Abstract

Psyllium husk is a commonly used fiber in Asia, North America and Europe. It is commonly used as laxative and dietary supplement. In this study, we extracted hydrogel from *Plantago ovata* seeds i.e. Psyllium husk. The hydrogel thus obtained was used as a reducing agent in the synthesis of Manganese oxide nanoparticles. Various techniques were applied on MnO NPs in order to characterize them and confirm the synthesis. The UV spectra of MnO gave the absorption peak at 286 nm indicating the presence of MnO NPs. The data obtained as a result of FTIR analysis gave the peak at 549.65 cm^{-1} that confirmed the synthesis of MnO NPs. EDX and SEM analysis were also carried out to determine the shape and size of nanoparticles. Spherical shaped nanoparticles of manganese oxide ranged between 37-83 nm in size. The nano-gel films prepared from the hydrogel encapsulated nanoparticle solution was used in combination with stem cells conditioned media to study their wound healing properties. The results obtained as a result of pre-clinical trial carrying out in mice gave remarkable results confirming the therapeutic characteristics of the studied nanoparticles. Anti-biofilm activity was also carried out using the same nanoparticles and incubating bacterial strains at 37 C. No mature biofilm was observed after 7 days of incubation period. Moreover, the antibiotic activity was assessed against *E. coli, B. licheniformis,* and *Aeromonas* and the MIC (Minimum Inhibitor Concentration, MBC (Minimum Bactericidal Concentration) and Agar Well Diffusion technique. Good anti-biotic activity was exhibited by MnO NPs. The amount required to kill 99.9% of bacteria was found to be almost equal to that of the market drug, Rifampicin. Hence, the remarkable therapeutic capabilities of MnO NPs can be inferred from the discussion.