The success of root canal treatment is mainly based on the complete eradication of microorganisms by instrumentation and disinfection protocols followed during the procedure. Due to anatomical complexities, achieving long-term success would be difficult, because these areas have limited access to instruments and irrigants. Hence, application of intracanal medicament has been considered as an important step to reduce the persistent bacteria inside the root canal. Since the routine intracanal medicaments could not penetrate into the dentinal tubules, the role of Nanotechnology was explored in Endodontics. The field of nanotechnology has the ability of synthesising the metals in nanosize, which drastically changes the chemical, physical and optical properties of metals. The aim of the present study was three fold i) antibacterial efficacy of AgNps against *E. faecalis* ii) biocompatibility of AgNps by haemolytic assay iii) effect of AgNps on the microhardness of root dentin. In the present study, AgNps was synthesised at 4 mM, 6 mM, 8 mM, 10 mM and 100 mM concentrations. These concentrations showed different zones of inhibition against *E. faecalis*. Minimum inhibitory concentration of 8 mM AgNps was 1.05 µg for *E. faecalis*. Hence this concentration was standardized for tooth model study. The number of colony-forming units in CHX and AgNps groups was significantly lower in comparison with the control group (Saline). Both AgNps and CHX
showed antibacterial activity; but no statistical difference was observed at 200 µm and 400 µm. On comparison of Saline, CHX and AgNps treated groups, Group III (AgNps) showed statistically significant counts of dead bacteria compared to the CHX and saline. Further, the percentage of dead bacteria between Day 1 and Day 3 for AgNps showed no statistically significant differences. Hence, AgNps when placed inside the canal for 24 hrs would be effective. Scanning electron microscopy, PI uptake and ROS generation were used to study the biocidal action of AgNps. The results confirmed that after treatment with AgNps, *E. faecalis* cells were damaged and pits were created in the cell wall. A membrane with such morphology exhibited a significant increase in permeability, which resulted in cell lysis. ROS generation was not observed. The combination of AgNps with thermosensitive agent followed by ultrasonic agitation showed 92.57 % of dead bacteria. The results showed that AgNps showed less percentage of haemolysis compared to CHX. On comparison of the mean micro hardness values of AgNps and CHX, no statistically significant differences were observed in the reduction of dentin micro hardness after 24 h of treatment with both AgNps and CHX. Thus, AgNps had no influence in reducing the micro hardness of root dentin. The present study proved the potential advantage of AgNps in root canal disinfection.