

# Acute effects of mobile phone radiation on nerve cells and sleep quality



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Mobile phones have become an essential tool for us in everyday life but its rapid growth in popularity since the 2000s has sparked many concerns of its safety. Its emittance of radio frequencies (RF), electro magnetic fields (EMF) and close proximity to the brain has given reason for exploration into its effects on sleep, glucose metabolism, cognitive functions and other brain activities. Electromagnetic radiation is a type of radiofrequency radiation that can be emitted in different frequencies and wavelength measured in hertz (Hz). The higher the frequency of EMF, the more ionizing it becomes. Telecommunication devices such as phones, televisions and radios use “ the frequency of radiofrequency electromagnetic radiation [that] ranges from 30 kilohertz (30 kHz, or 30, 000 Hz) to 300 gigahertz (300 GHz, or 300 billion Hz)” of which can be absorbed by the brain when positioned close enough. Specific absorption rate (SAR) is an estimated measure of the amount of RF-EMF absorbed in watts per kilogram of body weight (W/kg) (Institute, 2018).

A longitudinal cohort study (Mohler et al., 2012), where subjects were followed up over time, on exposure to RF EMF on sleep quality was done by means of questionnaires to 955 middle-aged participants and 119 other subjects in a nested study. Participants were questioned about their sleep patterns; daytime sleepiness and mobile phone use was collected. Their exposure to RF EMF was measured using a prediction model. The nested study participants were given actigraphs, a small non-invasive device used to measure sleep and activity cycles and their RF EMF was measured in their bedrooms using an exposimeter. The results showed no true association with sleep and exposure to RF EMF supported by the nested study. This study

helped add to the evidence that everyday use of mobile phones has no effect on sleep quality.

Another study was conducted using a double blind trial design on 48 participants who were exposed to a RF EMF from a sham or active MP at an SAR of 1.4 W/kg for 3 hours. After exposure, subjects had a full night of sleep at a sleep laboratory where a polysomnographic recording was taken using an electroencephalogram (EEG). These measurement techniques allowed the researchers to study the brain waves during sleep and showed that there were disturbances to normal sleep patterns in stage 3 and 4 on the EEG, which “ indicated moderate impairment of slow-wave sleep” (Lowden et al., 2011). Further cohort studies were undertaken, one of which was done on 286 young people and medical students who were questionnaires designed to collect information about their health and MP use. From analysing the results, it was found that the subjects used their MP frequently and also reported health complaints such as fatigue, headaches, sleeplessness and even sensations from the heat of mobile phones near the ear. This allowed the researcher to conclude that excessive mobile phone use could be detrimental to the neuropsychiatric health of developing young people and so should be considered for further studies or raise in awareness amongst medical students. (Khan, 2008)

Researchers have conducted many more cohort studies to identify the effects of exposure of RF EMFs on the brain with different aims and using different methods in measuring brain activities. The results show a range of different relationships between RF EMF exposure and neurocognitive functions. However some of these works contradict and are inconsistent in <https://assignbuster.com/acute-effects-of-mobile-phone-radiation-on-nerve-cells-and-sleep-quality/>

their results but “ it is argued that the heterogeneity in results may be due to methodological differences, statistical power and interpretation criteria.”

(Zhang et al., 2017)

Studies have not only been done on human subjects but on rats too. Mobile phone RF EMF exposure has shown to cause “ neural damage in the cortex, hippocampus, and basal ganglia in the brains of exposed rats” (Salford et al., 2003) When the rats were exposed to different frequencies of RF EMF in TEM-cells, which is a structure that would allow the RF EMF from a mobile phone to be distributed uniformly across the chamber where the rats were placed in for 2 hours. After exposure, the rats were observed for 50 days for any “ neurologic and behavioral abnormalities”. They were then sacrificed and brain sections were taken, analyzed by staining DNA/RNA and albumin antibodies were added to stain the albumin molecules. From previous experiments by (Leszczynski et al., 2002, Schirmacher et al., 2000) whose work outlined the increase in permeability of membranes in the blood-brain barriers to sucrose by activating specific proteins in rats exposed to an RF EMF of 1.8GHz. From this, Salford et al continued their work to focus on albumin leakage into the cerebellar brain tissue and whether this may cause damage to neurons and brain tissue. From the results obtained and images from the stained brain sections, it was visible that there was more albumin in exposed rats compared to the normal brain section. “ Exposed animals usually showed several albumin-positive foci around the finer blood vessels in white and gray matter”

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