Pomegranate seed oil nanoemulsions with selective antiglioma activity: optimization and evaluation of cytotoxicity, genotoxicity and oxidative effects on mononuclear cells.

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Abstract

CONTEXT: Glioma is a malignant brain tumor with rapid proliferation, infiltrative growth, poor prognosis and it is chemoresistant. Pomegranate seed oil (PSO) has antioxidant, anti-inflammatory and antitumor properties. This study showed the optimization of PSO nanoemulsions (NEs) as an alternative for glioma treatment.

OBJECTIVE: The study aimed to evaluate PSO NEs cytotoxicity on human blood cells and antiglioma effects against C6 cells.

MATERIALS AND METHODS: NEs were prepared by the spontaneous emulsification method, using PSO at 1.5 and 3.0%, and were evaluated regarding their physical stability and antioxidant activity. Toxicity evaluations in human blood cells were performed in terms of cell viability, genotoxicity, lipid peroxidation, protein carbonylation, catalase activity and hemolysis at 0.1, 0.25 and 0.5 mg/mL PSO, after a 72-h incubation period. In vitro antitumor effect was determined against glioma cells after 24 and 48 h, and astrocytes were used as a non-transformed cell model.

RESULTS: Formulations presented droplet size below 250 nm, low polydispersity index, negative zeta potential and pH in the acid range. NEs and PSO had scavenging capacity around 30% and promoted a proliferative effect in mononuclear cells, increasing about 50% cell viability. No genotoxic and oxidative damage was observed in lipid peroxidation, protein carbonylation and catalase activity evaluations for NEs. Hemolysis study showed a hemolytic effect at high concentrations. Moreover, formulations reduced only tumor cell viability to 47%, approximately.

DISCUSSION AND CONCLUSION: Formulations are adequate and safe for intravenous administration. Besides, in vitro antitumor activity indicates that NEs are promising for glioma treatment.

KEYWORDS: Antitumor effect; C6 cells; astrocyte cells; catalase activity; colloidal systems; comet assay; lipid peroxidation; protein carbonylation; punica granatum

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