The present study was carried out to evaluate the effects of electromagnetic field radiation (EMF) on the early *in ovo* development and mortality ratio of chick embryos with EMF radiation (900 MHz) at different amplitudes and different durations. The study also included the estimation of prolonged exposure effects of EMF (900 MHz for 1 h/day for 12 weeks) on neurobehaviour, anxiety level, neurotransmitters status and other parameters responsible for normal functioning of brain (cerebellum) of male Sprague-Dawley rats. The chick studies result showed increase in mortality ratio, increased somite number, affected circulatory system, lens and cornea development changes in radio frequency exposed chick embryos when compared to normal controls. The rat cerebellar tissue results showed that level of lipid peroxidation was not significantly increased. Likewise, serum monoamine oxidase and acetylcholinesterase activities were not changed after EMF treatment. The activities of enzymes such as acetylcholinesterase, superoxide dismutase, catalase, monoamine oxidase, glutathione-s-transferase and glutathione reductase were not altered in brain tissue. Total glutathione content in brain was not altered after 12 weeks of EMF exposure. On the contrary, reduced glutathione content showed a significant decrease in EMF irradiated animals. The histo-pathological results showed decrease in Purkinje cells and granular cells alteration. The ultra structural studies showed changes in shape of nucleus, chromatin condensation and mitochondrial distortion in EMF exposed cerebellum sections. On the other hand, the level of serotonin and dopamine was unaltered after exposure conditions. Similarly, there were no differences in p53 and NFkB expression of cerebellar tissue in control and EMF exposed rat samples.