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| Development and characterization of OGP 10-14 peptide loaded mesoporous silica nanoparticles for the management of rheumatoid arthritis.  |
| Sani Jaysing Shinde, Sreekanth Pentlavalli, Justin Tian , Raghu Raj Singh Thakur |
| School of Pharmacy, Queen’s University Belfast, BT9 6DH, Northern Ireland, United Kingdom. |
| **Background:** Rheumatoid Arthritis is disease commonly affects joints in the hands, wrists, and knees. And leads to long-term pain and damage of joint tissue, and joints become inflamed. The WHO estimates 0.5–1.0% of the adult population are diagnosed with RA. The target of the treatment of RA is remission or a state of low disease activity, which should be attained within 6 months. Methotrexate is the first-line therapy and should be prescribed at an optimal dose of 25 mg weekly and in combination with glucocorticoids. Rheumatoid arthritis (RA) involves cartilage destruction, bone destruction, and swelling of joints and pain. Current treatment helps in postponing the diseases progression. Despite all advancement restriction on administration, frequent and long-term dosing leads to patient non-compliance, and systemic adverse effect. The current study focuses development of sustained released drug delivery technology for RA. The study intends to develop and characterize OGP 10-14 peptide loaded silica-based nanoparticles for the treatment of RA, OGP (10–14) peptides are the C-terminal pentapeptide which helps in proliferation, differentiation of alkaline phosphatase activity and matrix mineralization of bone cells. |
| **Methods:** OGP 10-14 peptide was synthesized using solid phase peptide synthesis. The amino acids were conjugated in the following sequence Glycine, glycine, phenylalanine, glycine, tyrosine. Chemical structure was validated using NMR and FTIR. The silica nanoparticles were characterized for their physicochemical properties. The size and morphology of nanoparticles was characterized using BET, SEM, and TEM. Further, the particles size was measured using DLS. OGP 10-14 peptide was loaded into the hollow silica NP using chemical conjugation via EDC/NHS and drug release study was performed.  |
| **Results:** Solid phase peptide synthesis (SPPS) was used to make osteogenic growth peptides, which were then characterized by NMR and FTIR. aromatic proton was observed at 8-7 ppm and carboxylic acid proton was observed at 12-13 ppm. NMR revealed all amino acid protons implicated in the peptide. Further, peak at (3300- cm-1) in FTIR spectra, confirmed the formation of an amid linkage. The particle size of silica NPs was found to be 670.15 nm using DLS. method was used to conduct temperature research on mesoporous silica particle size. Drug release study of physical loaded NPs and chemical conjugated NPs..  |
| **Conclusions:** One of the major drawbacks of mesoporous silica particles (MSP) is a lack of physical/chemical interaction between the silica and the drug, resulting in a high initial burst release. The aim of this project is to create a bioconjugate of therapeutic molecule and mesoporous materials to reduce the initial bursts release. The peptide's conjugation reduces its surface area while increasing its polar interaction with the medication. OGP (10-14) is a short peptide that may be easily produced in the laboratory. Further, work will focus on development of NIR triggered sustained release MSPs for the treatment of RA.  |