Gallocatechin-silver nanoparticles embedded in cotton gauze patches accelerated wound healing in diabetic rats by promoting proliferation and inhibiting apoptosis through the Wnt/β-catenin signaling pathway

ABSTRACT

Background: Diabetes mellitus is a chronic metabolic disorder characterized by elevated plasma glucose levels. It is often defined as a lifestyle disease having severe economic and physiological repercussions on the individual. One of the most prevalent clinical consequences of diabetes is the lagging pace of injury healing leading to chronic wounds, which still to date have limited treatment options. The objective of this research is to look into the wound healing capabilities of gallocatechin (GC) and silver nanoparticles (AgNPs) impregnated patches in diabetic rats. Experimental rats were dressed patches and the wound healing skin region was dissected at the end of the experiment for molecular analysis. The wound healing rate in diabetic rats dressed with CGP2 and CGP3 & silver sulfadiazine (AgS) patches were found to be high. While mRNA and immunofluorescence or immunohistochemistry assays reveal that Wnt3a and β-catenin levels were higher with Gsk-3β and c-fos levels were lower in diabetic rats dressed with in CGP2 and CGP3 as compared with diabetic rats dressed with DC+CGP1. Furthermore, apoptosis markers such as caspase-3, caspase-9, and Bax levels were reduced, whereas anti-apoptosis maker (Bcl-2) and proliferation marker (PCNA) levels were increased in diabetic rats dressed with CGP2 and CGP3 as compared with diabetic rats dressed with DC+CGP1. In conclusion, the results demonstrated that GC-AgNPs-CGP (CGP2 & CGP3) dressing on diabetes wound rats decreased changes in Wnt3a/β-catenin pathways, resulting in lower apoptosis and greater proliferation, so drastically improving diabetic wound healing.