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Effect of sardine oil loaded vanillic acid grafted chitosan microparticles on improvement of metabolic and immune responses in experimental rats and attenuation of Doxorubicin-induced cardiotoxicity in cardiomyoblast cell lines

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The effect of sardine oil loaded vanillic acid grafted chitosan microparticles on improvement of metabolic and immune responses in experimental rats and attenuation of doxorubicin-induced cardiotoxicity in cardiomyoblast cell lines were assessed. Encapsulation with vanillic acid grafted chitosan (VA-CS) was done to improve stability and impart sustained release of omega-3 rich sardine oil. Characterization of VA-CS was carried out with the help of FTIR spectroscopy and NMR. Sardine oil loaded VA-CS microparticles were fed to 3 groups (n=6) of male albino rats namely Group-I: Control, Group-II: 1% sardine oil loaded microparticles and Group-III: 3% sardine oil loaded microparticles for 60 days to assess metabolic and immune responses. The blood analysis showed an increase of hemoglobin and platelet count in the sample treated group (1%). Lipid profiling showed that both triglycerides and LDL level is decreased in the sample treated group (1%). Antioxidant enzymes were monitored such as catalase, LDH, MDH, GST and GPx. Significant activation of antioxidant defense system was observed in the sample treated group (1%). An increase in IgG was observed in 1% treated sample and is the indication of immunostimulation. Cytoprotective effect was observed in in vitro cytotoxicity assay using H9C2 cardiomyocytes when treated with a sample concentration of 12.5 µg. Results of apoptosis by double fluorescent staining and Caspase-3 evaluation substantiated the above findings. Membrane potential, relative expression of NF-κB by PCR and ROS determination confirmed the protective effect against doxorubicin-induced cardiotoxicity. The results revealed that this encapsulated sardine oil may be responsible for a significant cell protection against doxorubicin-induced oxidative stress. In conclusion, improvement of strong metabolic and antioxidant defense system in an animal model is confirmed and it could be the reason behind the positive cardioprotective effect exerted by stable sardine oil.

Recent Publications

1. Vishnu K V, Ajeeshkumar K K, Niladri Sekhar Chatterjee, Suvanish kumar, Shyni K, Jayarani R and Suseela Mathew (2016) Biochemical characterization of liver oil of *Echinorhinus brucus* (Bramble shark) and its cytotoxic effect on neuroblastoma cell lines (SHSY-5Y) Scientifica Volume 2016: 6 pages.
2. Vishnu K V, Ajeeshkumar K K, Asha K K, Niladri Sekhar Chatterjee, Anandan R, Suseela Mathew (2015) Protective effects of Bramble shark (*Echinorhinus brucus*) liver oil against experimentally induced inflammation and ulceration in rats. Fishery Technology 52: 252-257.
3. Ajeesh kumar K K, Vishnu K V, Remyakumari K R, Navaneethan R, Niladri S Chatterjee, R Anandan, K.K Asha, B Ganesan Suseela Mathew (2015) "Proximate composition, Nutrient, Amino acid, Fatty acid profile and heavy metal contamination level of selected marine fish From the Gulf of Mannar, India. Fishery Technology 52: 1-7.

Biography

Vishnu K V has expertise in microencapsulation of marine lipids and its bioactivity in animal model. He has multiple years of experience in research in the field of biochemistry and molecular biology. He is currently working on stabilization of nutritionally important marine lipids by microencapsulation with polysaccharide-protein complex. He has practical experience in biophysical techniques, fatty acid analysis using gas chromatography, amino acid analysis using ion exchange-HPLC, carotenoids and vitamins by using analytical HPLC and clinical biochemistry.

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