ABSTRACT

Diabetic cardiomyopathy is a pathogenic state which is predominant in millions of people worldwide. Therapeutics regarding this complication is not much successful as the antidiabetic drugs have the toxicity issues and there is a lack in availing a safe, less toxic and cost effective therapy. Plant based therapeutic approaches are introduced recently to overcome the severity of diseases. Therefore, in the present study, we analysed the cardioprotective potential of *Syzygium cumini*, a well known antidiabetic plant.

In the current study, the effect of *S. cumini* MSE was analyzed against glucose stressed cardiac cells. To achieve the aim, the antiglycoxidative potential of *S. cumini* pulp and seed extracts was screened by examining the scavenging activities against different free radicals which showed that MSE had highest antiglycoxidative activities than other extracts. Biophysical studies revealed that *S. cumini* MSE is enriched with the polyphenolic functional groups, essential oils and hydrocarbons. To observe the effect of MSE on glucose stressed cardiac cells, the safe dose of glucose, MSE was optimized by MTT assay. MSE successfully reduces the glucose induced cellular and nuclear deformations, ROS overproduction, inflammatory and apoptotic markers and loss of mitochondrial membrane potential. Immunocytochemistry, substrate and *in situ* Zymography revealed that *S. cumini* MSE suppresses MMP-9 expression and activity. *In silico* docking studies disclosed the possibility of *S. cumini* polyphenols as natural inhibitors of MMPs, critical and emerging therapeutic targets. We also used gallic acid, one of the purified components of *S. cumini* and reported to have cardioprotective potential and observed that crude methanol seed extract has better efficacy and protection as compare to its purified component possibly due to the synergetic performance of phytoconstituates of *S. cumini*. However poor absorption and less bioavailability of plant extract is a major concern associated with such therapeutic approaches. Silver nanoparticles have recently been reported to possess antidiabetic activities and good bioavailability but have toxicity issues as their synthesis is chemical based. We therefore synthesized silver nanoparticles by using *S. cumini* MSE to overcome the bioavailability and toxicity concerns associated with plant products and nanoparticles respectively which revealed that ScSNPs have significant cardioprotection on high glucose induced cardiac cells.