Journal of Pharmaceutical Investigation
Volume 46| April 2016 | ISSN: 2093-5552

Brain Targeting Efficiency of Curcumin Loaded Mucoadhesive Microemulsion through Intranasal Route

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Abstract:

This study was aimed at designing mucoadhesive microemulsion gel to enhance the brain uptake of curcumin through intranasal route. Suitable oil, surfactant and cosurfactant for the development of microemulsion were selected based on maximum curcumin solubility, drug excipients compatibility through FTIR study and non-toxicity to sheep nasal mucosa. Curcumin loaded mucoadhesive microemulsion (CMME) was developed by incorporating polycarbophil as mucoadhesive polymer into Capmul MCM based optimal microemulsion (CME) and was subjected to characterization, stability, mucoadhesion and naso-ciliotoxicity study. Brain uptake of Curcumin via nasal route was studied by performing biodistribution study in Swiss albino rats. CME was found to be transparent, stable and non ciliotoxic with 57.66 nm ± 3.46, 16.28 mV ± 4.11 and 98.08 % ± 1.01 as average globule size, zeta potential and drug content respectively. PdI and TEM study depicted the narrow size distribution of CME. Following single intranasal administration of CMME and CME at dose of 2.86 mg/kg, Maximum Curcumin uptake in the olfactory bulb was more than 11 fold (51.1 ± 2.8) than that of intravenous injection of Curcumin solution (4.4 ± 1.1). AUC ratio of brain tissues to that in plasma obtained after nasal administration of CMME were significantly higher than those after intravenous administration of Curcumin solution. Findings of the present study revealed that optimal CMME and intranasal route may be considered to be promising and an alternative approach for brain targeting of Curcumin.

Link: https://link.springer.com/article/10.1007/s40005-016-0227-2#citeas