

Preparation and evaluation of topical microemulsions containing hydroquinone

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Background and Aims: Microemulsions are isotropic, thermodynamically stable and transparent colloidal systems of oil, water and surfactant. These adaptable delivery systems provide protection against oxidation and improve the solubilization of lipophilic and hydrophilic drugs. Hydroquinone is physically unstable to environmental conditions and is used for the treatment of hyperpigmentation. The aim of this work was to prepare a microemulsion product that increases skin permeability of hydroquinone in addition to improve photostability of this drug.

Methods: The phase diagram was constructed using water titration method by oil phase of oleic acid and transcutool P (10:1), tween 80 and span 20 as surfactant and Propylen Glycol (as cosurfactant) (1:1) and water. Then four samples of microemulsions were selected with full factorial design and 2% of hydroquinone added to each one. These samples were examined for pH, refractive index, viscosity, DSC, droplet particle size and drug release. Also, drug photostability of microemulsion samples examined under UV light in comparison to methanolic samples.

Results: The results from phase diagram show that microemulsion region was observed in high surfactant and co-surfactant amounts. The mean particle size of micro emulsion samples was within 11.8-38.8 nm, the polydispersity values were lower than 0.5, indicating uniformity of droplet size distribution within microemulsions. The pH value, RI and viscosity were observed (5.11-5.93), 1.4544 and 116.4-277.3 centipoise respectively. The highest cumulative release percent of microemulsion samples was 55% belong to microemulsion 1 (oil 50%, water 5%). Microemulsion samples were more stable in comparison to methanolic samples under UV light. DSC cooling thermogram of microemulsions showed free water peak at (-5 degree C) and interface water at (-15 degree C) indicating water/oil microemulsion structures.

Conclusions: The results show that using microemulsion nanovehicles for formulation of photosensitive drugs such as hydroquinone can prolong shelf life, increase stability and improve the effectiveness of drug.

Keywords: Hydroquinone; Microemulsion; Topical