Abstract

Polymeric scaffold has been widely used as medical devices and tissue-engineering scaffolds. It has many advantages, for example, biodegradable, biocompatible, high surface-to-volume ratio, high porosity with very small pore size, and proper mechanical properties. Poly(L-lactic acid) (PLLA) is thermoplastic polyester derived from renewable resources, such as corn and starch. It has many properties such as biocompatible, biodegradable, and non-toxic to human body. Therefore, it has been used in tissue engineering. Sericin is a natural polymer derived from silk cocoon with the good advantages of antioxidant activity and moisture retention capacity. In this research work, the PLLA-sericin hybrid scaffolds containing gentamicin sulphate (GS) were fabricated for use in bone tissue engineering application. Since GS is an aminoglycoside antibiotic that is useful in skin/soft tissue, bone and severe respiratory infections. PLLA scaffolds were prepared by particulate leaching using sodium chloride (NaCl) with size of 300-425 μm as a particulate leaching. PLLA:NaCl ratio was varied as 1:8, 1:10, 1:12, and 1:15 at a fixed concentration of 20% w/v PLLA. The GS-loaded PLLA-sericin hybrid scaffolds were obtained by immersion of the PLLA scaffolds in sericin solution containing GS and subsequently freeze drying. The morphology and pore size of these scaffolds were characterized by Scanning Electron Microscopy (SEM). The water retention and weight loss behaviors and the compressive strength of these scaffolds were investigated. The release characteristics of GS from these scaffolds were carried out in phosphate buffer solution (PBS). Lastly, the antibacterial activity and the indirect cytotoxicity of these scaffolds were evaluated.

Key words: Poly(L-lactic acid), Scaffolds, Particulate Leaching, Sericin, Gentamicin Sulphate