Abstract

Blood clot-related diseases have been challenging for decades; this includes severe conditions like thrombosis, thrombophilia, strokes, atrial fibrillation, and disseminated intravascular coagulation. Commercially used anticoagulation and antithrombotic agents, EDTA and heparin, too, have limitations. Herein, we have developed novel nanoparticles from the inorganic complex reaction. These oxalate-containing NPs were thoroughly characterized using FTIR, TEM, SEM, DLS, and XRD. We hypothesize that the presence of oxalate can chelate the calcium, and we found that nanoparticles display efficient anticoagulation properties when incubated with human blood. In vitro studies, including prothrombin time, activated partial thromboplastin time, and fibrinolytic assay, were evaluated, which confirms the anticoagulation property of NPs. BALB/C mice were used for all in vivo studies. In the tail bleeding assay, enhanced clotting was observed after NPs treatment, whereas the ferric chloride was used to induce thrombosis model. According to the histology reports, accumulation of leukocyte, fibrin, and red blood cells was the least in the NPs treated group. Moreover, CAM and hemolysis assay signifies the biocompatibility and hemocompatibility of the NPs. Hence, this can be used in the treatment of diseases that are associated with blood clot management.

Graphical abstract: