Reviewer(s)' Comments to Author:

Reviewer: 4

Comments to the Author
Minor revision:
In discussion, authors have to revise the words “positive result" and “good” avoided. I have copied and pasted the sentences where they have used. Please revise those sentences. As the material is not causing any cytotoxic effect, authors may mention as the material is biocompatible.

“A positive result in cell viability assays using chitosan and Aloe vera blends on fibroblasts indicates the biocompatibility of these materials, which is a crucial prerequisite for their potential application in wound healing”.
Therefore, the observed good cell viability of fibroblasts upon treatment with chitosan and Aloe vera blends supports their potential use in future wound healing applications.

Reviewer: 3

Comments to the Author
The manuscript presents the preparation of chitosan and aloe vera-based blends using a co-precipitation technique, followed by comprehensive characterization of the resulting polymer materials. The authors' responses to the reviewers’ comments are generally satisfactory. The manuscript is suitable for publication in this journal, pending minor revisions.

1. Section 3.2: Presenting the SEM and EDS results across five separate figures is not ideal. Grouping them into a single figure panel would enhance readability and make the presentation more concise.

2. Section 3.2: It may be unnecessary to include the full EDS spectra from Figures 3 onward, as Table 1 already summarizes the elemental composition. Instead, the authors could consider providing EDS elemental mapping for a representative blend sample. This would offer valuable insight into the spatial distribution of elements and help assess the homogeneity of the materials.

3. Figure 8(b): The format should be consistent with the other figures. Specifically, the right Y-axis should be color-coded to clearly indicate which curve corresponds to which axis.

4. Section 3: Several parts of this section consist of multiple short paragraphs, which make the text appear fragmented and affect the overall flow. The authors are encouraged to combine related paragraphs where appropriate to improve coherence and readability.

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Original Article

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Preparation and characterization of chitosan and *Aloe vera* blends by co-precipitation for potential biomedical applications

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Abstract

Blends of chitosan and *Aloe vera* exudate in ratios of 75:25, 50:50, and 25:75 were prepared from aqueous solutions using the co-precipitation technique. This method offers notable advantages including simplicity, rapid processing, and efficient separation of interacting phases from non-associated components, resulting in products with greater purity and compositional control. Samples and precursors were characterized using Fourier-transform infrared spectroscopy (FTIR), thermal analysis (TG/DTG), scanning electron microscopy with energy-dispersive X-ray spectroscopy (SEM-EDS), swelling degree, antioxidant activity, and cell viability assay. The analyses indicated interactions between the biomaterials within the blend. Additionally, the biomaterials

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were found to be non-toxic, and the addition of *Aloe vera* exudate enhanced fibroblast cell viability. These findings underscore the significant potential of these biocompatible, antioxidant-rich blends, sustainably produced from renewable resources for a wide range of biotechnology applications.

Keywords
Biopolymers, sustainable materials, antioxidants, co-precipitation

Introduction

In recent years, there has been a significant search for the application of natural polymers in various biomedical areas, in particular the use of chitosan (CS).[1] This biopolymer, known since 1859, has been widely explored due to its unique properties, such as biocompatibility, biodegradability and antimicrobial activity, as well as its versatility of applications. CS has often been used as a starting material for obtaining polymer blends, combining with other biopolymers to develop materials with functional properties.[2–5]

One of the biopolymers frequently combined with CS is hyaluronic acid (HA). CS/HA mixtures have promising properties for applications in tissue engineering, cartilage regeneration, dressings, and controlled drug release. The combination of these biopolymers makes it possible to exploit the hydrophilic, bioadhesive and biocompatible properties of hyaluronic acid, together with the antimicrobial and healing-stimulating capacity of chitosan.[6,7] In addition to hyaluronic acid, other materials have been combined with chitosan to obtain blends, such as gelatin, alginate, fibrin, carrageenan, pectin and collagen. The advantage of this combination lies in the possibility of obtaining materials with improved properties compared to pure materials.[8–12]

Several strategies have been employed to prepare chitosan-based blends, including casting,[13,14] solvent evaporation,[15,16] lyophilization,[13,17] ionic, and chemical crosslinking,[18,19] and freeze-thaw cycling.[20] Each method offers distinct advantages and limitations. Casting and solvent evaporation are relatively simple and widely used, but they may yield heterogeneous films or result in incomplete blending. Crosslinking methods can improve mechanical and thermal stabilities; however, they often involve toxic reagents or require complex purification processes.[21]

Chitosan-*Aloe vera* (CS/AV) blends have also been the subject of studies and research due to their individual properties and synergistic potential.[21,22] *Aloe vera*, a succulent plant rich in bioactive compounds, is known for its anti-inflammatory, anesthetic, antipyretic, emollient, wound-healing, and antimicrobial properties.[23,24] One of the most explored applications of *Aloe vera* and chitosan mixtures is in the manufacture of biological dressings and bandages. The combination of these materials allows for the creation of bioactive dressings that more effectively promote wound healing. The moisturizing and anti-inflammatory properties of *Aloe vera* gel, combined with the antimicrobial capacity of chitosan, help prevent infections, and accelerate the skin regeneration process.[25,26]

Kudłacik-Kramarczyk et al.[27] investigated the effect of *Aloe vera* addition to chitosan-based hydrogel matrix on the cytotoxic and hydrophilic properties of this system, aiming to propose its use as a wound dressing. The hydrogels were obtained by UV radiation, and parameters such as the amount of crosslinking agent, presence of *Aloe vera* in the matrix, swelling capacity, surface roughness, *Aloe vera* release profiles, hydrogels' contact angle, cytotoxicity via MTT reduction, cell viability, among others, were evaluated. The results showed that the addition of *Aloe vera* improves the hydrophilic properties of the materials, increases swelling, and cell viability. Furthermore, the materials did