

A Review on Health Risks Due to Mobile Phones Usage

Dr. Gopal Arora, Namrata Arya

SOBAS, Sanskriti University, Mathura, Uttar Pradesh, India

Email Id- drgopalarora.chem@sanskriti.edu.in

ABSTRACT: *Mobile phones are becoming an increasingly significant component of our daily lives. This is one of the most significant forms of communication. Over the last two decades, the exponential development in mobile phones has increased the volume of non-ionizing radio waves, making the potential dangers of human body exposure to radio frequency electromagnetic fields a serious worry for society. Although the use of mobile phones is increasing at an alarming rate, the effects of radiation exposure on human health, the influence of blue light on human eyes, and macular degeneration and its consequences have all been explored and are the topic of heated discussion. The Specific Absorption Rate is a measurement of how quickly the human body absorbs radiation, and government regulatory bodies in many countries have established limit values for contemporary phones. It's scarier since the radiation is undetectable and enters and exits our bodies without our knowledge. Radiation waves induce a 0.3-degree increase in temperature on the surface of the brain at most. It is unknown whether or not this sort of temperature increase has biological implications. The temperature of the brain changes by roughly one degree on a regular basis, and cells are only destroyed after a five-degree rise in temperature. Men's sperm cells are destroyed by mobile phone radiation, causing them to lose reproductive changes and experience mental health problems, according to the cell phone radiation test.*

KEYWORDS: *Blue Light, Health Risk, Mobile phone, Radiation, Radio frequency, Thermal Effect.*

1. INTRODUCTION

Modern technology has brought comfort and ease to human civilization, but these technical and communication instruments are also accompanied by a slew of other unavoidable elements. Electromagnetic radiation is one of these variables that is employed in mobile phones and wireless devices for signal transmission. EMF radiation has been linked to a variety of negative health, development, reproductive, immune system, growth, sleep, skin, and cognitive impacts, according to a number of studies. The link between mobile phones and memory loss has been investigated in a variety of methods. Due to their smaller heads, thinner skulls, and greater tissue conductivities, children can consume more energy from a given phone than adults. The power levels of wireless devices are restricted by international rules on microwave frequency exposure limits, and exceeding these guidelines is uncommon for wireless equipment. Furthermore, because non-thermal impacts have yet to be demonstrated clearly, these guidelines only take thermal effects into consideration. The topic of whether microwave radiation released by mobile phones (radio-frequency modulated electromagnetic fields (RF-EMF): might cause health problems remains unresolved. RF-EMF has biological impacts, according to several recent evaluations of amended published studies, is important and trustworthy scientific evidence. Earlier in vivo and in vitro research suggested that RF-EMF exposure might affect the permeability of the blood-brain barrier [1].

There are also studies, however, where authors claim that non-thermal RF-EMF radiation levels do not affect the permeability of the blood-brain barrier. Microwaves can cause or encourage cancer, and the symptoms associated with its use include sleep disturbance, memory problems, headaches, nausea, and dizziness. There were also records of improvements in the blood brain barrier permeability, electroencephalographic activity, and blood pressure [2], [3].

However, some research suggest that non-thermal RF-EMF radiation levels have no impact on the permeability of the blood-brain barrier. Microwaves have been linked to sleep disturbances, cognitive difficulties, headaches, nausea, and dizziness, among other symptoms. Improvements in blood brain barrier permeability, electroencephalographic activity, and blood pressure were also documented. While mobile phones are meant to function at power levels below a threshold for recognized thermal impacts, radio frequency radiation can have additional, biological consequences. Users of wireless devices have a genuine worry about security, particularly when it comes to possible risks posed by electromagnetic fields (EM). The possible negative health consequences of radiofrequency radiation (RFR), such as those emitted by mobile communications devices, have been a growing source of worry. The signal is conveyed by electromagnetic

1.3. Impact Of Blue Light On Human Eyes

Light is relayed by smart phones, laptops, and other portable gadgets. However, blue light, in particular, may be harmful to the skin. Macular degeneration is the result of photoreceptor cell loss in the retina. The goal of photoreceptor cells is to gather and transmit visual images to the brain via a substance called retinal. The retinal, which is generated by the eye, is stimulated by blue light, which causes various chemical processes. These processes within the eye can be harmful to the photoreceptor's cell molecules, causing damage. When photoreceptor cells die, they do not regenerate. "The toxicity of blue light to the retina is ubiquitous. It has the ability to kill any sort of cell "Part of this might be due to the fact that blue light has a shorter wavelength than other colors and hence has greater energy. The additional energy might explain the retinal-generated toxicity that this chemical shift has created. Phone [6] Blue Light The combination of blue light and retinal damage can harm cells; however, the studies were done in a laboratory setting rather than on human eyes. It's uncertain if cell death is triggered by blue light in the eye itself, according to studies [8].

The topic of whether blue light from mobile phones and digital screens cause's similar degrees of toxicity remains unresolved, and it is presently being investigated. Although age-related macular degeneration affects people of all ages, it is more common after the age of 60. Experts believe that, with the growing usage of blue light technology, this will happen sooner. According to the Bright Focus Foundation, as many people as ever suffer age-related macular degeneration. By 2050, this number is anticipated to reach 22 million. Blue light is emitted not just by our electronic devices, but also by natural sunshine. Certain circumstances, such as utilizing night gadgets, might exacerbate the blue light.

In reality, the produced blue light filters the light into a very small region within the pupil in the dark. This impact is likened by one of the study's authors to using a magnifying glass in the sun, which may produce light so intense and focused that it can burn the eyes. The blue light from such screens gadgets can also cause dry eyes.

"Studies have indicated that increased usage of iPhones, iPads, and laptops has resulted in an increase in dry eye development owing to a decreased blink rate." The less individuals blink, the more they engage with their gadgets over time. A number of technological firms have already proposed potential counter-measures to this tendency. Apple has a "night shift" setting, while Samsung has a "blue light filter" that reduces the amount of blue light reflected on the device's screen. Former suggests "considering decreasing the time spent on these devices" and "providing your eyes a break while performing long activities on the screen." To assist relax eye muscles and relieve unneeded strain, he recommends closing your eyes for a short time or looking into the distance. Although this study is useful for people who are at risk of developing degenerative eye diseases, it is another reason for everyone else to restrict their screen time, especially after sunset.

1.4. Hazardous Effect On Human Health:

The effect of radio waves released by mobile phone contact can be characterized as thermal, non-thermal, or nontoxic in terms of handsets, especially when it comes to human health. The thermal effect occurs when the electromagnetic field of radio waves induces polar molecules to release dielectric heat, which kills tissues. When processing the message from radio waves, for example, any area of the brain may have injured nerve fibers if the temperature rises.

The non-thermal effect, which occurs when the temperature created by radio waves flows through the cell constantly, is next to the thermal effect (only the electrical current). Membrane, while Trans gets messages, and then the nontoxic effect, which includes chromosomal damage, alterations in the function of some genes, and a faster rate of cell division. Non-ionizing radiation and ionizing radiation are two kinds of electromagnetic radiation that have different biological consequences. Non-ionizing radiation includes radio waves, microwaves, infrared, and visible light waves, which lack the energy to break apart atoms and molecules and transform them into ions, which are electrically charged particles. This indicates that non-ionizing radiation in molecules does not cause cancer or any other illness in people since it does not particularly destroy genetic material (DNA).

Ionizing radiation such as X-rays and gamma rays can raise the risk of cancer, birth abnormalities, and genetic disorders by causing DNA mutations as a result of atomic and molecule ionization, especially at high doses.

There is no such thing as totally safe ionizing radiation. Dielectric heating is a well-known phenomenon of microwave radiation, in which the rotation of polar molecules caused by the electromagnetic field warms any dielectric substance (such as living tissue). When a person uses a mobile phone, the majority of the heating impact may occur on the head's surface, increasing the temperature by a fraction of a degree. The level of temperature rise in this scenario is an order of magnitude lower than that achieved after head exposure to direct sunshine.

The brain's blood circulation is able to rid of excess heat through local blood flow. Nonetheless, the cornea of the eye lacks this temperature-control mechanism, and a 2-hour exposure was found to cause cataracts in rabbits' eyes at SAR values of 100-140W/kg, resulting in lenticular temperatures of 41 ° C. There were no cataracts in the eyes of monkeys who were subjected to comparable circumstances. The carrier signal is commonly pulsed at low frequency due to the signaling methods employed by mobile phones.

The biological relevance of these modulations has been questioned. Some studies suggested that so-called "non-thermal effects" may be reinterpreted as a typical biological reaction to temperature increases. For example, German biophysicist Roland Glaser proposed that cells have multiple thermos receptor molecules that activate a cascade of second and third messenger systems, gene expression mechanisms, and heat shock protein production in order to protect the cell from heat-induced metabolic cell stress.

Due to the apparent stability of thermal equilibrium in their cell cultures, investigations like REFLEX are unable to detect the temperature changes that induce these alterations. Because stress proteins exist for both very low frequencies (ELF) and radio frequencies (RF) with very differing amounts of energy, some researchers believe they are unrelated to thermal effects. Using fluorine ox glucose injections and positron emission tomography, researchers discovered that radiofrequency radiation waves enhanced glucose metabolism in regions of the brain nearest to the mobile phone antenna, although the clinical relevance of this finding is uncertain [9] [10].

2. DISCUSSION

According to early study from the University of Toledo, the blue light emitted by our devices may cause macular degeneration. When the photoreceptor cells in our eyes die, macular degeneration occurs. According to a statement from the University of Toledo, blue light from our phones activates a molecule in our eyes called Retinal, which causes chemical processes that damage and destroy photoreceptor cells. Our blue light may not be powerful enough to harm our eyesight severely.

The Sun also produces a lot of blue light and is by far the most common cause of macular degeneration. Smartphone-related health issues may extend beyond eye strain. Spending time on your phone before bed might lower the synthesis of melatonin, making it more difficult to fall or sleep, according to research. Cell phone usage has also resulted in back and neck issues, as well as regular stress injuries in the hands.

2.1.How to Protect Eyes from Mobile Screen's Light

For many individuals, the benefits of smartphones outweigh the hazards to their health. Taking the correct actions now, on the other hand, will drastically minimize the chance of future smartphone vision issues. If you are not actively avoiding eye strain, consider taking these easy actions to decrease the risk of smartphone-related eye damage: Reduce the amount of glare: The brightness on your smartphone is probably set far higher than it needs to be. Reducing screen glare makes it simpler for eyes to operate the phone while also preserving battery life. Simply go into your phone's settings and reduce the brightness to a lower, more comfortable level. Adjust Text Size: If you have to squint to read on your phone, increase the default font size to make the on-screen text larger and easier to view. Remember to Blink: It may seem counterintuitive, but remembering to blink when using your smartphone will minimize the amount of stress you put on your eyes.

2.2.Advantages and Disadvantages of Mobile Phone Effect:

With the passage of time, innovation grows and moves at a quicker rate. The most important and widely used component of technology in our life is mobile phone technology. A mobile phone originated as a basic gadget with simply numbers and was mostly used for emergencies by most people. Cell phones today contain as many

devices as apps, such as phone calls, text messaging, photo capturing, internet access, calculator use, and so on.

People grow addicted to their mobile phones because they utilise them to access a wide range of services. For example, people can carry the phone outside owing to its size, network range, fully charged battery, essay link, and so on. There is no denying that mobile phones have several advantages. Mobile phones have several advantages, but they also have certain disadvantages. It has become a necessary component for everyone, but it is also becoming an addiction for the younger generation. When it comes to Bangladesh, nine out of ten young individuals in the city area own a mobile phone. They utilise it for a variety of reasons. Their popularity with mobile phones is increasing by the day. Mobile phone radiation is harmful to human health, according to medical scientists.

3. CONCLUSION

Cell phone usage is skyrocketing, but the majority of the world's population has no idea how cell phones influence human health. Globalization has become the new slogan. In this day and age, it's nearly impossible to live without technology. However, as this study demonstrates, any technology created to assist humans comes with some risks. Only a new, enhanced technology will be able to overcome these disadvantages of modern technology. Electromagnetic radiation may be found everywhere. Increasingly wireless communication services are predicted as artificial electromagnetic radiation becomes more prevalent.

There seemed to be no way to break this cycle. Scientists and engineers must build better and safer wireless networks and gadgets. Future mobile phones would be able to emit far less power because to smaller cell sizes, better antennas for base stations, and other sophisticated technologies, making technology a true blessing. Mobile phones emit a lot of near-field microwave radiation since they are so close to the user's head. Never before in history has such a huge section of the population been exposed to such high quantities on a regular basis.

As a result, there is worry that exposure might have long-term negative health consequences, including an increase in the risk of cancer. Despite the lack of scientific proof, the state, society, and business are obliged to cope with the relatively new mobile phone technology and its possible health concerns in a blameworthy manner. The fact that commercial interests are involved further complicates the matter. Any risk assessment and measures, however, should be based on systemic considerations. There is no other option for gaining public support of the final policy but to communicate these systemic principles to the public in a completely transparent manner. Cell phone usage is increasing at an exponential rate, but most people are unaware of how cell phones influence human health. Cell phone radiation has been linked to a variety of illnesses, including brain tumors, migraines, short-term memory loss, and several forms of heart disease, according to research. This new technology and human health has become a serious concern for safety due to the availability of different RF sources, such as mobile phone handsets and broadcast antennas that contribute to total ambient exposure. Nonetheless, additional efforts should be made to transform mobile radio communication into an effective, safe, and convenient system that benefits both India and the rest of the world.

REFERENCES

- [1] B. Sirav and N. Seyhan, "Effects of GSM modulated radio-frequency electromagnetic radiation on permeability of blood-brain barrier in male & female rats," *J. Chem. Neuroanat.*, 2016, doi: 10.1016/j.jchemneu.2015.12.010.
- [2] World Health Organization (WHO) and WHO, "Mobile Phone Use: A Growing Problem of Driver Distraction," *Technology*, 2011.
- [3] J. Ige, A. Banstola, and P. Pilkington, "Mobile phone use while driving: Underestimation of a global threat," *Journal of Transport and Health*. 2016, doi: 10.1016/j.jth.2015.11.003.
- [4] S. Thomée, A. Härenstam, and M. Hagberg, "Mobile phone use and stress, sleep disturbances, and symptoms of depression among young adults - A prospective cohort study," *BMC Public Health*, 2011, doi: 10.1186/1471-2458-11-66.
- [5] G. Taino, P. Paraluppi, M. Giorgi, M. I. D'Orso, and B. Piccoli, "Occupational diseases caused by artificial optical radiations (AOR)," *Med. Del Lav.*, 2013.
- [6] P. Frei, A. H. Poulsen, C. Johansen, J. H. Olsen, M. Steding-Jessen, and J. Schüz, "Use of mobile phones and risk of brain tumours: Update of Danish cohort study," *BMJ*, 2011, doi: 10.1136/bmj.d6387.

- [7] N. Arjmandi, G. Mortazavi, S. Zarei, M. Faraz, and S. A. R. Mortazavi, "Can light emitted from smartphone screens and taking selfies cause premature aging and wrinkles?," *J. Biomed. Phys. Eng.*, 2018, doi: 10.31661/jbpe.v0i0.599.
- [8] J. H. Oh, H. Yoo, H. K. Park, and Y. R. Do, "Analysis of circadian properties and healthy levels of blue light from smartphones at night," *Sci. Rep.*, 2015, doi: 10.1038/srep11325.
- [9] M. H. Repacholi, "Health risks from the use of mobile phones," 2001, doi: 10.1016/S0378-4274(01)00285-5.
- [10] E. H. Doeven *et al.*, "Mobile phone-based electrochemiluminescence sensing exploiting the 'USB On-The-Go' protocol," *Sensors Actuators, B Chem.*, 2015, doi: 10.1016/j.snb.2015.04.087.

