Curcumin and ceramide 6 (C6) are known to induce apoptosis in cancer cells. Curcumin is the constituent of *Curcuma Longa* whereas C6 is a sphingolipid. The aim of this study is to encapsulate both the anti-cancer agents in liposomal nanoparticles and evaluate its anti-tumor potential against a model of osteosarcoma. Three liposomal formulations were prepared, ceramide liposomes, curcumin liposomes and curcumin-C6 liposomes using thin film evaporation method. All the three formulations were characterized for size and shape using cryo-transmission electron microscopy. The anti-tumor potential of these formulations was evaluated against KHOS osteosarcoma cell line. Cells were plated in 96 well plate and allowed to adhere, then treated for 48 h with above mentioned three formulations. After 48 h, Cell survival was determined using a Cyquant assay. IC50 for curcumin formulations was estimated using GraphPad Prism. Preliminary *ex vivo* experiments were performed by using immunodeficient mice (nu/nu) injected with KHOS cells. Intratumoral diffusion of liposomal formulations was carried out *in vitro* and evaluated by using confocal microscopy. All the three liposomes found to have apoptotic potential. Ceramide liposomes alone are cytotoxic at higher concentration whereas curcumin liposomes are effective at lower concentration. The encapsulation of curcumin and ceramide shows synergistic effect (2-3 fold) as compared to curcumin or C6 alone. *Ex vivo* diffusion study shows promising results about penetration power of curcumin and curcumin-C6 liposomes. In conclusion, synergistic effect of curcumin and C6 indicates the common molecular target in apoptotic pathway.

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