

## Preparation of diethyltoluamide (DEET) niosomes as a sustained-release insect repellent

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**Background and Aims:** The insect repellents are compounds that are used for protection of human, animals and plants against insect biting. Aromatic amides have insect repellent effects. DEET (C<sub>12</sub>H<sub>17</sub>NO) is one of the best insect repellents that have been used for many years. Due to the low solubility of DEET, its topical formulations have usually alcoholic bases which have the drawbacks of DEET skin permeation increment. The main goal of this study was to prepare the formulation of DEET niosomes in a topical dosage form with good rheologic and stability properties.

**Methods:** Three different methods, including direct mixing, DRV and homogenization method were used to prepare the niosomal formulations. Spans, Brij, cholesterol and dicetylphosphate (DCP) were the lipids used for vesicle preparation. A new developed HPLC method was used for the determination of the loaded DEET. Physical stability of the vesicles was also studied.

**Results:** The DRV method was not capable of loading DEET in niosomes which could be due to the lipophilic nature of DEET which resulted in the dissolution of the vesicles. The syringe method could load approximately 7-10% of DEET and the homogenization method was capable of loading about 15-20%. DEET release profile of selected formulations showed a slow and sustained delivery of DEET during 5 h.

**Conclusions:** According to this study, homogenization method could be used for formulation of DEET in niosomes which are physically stable and could be utilized in topical formulations.

**Keywords:** Niosomes; Insect repellants; DEET; DRV method