Significant efficacy of spiramycin-loaded chitosan nanoparticles on the treatment of histopathological changes in acute experimental toxoplasmosis

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Background: The wide distribution of *T. gondii* infection makes finding a safe and effective drug a great success. Current therapeutics does not clear parasite infection and are hampered by severe adverse effects.

Aim: The present study was carried out to investigate the effect of chitosan nanoparticles (CS NPs), spiramycin, spiramycin co-administered with metronidazole and spiramycin-loaded CS NPs on the parasite load and histopathology in the liver, spleen and brain in Swiss albino mice infected with acute *T. gondii* (RH strain).

Materials and Methods: Seventy male Swiss albino mice were divided into seven equal groups: healthy control (I), infected untreated control (II), infected group receiving CS NPs (III), infected group treated with spiramycin (IV), infected group treated with spiramycin-metronidazole (V), infected treated with spiramycin-loaded CS NPs 400 mg/kg (VI) and infected treated with spiramycin-loaded CS NPs 100 mg/kg (VII). All mice were inoculated intraperitoneally with 2500 *T. gondii* tachyzoites RH strain except the healthy control group. Mice were sacrificed on the 8th day for liver, spleen and brain parasite load and histopathological studies.

Results: Parasite load and histopathological examination of liver, spleen and brain of all treated mice revealed decrease in the inflammation, congestion, necrosis and mean tachyzoites count within tissue sections. Spiramycin-loaded NPs showed the highest significant reduction in the pathological insult while spiramycin alone revealed the lowest reduction as compared to the other used drugs. Administration of either CS NPs or spiramycin-metronidazole induced a moderate reduction in the pathological changes.

Conclusion: Based on the present research, it can be concluded that spiramycin-loaded CS NPs lead to a pronounced decrease in tachyzoites count and histopathological effects compared to the other used treatments. Thus, spiramycin-loaded CS NPs is a promising synergistic formulation in the treatment of acute toxoplasmosis.

Biography

Nancy Abd El-Kader Hagras received the B.Sc in Pharmacy and Biotechnology, from German University in Cairo, Egypt in 2010. She received the M.Sc and Ph.D degrees in Applied and Molecular Parasitology, Alexandria University, Egypt, in 2014 and 2018 respectively. She is currently an Assistant Professor in Pharos University in Alexandria. Her research interests cover several aspects across parasitology, nanotechnology and molecular biology aiming to create new diagnostic and treatment pathways in order to improve the health and wellbeing.