Nowadays, 2.45 GHz irradiation is extensively used in industrial, scientific, medical, military and domestic purposes, and its possible leakage into the environment is possible. Therefore, there is growing public concern about the potential human health hazard caused by exposure to electromagnetic radiation (EMR). This study was designed to investigate the effects of 2450 MHz EMR in blood of rat and possible ameliorating effects of melatonin. Thirty two male Wistar Albino rats were randomly grouped (eight each) as follows: Cage-control group \[\text{dimethyl sulfoxide (DMSO)} \, 10 \text{ mg/kg/day, i.p., without stress and EMR; Group I},\] shame-control group \[\text{rats stayed in restrainer without exposure to EMR and DMSO (10 mg/kg/day, i.p.); Group II},\] rats exposed to 2450 MHz EMR; Group III, 2450 MHz EMR exposed+melatonin \(10 \text{ mg/kg/day, i.p.}\) treated group; Group IV. Group III and Group IV were exposed to 2450 MHz EMR 60 minutes/day for 30 days. At the end of the 30 days, blood samples were taken for oxidant-antioxidant examination. There was no significantly difference between the groups by means of the erythrocytes GSH, GSH-Px activity, plasma LP level and vitamin A concentration \((p>0.05)\). However, in the Group IV, erythrocytes LP levels \((p<0.05)\) were observed significantly decreased and plasma vitamin C, vitamin E concentrations \((p<0.05)\) increased and when compared to Group III. In conclusion, these results demonstrated that wireless (2.45 GHz) devices slight cause oxidative-antioxidative changes in blood of rat and the moderate melatonin supplementation may play an important role on antioxidant system (plasma vitamin C and vitamin E). However, further investigations are required to clarify the mechanism of action of the applied 2450 MHz EMR exposure.

**Keywords:** 2450 MHz electromagnetic radiation, blood of rat, oxidant-antioxidant system, melatonin.