Abstract

Peripheral nerve injuries (PNI) are becoming global problem nowadays and are leading source of long-lasting disabilities affecting motor and sensory functions. According to the World Health Organization, 3.2 million people become disabled annually due to peripheral nerve injuries. The treatment of nerve injuries has taken a new dimension with the development of tissue engineering techniques. Prior to tissue engineering, suturing and surgery were the only options for effective treatment. Peripheral nerve tissue engineering researchers have been discovering different approaches to replace autologous nerve grafts, the gold standard treatment for peripheral nerve injury. Naturally occurring biomaterials such as Silk fibroin (SF) and Chitosan (CS) owing to their excellent biocompatibility, biodegradability, availability, may show remarkable regeneration potential. The aim of this study is to prepare Silk fibroin and Chitosan nanoparticles and evaluate the neuro-regenerative potential of SF-CS nanoparticles. Morphology and particles size was determining through Scanning Electron Microscope (SEM). Sustained release of silk fibroin from chitosan nanoparticles was estimated through *in vitro* release assay using dialysis method. To assess the neuro-regenerative potential of prepared nanoparticles, adult male swiss albino mice were randomly divided into 4 groups; (1) Control vehicle group, (2) SF group, (3) CS group, (4) CS-SF group. The crush injury was performed on sciatic nerve of mice. Nanoparticles was administered on injury site. Behavioral tests (Pinprick for sensory function assay, Toes Spread for motor function assay, Sciatic function index for locomotory function assay) were performed to assess the recovery situation. The average nanoparticles size range between 60-90nm and *in vitro* release assay showed that there was about 81.81% SF released from CS nanoparticles after 14 days. Behavioral results demonstrated that there is significant enhancement of functional recovery in SF-CS nanoparticles treated group as compare to control vehicle group. It is concluded that silk fibroin and chitosan nanoparticles shows significant regeneration potential after nerve injury, however the underlying mechanism of accelerated recovery remains to be elucidate