



# IJPPR

INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH  
An official Publication of Human Journals

ISSN 2349-7203



Human Journals

**Research Article**

January 2018 Vol.:11, Issue:2

© All rights are reserved by Vaishnavi S. Wategaonkar et al.

## Mobile Phone Radiation and Human Health



**IJPPR**  
INTERNATIONAL JOURNAL OF PHARMACY & PHARMACEUTICAL RESEARCH  
An official Publication of Human Journals



ISSN 2349-7203  
HUMAN

**Vaishnavi S. Wategaonkar\*, S. S. Todake, P. S.**  
**Throat**

*Rajarambapu College of Pharmacy, Kasegaon*

**Submission:** 27 December 2017  
**Accepted:** 3 January 2018  
**Published:** 30 January 2018

**Keywords:** cell phones, hematological count, RBCs, WBCs, harmful, modern day, ill effects, radiations

### ABSTRACT

The aim of this study is how the cell phone radiation affects the health of human being. Objective of present study is to create the awareness among the cell phone users affecting their count of RBC's and WBC's Count and other parts of the body. This study was conducted with 30 people of age group 18 - 25, Group 1: Cellphone users less than 1 hour per day, Group 2: Cellphone users more than 5 hours per day, The RBC and WBC count of both the group people are compared to conclude the result of the study. Reasons: Usage of Cell phones have become common among people; this study was done to create awareness among those who are prone to radiation.



HUMAN JOURNALS

[www.ijppr.humanjournals.com](http://www.ijppr.humanjournals.com)

## **INTRODUCTION:**

Mobile or cell phones are now a day's an integral part of modern telecommunications in every individual life. In many countries, over half of the population uses mobile phones. As billions of people use mobile phones globally, a small increase in the incidence of adverse effects on health could have major public health implications on a long term basis and the mobile phone market is growing rapidly. Besides the number of cell phone calls per day, the length of each call and the amount of time people use cell phones are important factors which enhance the health-related risk.

Mobile phones emit radiofrequency energy, a form of non-ionizing electromagnetic radiation, which can be absorbed by tissues close to the phone. The amount of radiofrequency energy a mobile phone user is exposed depend on many factors as the technology of the phone, the distance between the phone and the user, the extent, and type of mobile phone use and the user's distance from cell phone towers.

## **MATERIALS AND METHODS:**

This study was conducted with 30 people of age group 18 – 25.

Group 1: Cell phone users less than 1 hour per day, (15 People)

Group 2: Cell phone users more than 5 hours per day, (15 People)

The RBC and WBC count, and the other parts of the body of both the group people were compared to conclude the result of the study.

The effect of mobile phone radiation on human health is a subject of interest and study worldwide, as a result of the enormous increase in mobile phone usage throughout the world. As of 2015 there were 7.4 billion subscriptions worldwide, though the actual number of users is lower as many users own more than one mobile phone. Mobile phones use electromagnetic radiation in the microwave range (450–2100 MHz). Other digital wireless systems, such as data communication networks, produce similar radiation.

In May 2011, the World Health Organization's International Agency for Research on Cancer announced it was classifying electromagnetic fields from mobile phones and other sources as

"possibly carcinogenic to humans" and advised the public to adopt safety measures to reduce exposure, like the use of hands-free devices or texting.

Some national radiation advisory authorities, including those of Austria, France, Germany and Sweden, have recommended measures to minimize exposure to their citizens. Examples of the recommendations are:

- Use hands-free to decrease the radiation to the head.
- Keep the mobile phone away from the body.
- Do not use a telephone in a car without an external antenna.

The use of "hands-free" was not recommended by the British Consumers' Association in a statement in November 2000, as they believed that exposure was increased. However, measurements for the (then) UK Department of Trade and Industry and others for the French, Agency française de sécurité Sanitaire environmental, showed substantial reductions. In 2005, Professor Lawry Challis and others said clipping a ferrite bead onto hands-free kits stops the radio waves traveling up the wire and into the head.

Several nations have advised the moderate use of mobile phones for children. A journal by Gandhi et al. in 2006 states that children receive higher levels of Specific Absorption Rate (SAR). When 5- and 10-year olds are compared to adults, they receive about 153% higher SAR levels. Also, with the permittivity of the brain decreasing as one gets older and the higher relative volume of the exposed growing brain in children, radiation penetrates far beyond the mid-brain.

There are three main reasons why people are concerned that cell phones might have the potential to cause certain types of cancer or other health problems.

Cell phones emit radiofrequency energy a form of non-ionizing radiation, from their antennas. Tissues nearest to the antenna can absorb this energy.

The number of cell phone users has increased rapidly. As of December 2014, there were more than 327.5 million cell phone subscribers in the United States .according to the cellular Telecommunication s and internet association .this is a nearly threefold increase from 110

million users in 2000. Globally, the number of subscriptions is estimated by the International Telecommunication Union to be 5 billion.

Over time the number of cell phone calls per day, the length of each call, and amount of time people use cell phone has increased. However, improvements cell phone technologies have resulted in devices that have lower power outputs than earlier models.

### **What is Radiofrequency Energy and How Does It affect the body?**

Radiofrequency energy is a form of electromagnetic radiation. Electromagnetic radiation can be categorized into two types ionizing and non-ionizing. Electromagnetic radiation is defined according to its wavelength and frequency, which is a number of cycles of a wave that pass a reference point per second. Electromagnetic frequencies are described in units called hertz (Hz).

The energy of electromagnetic radiation is determined by frequency, ionizing radiation is high frequency, whereas non-ionizing radiation is low frequency, and therefore low energy. The NCI fact sheet *Electromagnetic Fields and Cancer* lists sources of radiofrequency energy. More information about ionizing radiation can be found on the radiation page.

The frequency of radiofrequency electromagnetic radiation ranges from 30 kHz to 300 gigahertz. The electromagnetic field in the radiofrequency range is used for telecommunication applications including cell phones, televisions, and radio transmissions. The human body absorbs energy from devices that emit radiofrequency electromagnetic radiations. The dose of the absorbed energy is estimated using a measure called specific absorption rate.

Exposure to ionizing radiation such as from x-rays, is known to increase the risk of cancer; however, although many studies have examined the potential health effect of nonionizing radiation from radar, microwave ovens, cell phones, and other sources, there is currently no consistent evidence that ionizing radiation increases cancer risk.

The only consistently recognized biological effect of radiofrequency energy is heating. The ability of microwave ovens to heat food is one example of radio frequency energy. Radiofrequency exposure from cell phone use does cause heating to the area of the body where a cell phone or other device is held (ear, head, etc.) however, it is not sufficient to

measurably increase body temperature and there are no either clearly established effects on the body from radiofrequency energy.

It has been suggested that radiofrequency energy might affect the glucose metabolism, but in small studies that examine brain glucose metabolism after the use of cell phone showed inconsistent results. Whereas one study showed increased glucose metabolism in the region of brain close to antenna compared with tissues on the opposite side of the brain the other study, found reduced glucose metabolism on the side of the brain where phone was used

Another study investigated whether exposure to the radiofrequency energy from cell phone affects the flow of blood in the brain and found no evidence of such an effect.

The authors of these studies noticed that that the results are preliminary and that possible health outcomes from changes in glucose metabolism are still unknown. such inconsistent findings are not uncommon in experimental studies of the biological effects of radiofrequency, electromagnetic radiation some contributing factors include assumption used to estimate does failure to consider temperature effects, and lack of blinding of investigation to exposure status

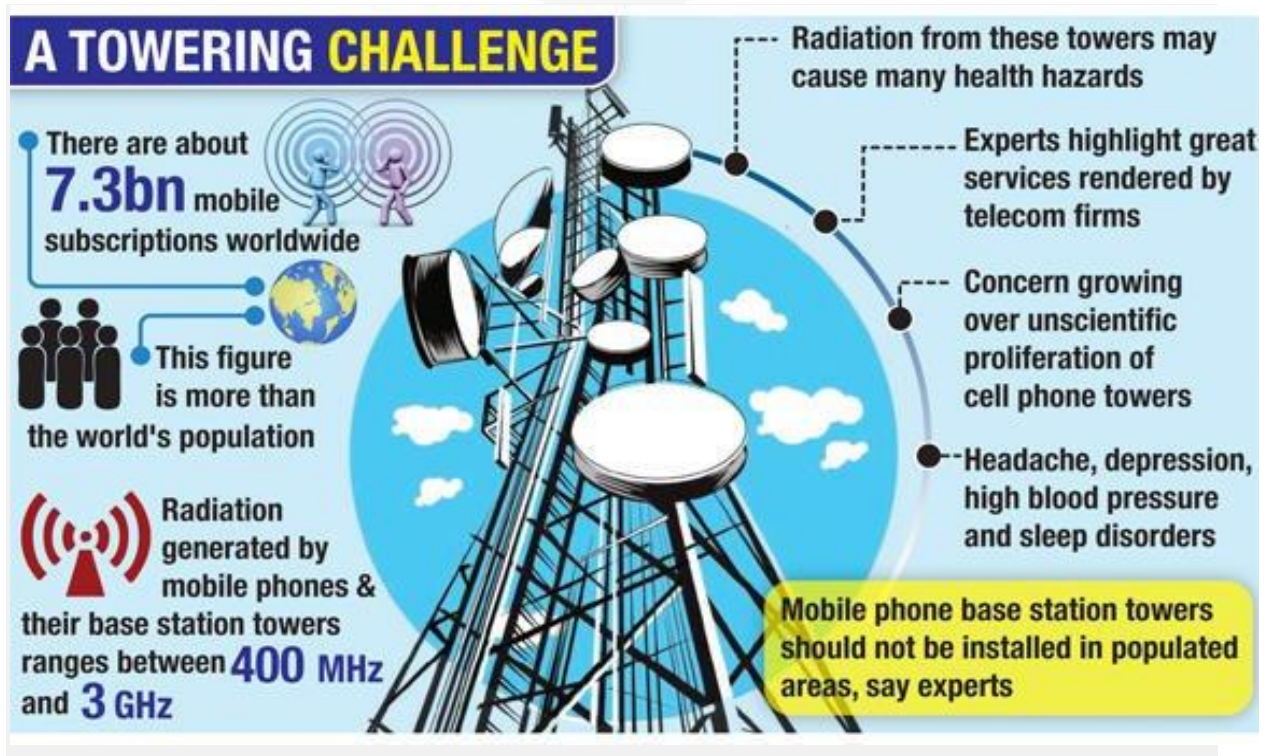
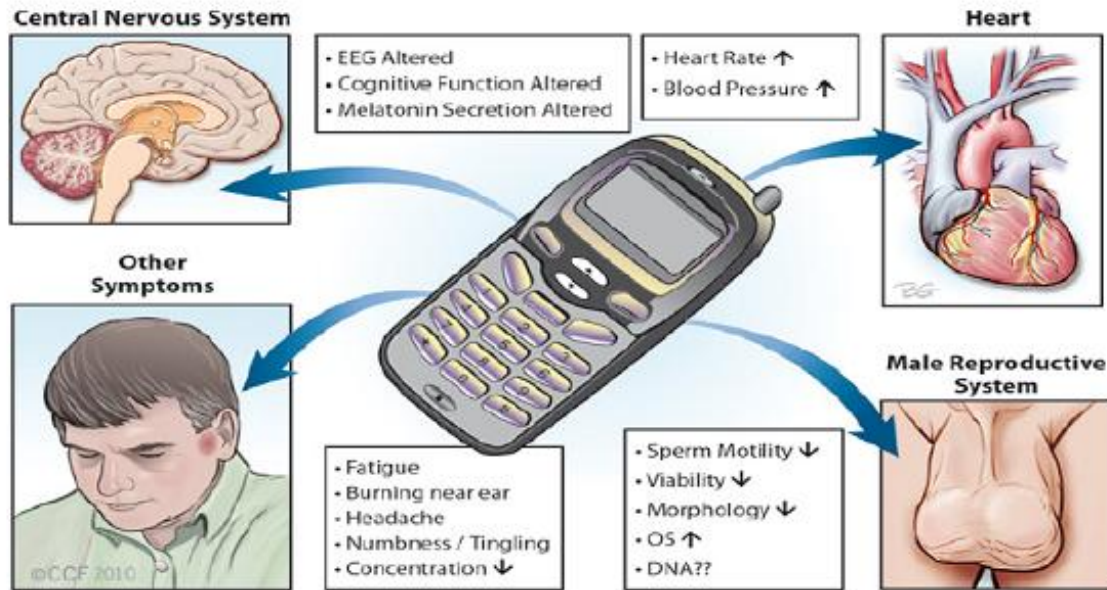


Figure 1: Towering challenges



**Figure 2: Organs affected by cell phones**

Safety is a legitimate concern of the users of wireless equipment, particularly, in regard to possible hazards caused by electromagnetic (EM) fields. There has been growing concern about the possible adverse health effects resulting from exposure to radiofrequency radiations (RFR), such as those from mobile communication devices. Mobile communication is where a signal is transferred via electromagnetic wave through radio frequency and microwave signals. This signal produces electromagnetic radiation in the form of thermal radiation that consists of harmful ionizing radiation and harmless non-ionizing radiation. When using the mobile phone, an electromagnetic wave is transferred to the body which causes health problems especially at the place near ear skull region where they are known to affect the neurons. The radiations interfere with the electrical impulses that two neurons connect with each other.

### **Radiation Effects on Humans**

Certain body parts are more specifically affected by exposure to different types of radiation sources. Several factors are involved in determining the potential health effects of exposure to radiation. These include:

The size of the dose (amount of energy deposited in the body)

The ability of the radiation to harm human tissue

### **Which organs are affected?**

The most important factor is the amount of the dose - the amount of energy actually deposited in your body. The more energy absorbed by cells, the greater the biological damage. Health physicists refer to the amount of energy absorbed by the body as the radiation dose. The absorbed dose, the amount of energy absorbed per gram of body tissue, is usually measured in units called rads. Another unit of radiation is the rem, or roentgen equivalent in man. To convert rads to rems, the number of rads is multiplied by a number that reflects the potential for damage caused by a type of radiation. For a beta, gamma and X-ray radiation, this number is generally one. For some neutrons, protons, or alpha particles, the number is twenty.

### **Hair**

The losing of hair quickly and in clumps occurs with radiation exposure at 200 rems or higher.

### **Brain**

Since brain cells do not reproduce, they won't be damaged directly unless the exposure is 5,000 rems or greater. Like the heart, radiation kills nerve cells and small blood vessels and can cause seizures and immediate death.

### **Thyroid**

The certain body parts are more specifically affected by exposure to different types of radiation sources. The thyroid gland is susceptible to radioactive iodine. Insufficient amounts, radioactive iodine can destroy all or part of the thyroid. By taking potassium iodide can reduce the effects of exposure.

### **Blood System**

When a person is exposed to around 100 rems, the blood's lymphocyte cell count will be reduced, leaving the victim more susceptible to infection. This is often referred to as mild radiation sickness. Early symptoms of radiation sickness mimic those of flu and may go unnoticed unless a blood count is done. According to data from Hiroshima and Nagasaki, show that symptoms may persist for up to 10 years and may also have an increased long-term risk for leukemia and lymphoma.

## **Heart**

Intense exposure to radioactive material at 1,000 to 5,000 rems would do immediate damage to small blood vessels and probably cause heart failure and death directly.

## **Gastrointestinal Tract**

Radiation damage to the intestinal tract lining will cause nausea, bloody vomiting, and diarrhea. This occurs when the victim's exposure is 200 rems or more. The radiation will begin to destroy the cells in the body that divide rapidly. These including blood, GI tract, reproductive and hair cells, and harm their DNA and RNA of surviving cells.

## **Reproductive Tract**

Because reproductive tract cells divide rapidly, these areas of the body can be damaged at rem levels as low as 200. Long-term, some radiation sickness victims will become sterile.

## **RESULTS AND DISCUSSION:**

After the examination of group 1 and group 2 we come to a conclusion as follows:

3-5 hr- 27%

1-2 hr - 26.56%

5-10 hr - 21.63%

10-20 hr - 11.9%

Other: 9.14%

A significant change in behavior, i.e., more anxiety and poor learning was shown by test people as compared to controls and sham group. Histological examination showed neurodegenerative cells in hippocampal subregions and cerebral cortex.

## **ACKNOWLEDGEMENTS:**

The authors wish to thank Principal Dr. C. S. Magdum and Vice-Principal Dr. S. K. Mohite of Rajarambapu College of Pharmacy Kasegaon, for giving us the chance for this study and also thanking Mr. P. S. Kore.



## REFERENCES:

1. Electromagnetic fields and public health, mobile phones available at URL: <http://www.who.in/int/mediacentre/factsheets/fs193/en/>
2. Volkow ND, Tomas D, Wand GJ, et al. Effects of cell phone radiofrequency signal exposure on brain glucose metabolism. *JAMA*. 2011; 305(8):808 – 813. (PMC free article)
3. The INTERPHONE Study Group. Brain tumor risk in relation to mobile telephone use: results of the INTERPHONE international case-control study. *International Journal of Epidemiology*. 2010; 39(3):675–694.
4. Mena R, Kumari K, Kumar S, Rajamani P, Verma HN, Kesari KK (2014), Therapeutic approaches of melatonin in microwave radiation-induced oxidative stress-mediated toxicity on male fertility pattern of Wistar rats, *Electroniagn Bid Fled.*; 33(2):81-91.
5. Johansen C, Boice J, Jr, McLaughlin J, Olsen J. Cellular telephones, and cancer: a nationwide cohort study in Denmark. *Journal of the National Cancer Institute*. 2001; 93(3):203–207.
6. RYAN GORMAN. [March 2014]. <http://www.dailymail.co.uk/news/article-2591148/>
7. <http://www.fda.gov/Radiation, Emitting Products/Radiation>
8. Gandhi G, Singh P (2005). Cytogenetic damage in mobile phone users: Preliminary data titled *Hum Genet* 5(4): 259-265.
9. Gandhi G, Anita (2007). Genetic damage in mobile phone users. Some preliminary findings *Int J Hum Genet* 11(2): 99-104.
10. Kesari KK and Behan J (2008), Comparative study of 900 MHz and 2.45 GHz radiation effect on reproductive system of male rats. In *Recent Advances and Challenges in Reproductive; Health Research*, eds. RS Sharma et al, pp 363-377.
11. Ahamed VI, Kartick NG, Joseph PK (2008), Effect of mobile phone radiation on heart rate variability, *Comput Biol. Med.* 35(6): 709-12.
12. Panda et al (2010). Audiologic disturbances in long-term mobile phone users, *J Otolaryngology Head Neck Surg.*, Chandigarh, 1; 39(1):5-11.
13. Parkar MA, Ahmed R, Abdullah BB, Pail BS, Das KK (2010). Effect of cell phone exposure on physiologic and hematologic parameters of male medical students of Bijapur (Karnataka) With reference to serum lipid profile. *J Basic Clin PhysiologyPharmacol.* 21(2): 201-10.
14. C. M. Chaturvedi, V. P. Singh, P. Singh, P. Basu and M. Singaravel (2011). 2.45 ghz (Cw) Microwave Irradiation Alters Circadian Organization, Spatial Memory, DNA Structure In the Brain Cells And Blood Cell Counts Of Male Mice, *Mus Musculus Electromagnetic Research B*, Vol. 29, 23-42.
15. Sanjay Kumar, Kavindra Kumar Kesari, Jitendra Behan (2011). The Therapeutic effect of a pulsed electromagnetic field on the reproductive patterns of male Wistar rats exposed to a 2.45-GHz microwave field. *CLINICS* 2011; 66(7):1237-1245.
16. Dhama AK (2011). Study of electromagnetic radiation pollution in an Indian city. *Environ. Monit Assess*: 84(11): 6507-12.
17. Kesari KK, Kumar S, Behari J (2012). Pathophysiology of microwave radiation: effect on rat brain. *Appl Biochem Biotechnol*; 166(2):379-88
18. Behari J, Nirala JP (2013), Specific absorption rate variation in a brain phantom due to exposure by a 3G mobile phone: problems in dosimetry. *Indian J Exp Biol.*; 51(12):1079-85.
19. Kesari KK, Siddiqui MH, Mena R, Verma HN, Kumar S (2013), Cell phone radiation exposure on brain and associated biological systems, *Indian J Exp Biol.*; 51(3):187-200.
20. Shahin S, Mishra V, Singh SP, Chaturvedi CM (2014), 2.45-GHz microwave irradiation adversely affects reproductive function in male mouse, *Mus musculus* by inducing oxidative and nitrosamine stress. *Free Radica Res.*; 48(5):511-25.
21. Kesari KK, Mena R, Wirala. J, Kumar J, Verma HN (2014), Effect of 3G cell phone exposure with computer controlled 2-D stepper motor on non-thermal activation of the hsp27/p38MAPK stress pathway in rat brain. *Cell Biochem Biophys.*; 68(2); 347-58.