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In-vitro and *in-silico* studies on curcumin loaded chitin and chitosan nanoparticles from shrimp shells

Palanivel Rameshthangam[a] and **Dhanasekran Solairaj**[a]
[a]Alagappa University, India

Curcumin, is an active ingredient of turmeric, have several biological activities and used as a therapeutic agent for various diseases. However, some physical properties such as low solubility, sensitive to pH values and faster degradation in the digestive system limit the application of curcumin. Hence we aimed to evaluate the curcumin delivery potential of chitin and chitosan nanoparticles which are isolated from the shrimp shells. Chitin is a second most abundant biopolymer in the world, and chitosan is a deacetylated derivative of chitin. We have synthesized chitin nanoparticles (CNP) and chitosan nanoparticles (ChNP) from the shrimp shells and characterized using FTIR, XRD, SEM and DLS studies. Curcumin loading (CNP/Cur and ChNP/Cur) was performed at various weight ratios (0.5:1, 1:1, and 1:2) and encapsulation efficiency was calculated. At 1:1 weight ratio of CNP: Cur and ChNP: Cur, shows maximum (87.5% and 93.4% respectively) encapsulation efficiency. *In-vitro* release kinetics was performed at two different pH (2.5 and 7.4) and confirmed that the drug release was stable, higher, time dependent at pH 7.4. FTIR analysis of Curcumin loaded nanoparticles evidenced that there was no chemical interaction, only the physical interaction was observed between CNP/Cur and ChNP/Cur. *In-silico* molecular docking studies of CNP:Cur and ChNP:Cur has showed the docking score of 0.647 and -0.427 respectively, is in good agreement with *in-vitro* studies. Thus the present study revealed significant physiochemical nature, strength and interacting sites of CNP and ChNP nanoparticles with curcumin and could be used for drug delivery applications.

Biography

Palanivel Rameshthangam has completed his PhD at 2008, from Department of Biotechnology, University of Madras, India. After completing his postdoctoral studies, he joined as Assistant Professor at Alagappa University, India. He has got Indian Patent for the identification of novel antiviral agent from the plant *Pongamia pinnata*. He has published more than 15 research papers in peer reviewed International journals and also published one book. Over all he has 124 citations, 5 h-index and 3 i10-index of citation indices. One of his research article published in New Journal of Chemistry (doi:10.1038/nindia.2016.27) was cited in Nature India and the other in Virus Research 110(2005) 133 -141 was selected as 14th among the Science Direct TOP 25 articles in the subject area Immunology and Microbiology. He has presented his research findings in more than 50 conferences, both National and International level. He is also serving as a reviewer for reputed journals.

rameshthangam@alagappauniversity.ac.in

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