ABSTRACT

Bone tuberculosis poses a grave medical challenge due to its capacity to induce defects in bone tissue, thereby necessitating effective regenerative strategies.The objective of this study is to devise a fabrication method for chitosan-gelatin scaffolds, incorporating variations in gelatin concentration and incorporating betel leaf extract (Piper betle L.).An evaluation was conducted to ascertain the optimal gelatin concentration within the scaffolds, in conjunction with betel leaf extract, to promote bone tissue regeneration. The characterization of the scaffolds involved the analysis of physicochemical properties to assess their performance in medical applications. The combination of chitosan and gelatin has demonstrated significant potential in supporting bone cell growth and regeneration due to its biocompatibility and bioactive properties, as evidenced by previous studies. Chitosan is known for its antimicrobial properties, while gelatin mimics a natural extracellular matrix that supports cell proliferation and differentiation. The addition of betel leaf extract is expected to enhance the antimicrobial and anti-inflammatory properties of the scaffolds. The findings indicated that a 4% gelatin concentration proved optimal with regard to physical, mechanical, and swelling properties, while an 8% concentration exhibited the highest antibacterial effectiveness against S. aureus and E. coli bacteria. These observations suggest that the incorporation of betel leaf extract into the chitosan-gelatin scaffolds holds promise for the treatment of bone defects resulting from tuberculosis, though further optimization is necessary to achieve an optimal balance between mechanical stability and antibacterial activity.

Keywords: *betel leaf extract, bone regeneration, Bone tuberculosis, chitosan-gelatin scaffolds.*