Development and evaluation of anticancer polymeric nano-formulations containing curcumin and natural bioenhancers.

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Abstract:

Curcumin, a major active constituent isolated from *curcuma longa*, showed a wide range of biological activities in terms of antioxidant, anti-inflammatory, antiproliferative, anticancer, antidiabetic, antirheumatic, antiviral effects, antibacterial and antifungal. With all these recompense of curcumin, its potential and use is restricted due to its poor aqueous solubility and poor systemic bioavailability. Present study was emphasized on the development of polymeric nanoparticles of pure curcumin (Cstd) and its combination with natural bioenhancer (CPP) using two different polymers poly (lactide-co-glycolide) (PLGA) and poly(ε-caprolactone) (PCL) by nanoprecipitation method. Curcumin incorporated in PCL nanospheres using stabilizer tween 80 was found to have comparatively high encapsulation (94%) with particle size 240±2nm and zeta potential of -22±2.7mv. The characterization of the formulation was done using Scanning Electron Microscopy. The percentages of haemolysis have been found within the acceptable range for all formulations. The developed formulations were also subjected for stability in terms of particle size and size distribution and have been found stable for more than 3 months. Although all formulations were capable of lowering viability in PC3 cell line, CPP (IC₅₀ values between, 4-5 μg/ml) was found to significantly higher (p<0.01) than Cstd formulations. Consequently PCL and PLGA has potential to form stable nano-formuations. CPP formulations of curcumin can be developed as potential chemo-preventive or therapeutic agents with enhanced bioavailability.