



## Combined effect of radiofrequency radiation and nanoparticle in male Wistar rats

Sonali Pardhiya<sup>1</sup>, Rohit Gautam, J.P Nirala and Paulraj R\*

School of Environmental Sciences, Jawaharlal Nehru University, New Delhi 110067, India

[pardhiyasonali@gmail.com](mailto:pardhiyasonali@gmail.com)<sup>1</sup>

Nanoparticles (NPs) are defined as materials having a single dimensional feature within 1–100 nm range. Commercialization of nanomaterials is rapidly overtaking efforts to study their impact on human and environment health. Toxicological studies are therefore necessary to find out the likely adverse effects of NPs. Manganese oxide (MnO<sub>2</sub>)-NPs are promising materials used as contrast agents for magnetic resonance imaging (MRI), drug delivery, an ionization-assisting reagent in mass spectroscopy, waste water treatment and consumer products such as batteries (1). With the advancement in technology, the number of cell phone users have increased rapidly (2). As the usage of both the nanoparticles and RF radiation in daily life is increasing, their combined effect needs to be evaluated.

In this study, MnO<sub>2</sub>-NPs of 40 nm size were synthesized by a co-precipitation method using the manganese sulphate and manganese oxalate. They were characterized by Scanning electron microscope, Fourier-transform infrared spectroscopy and X-ray powder diffraction. Adult male Wistar rats were divided into 4 groups. Group I was the control group that received saline and group II was the nanoparticle treated group, that received 30mg/kg bw (body weight of rats) of synthesized nanoparticles every alternate day for 30 days via intraperitoneal administration. Group III was exposed to 3G mobile phone radiation for 30 days, six days a week. Group IV was exposed to radiation along with the nanoparticle. Different biochemical parameters for liver and kidney function such as aspartate aminotransferase (AST), alanine transaminase (ALT), alkaline phosphatase (ALP), urea and creatinine were evaluated. Testis histopathology and sperm morphology was also analysed. Oxidative stress parameters like lipid peroxidation, SOD and Catalase was evaluated for liver, kidney, testis and brain.

The results showed decreased body weight of treated animals after 30 days. Changes in urea, creatinine, AST and ALT values along with sperm morphology and testicular histopathology was observed in treated groups as compared to the control. Oxidative stress parameters increased in treated rats as compared to control. The study suggest that the continuous exposure lead to oxidative stress mediated changes in rat.

### References:

1. Singh, S. P., Kumari, M., Kumari, S. I., Rahman, M. F., Mahboob, M., & Grover, P. (2013). Toxicity assessment of manganese oxide micro and nanoparticles in Wistar rats after 28 days of repeated oral exposure. *Journal of Applied Toxicology*, 33(10), 1165-1179.
2. Kesari, K. K., & Behari, J. (2012). Evidence for mobile phone radiation exposure effects on reproductive pattern of male rats: role of ROS. *Electromagnetic biology and medicine*, 31(3), 213-222.