

Enhancement in brain uptake of Vitamin D3 nanoemulsion for treatment of cerebral ischemia: Formulation, Gamma scintigraphy and efficacy study in transient middle cerebral artery occlusion rat model

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Abstract

In the present study, an attempt was made to develop vitamin-D3 loaded nanoemulsion formulation for effective treatment of cerebral ischemia through nose to brain targeting. Tween 20 and polyethylene glycol (PEG-400) were chosen as surfactant/co-surfactant, while oleic acid as oil phase in nanoemulsion. The formulation was characterized for several in-vitro studies and further targeting efficiency of radiolabelled vitamin D3 nanoemulsion (^{99m}Tc -Vitamin D-Nanoemulsion) was investigated through radiometry and gammascintigraphy. Efficacy of Vitamin D-Nanoemulsion was studied in transient middle cerebral artery occlusion rat model using Magnetic resonance images (MRI). Prepared Vitamin D-Nanoemulsion showed mean size range 49.29 ± 10.28 nm and zeta potential 13.77. Gamma scintigraphy static images revealed brain deposition through nasal delivery of prepared formulation. Radiometry assay confirms approximate 4 fold increased biodistribution of ^{99m}Tc -Vitamin D-Nanoemulsion into brain compare to oil solution of ^{99m}Tc -Vitamin D. MRI of rat ischemic model confirmed better efficacy of Vitamin D-Nanoemulsion. Further elevated serum level of MDA and decreased SOD, GSH and catalase activities confirm neurological deficits



Biography:

Presenting author is a Professor in Department of Pharmaceutical Technology, Meerut Institute of Engineering & Technology, Meerut. He has done Post Doctorate from Institute of Nuclear Medicine and Allied Sciences, Delhi under a SERB funded proposal. He has completed his doctorate from



JNT University Hyderabad in 2015. He has approximate 13 years of teaching and research experience in various organizations. More than 18 national and international research publications are in his account along with 02 patents applied. His area of interest is polysaccharide based drug delivery system such as oral, nano and hydrogels.

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