

# Review on Health Risks Associated With Mobile Phones Usage

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***Abstract: Mobile phones these days are becoming an important part of our life. This is one of the communication's most important media. The exponential rise in mobile phones has increased the amount of non-ionizing accompanying radio waves over the past two decades, the potential risks of human body exposure to radio frequency electromagnetic fields are a major concern for society. Although mobile phone familiarization and dependency is growing at an alarming rate, the effects of human health due to radiation exposure, the impact of blue light on human eyes, macular degradation and its impact have been discussed and become a subject of intense debate. The rate at which the human body absorbs radiation is measured by the Specific Absorption Rate, and government regulatory agencies in many countries have set their maximum levels for modern handsets. It is even more intimidating because this radiation is invisible and enters and leaves our bodies without our knowledge. The rise in temperature on the surface of the brain caused by radiation waves is 0.3 degrees at the most. It is not known that this type of temperature rise has biological significance. The brain's temperature normally fluctuates by about one degree, and cells become damaged only after a five-degree increase in temperature. According to the cell phone radiation test, men's sperm cells are damaged, causing them to lose reproductive changes and suffer mental health damage due to radiation from cell phones.***

***Keywords: Mobile phone, Health Risk, Radiation, Thermal Effect, Radio frequency, radio waves, Blue Light.***

## 1. INTRODUCTION:

Modern technology has provided human society with comfort and ease, but these technological and communication tools are also coupled with numerous other inevitable factors. These factors, which are used in cell phones and wireless devices for signal transmission, include electromagnetic radiation. Various research studies have shown that EMF radiation is responsible for different harmful health, development, reproduction, immune system, growth, sleep, and skin and brain effects. The relation between mobile phones and memory loss has been examined in various ways. Kids can consume more energy from a given phone than adults due to their smaller heads, thinner skulls and higher tissue conductivity. International guidelines on microwave frequency exposure levels restrict the power levels of wireless devices and exceeding guidelines is rare for wireless devices. Furthermore, these recommendations only take thermal effects into account, since non-thermal effects have not yet been shown conclusively. The question that remains unanswered whether microwave radiation emitted by mobile phones (radio-frequency modulated electromagnetic [1] fields: RF-EMF) could exert any harmful health effects. Numerous recent reviews of the revised published research have concluded that the fact that RF-EMF causes biological effects is significant and reliable scientific evidence. Earlier in vivo and in vitro studies indicated the possible effect of RF-EMF exposure on blood-brain barrier permeability.

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[2][3]. There were also records of improvements in the blood brain barrier permeability, electroencephalographic activity, and blood pressure.

While cell phones are designed to operate below a threshold for known thermal effects at power levels, radio frequency radiation can cause other effects, called biological effects. Security is a legitimate concern of wireless equipment users, especially with respect to potential hazards caused by fields of electromagnetic (EM). The potential adverse health effects arising from exposure to radiofrequency radiation (RFR), such as those from mobile communications devices, have been increasingly concerned. Mobile contact is where the signal is transmitted by radio frequency and microwave signals via electromagnetic wave. This signal produces electromagnetic radiation consisting of harmful ionizing radiation and harmless non-ionizing radiation in the form of thermal radiation. Electromagnetic wave is transmitted to the body when using mobile phones, which causes health problems especially in the area near the ear skull where they are known to affect the neurons. The radiations interact with the electrical impulses with which two neurons bind [4].

## 2. ELECTROMAGNETIC RADIATION

Electromagnetic radiation is a form of wave-like behaviour exhibiting energy as it travels through space. Electromagnetic radiation has components of both electrical and magnetic fields that oscillate perpendicular to each other in phase and perpendicular to the direction of the propagation of energy. Electromagnetic radiation can be categorized into ionizing radiation and non-ionizing radiation depending on whether it is capable of ionizing atoms and breaking chemical bonds. There are two major potential risks associated with non-ionizing radiation: electrical and biological. Extremely high electromagnetic radiation, when an induced voltage exceeds the breakdown voltage of the ambient medium, can cause electrical currents intense enough to produce sparks (electrical arcs). Then these sparks can ignite flammable materials or gases, which may result in an explosion. Extremely high electromagnetic radiation, when an induced voltage exceeds the breakdown voltage of the ambient medium, can cause electrical currents intense enough to produce sparks (electrical arcs).

Then these sparks can ignite flammable materials or gases, which may result in an explosion. To induce dielectric heating is the biological effect of electromagnetic fields. Complex biological effects of weaker non-thermal electromagnetic fields also exists, including weak Extremely Low Frequency magnetic fields and modulated Radio Frequency and microwave fields. Magnetic fields cause moving currents within the human body and these magnetic fields ' strength depends directly on the magnetic field's power. Such currents trigger activation of nerves and muscles that in turn affect biological processes. The effect of the weak EM radiation on humans can be understood as a sequence of events that involves exposure to EM radiation that, when absorbed, modulates the patterns of the biological environment, accumulates energy and information in the body fluid, changes the cell's functional activities that ultimately lead to some disease. The cellular phone has to emit radio frequency energy at levels high enough to reach base stations (antenna towers). Since the energy is generated in the direct vicinity of the user's head as a microwave, there are questions about this technology's health. Cell research as well as animal studies have indicated that there may be a small risk of developing cancer tumours, most of which are brain tumours[5] in cell phone users.

Depending on the level of exposure, radiation may directly affect individuals and the offspring. Radiation can affect cells of the body, increasing the risk of cancer or harmful genetic mutations that can be passed on to future generations; or, if the he dosage is large enough to cause massive tissue damage, it may lead to death within a few weeks of exposure.

### **3. SPECIFIC ABSORPTION RATIO (SAR)**

SAR is a measure of the amount of radio frequency (RF) energy consumed by the human body's tissue that is expressed in watts per kilogram. This test is used to determine if the safety guidelines are met by a cell phone. The exposure limit takes into account the ability of the body to remove heat from the tissues that absorb energy from the cell phone and is well below the levels known to have biological effects. The U.S. Federal Communications Commission (FCC) & International Commission for Non-Ionizing Radiation Protection (ICNIRP) recommends that the placed SAR in the head should be limited to an average of 1.6 to 2 Watts per kilogram over any 10 g tissue mass in the head.

The human head absorbs some of the radio waves generated by a mobile phone handset. The radio waves produced by a GSM handset can have a peak power of 2 watts, and the average transmission power of a US analog phone was 3.6 watts. Other mobile digital technologies, such as CDMA2000 and D-AMPS, use lower output power, typically less than 1 watt. A mobile phone's maximum power consumption is governed by the mobile phone standard and each country's regulatory agencies. In most systems, the reception quality and signal intensity are tested by the cell phone and base station, and the power level is increased or reduced.

### **4. IMPACT OF BLUE LIGHT ON HUMAN EYES**

Smart phones, computers, and other handheld devices all relay light. Nevertheless, the blue light in particular may be dangerous for skin. The effect of photoreceptor cell death in the retina is macular degeneration. Photoreceptor cells have the purpose of collecting and transmitting visual images to the brain using a molecule called retinal. Blue light stimulates the retinal, which is produced by the eye, which induces numerous chemical reactions. These reactions within the eye can be toxic to the cell molecules of the photoreceptor, causing damage to them. There is no regeneration when these photoreceptor cells die. "Blue light retinal toxicity is universal. It can destroy any type of cell, "part of this explanation may be because, compared to other colours, blue light has a shorter wavelength and thus has more energy. The extra energy can be the explanation for the retinal-generated toxicity caused by this chemical change. Phone Blue Light [6]. The blue light and retinal combination can damage cells; the experiments have been conducted in a laboratory setting, not on the eyes. The research to understand the mechanism and ability to which blue light triggers cell death is unclear if it occurs in the eye itself.

It is an unanswered question whether blue light from mobile designs and digital screens induces similar levels of toxicity and is currently under investigation. Although macular degeneration associated with age affects people of all ages, it is most likely after age 60 to occur. Experts, however, suspect that with increased use of blue light technologies this may come sooner. As many people now have some form of age-related macular degeneration, according to the Bright Focus Foundation. It is expected that this number will reach 22 million by 2050. Blue light not only comes from our digital devices, but also from natural sunlight. Often, certain conditions like using the night devices can also worsen the blue light [7]. For fact in the dark, the emitted blue light filters the light into a very small area within pupil. One author of the study compares this effect to the use of a magnifying glass in the sun

that can make light so bright and concentrated that it can burn eye. Such screened devices ' blue light can also lead to dry eyes.

"Studies have shown that the increased use of iPhone, ipads and laptops has led to an increase in dry eye development due to a reduced blink rate," Over time, the less they blink, the more people engage with their devices. A variety of technology companies have already developed possible solutions to help counter this trend. Apple currently offers the setting for the "night shift," and Samsung offers a "blue light filter" to reduce the amount of blue light reflected on the device's screen. Former advises that you "consider reducing the time on these machines" and "giving eyes a break while conducting lengthy tasks on the screen." He suggests that you simply close eyes for a short time or look at the distance to help relax eye muscle and reduce unnecessary pressure. Although this study is good information for those who are at risk of degenerative eye conditions, it's yet another reason for everyone else to consider limiting their exposure to the screens especially after sunset.

## **5. HAZARDOUS EFFECT ON HUMAN HEALTH**

With regard to the handsets, the effect of radio waves emitted by cell phone contact can be classified as thermal, non-thermal and nontoxic, particularly with specific reference to human health. Thermal effect is one that allows the electromagnetic field of radio waves to induce polar molecules that emit dielectric heat that causes the tissues to die. For example, any part of the head may have damaged nerve fibres when processing the message from radio waves if there is an increase in temperature.

Next to the thermal effect is the non-thermal effect in which the temperature produced by radio waves passes through the cell continuously (only the electrical current). Membrane, while Trans receives messages and finally the nontoxic effect, which involves chromosome damage, changes in the function of some genes, and a boosted cell division rate. EM radiation can be divided into two types according to their biological effects: non-ionizing radiation and ionizing radiation. Radio waves, microwaves, infrared, visible light waves are non-ionizing radiation that do not have enough energy to break apart atoms and molecules and turn them into ions, which are electrically-charged particles. This means that non-ionizing radiation in molecules does not specifically harm genetic material (DNA) and therefore cannot cause cancer or any other disease in humans.

X-rays and gamma rays are sources of ionizing radiation that can increase the risk of cancer, birth defects and genetic defects via DNA mutations resulting from atomic and molecular ionization, especially at high doses. There is no ionizing radiation that is completely safe. One well-understood effect of microwave radiation is dielectric heating, in which the rotation of polar molecules induced by the electromagnetic field heats[8] any dielectric material (such as living tissue). In the case of a person using a cell phone, most of the heating effect may occur on the head's surface, causing a fraction of a degree to increase its temperature. In this case, an order of magnitude less than that obtained during head exposure to direct sunlight is the level of temperature increase.

Through local blood flow, the blood circulation of the brain is able to dispose of excess heat. Nevertheless, the cornea of the eye does not have this function for controlling temperature, and a 2-3-hour exposure was reported to produce cataracts in the eyes of the rabbits at SAR values of 100-140W / kg, which created lenticular temperatures of 41 ° C. In the eyes of monkeys treated to similar conditions, no cataracts were observed. The signalling protocols used by mobile phones frequently contribute to the carrier signal being pulsed at low frequency.

It has been questioned whether these modulations have biological significance. Some researchers argued that it would be possible to reinterpret so-called "non-thermal effects" as a

normal cellular response to temperature increase. For example, the German biophysicist Roland Glaser proposed that there are several thermo receptor molecules in cells and that they activate a cascade of second and third messenger systems, gene expression mechanisms, and heat shock protein production to protect the cell against heat-induced metabolic cell stress.

The temperature increases that cause these shifts are too small to be observed by studies such as REFLEX, based on the apparent stability of thermal equilibrium in their cell cultures. Some researchers believe that the stress proteins are unrelated to thermal effects because they exist for both extremely low frequencies (ELF) and radio frequencies (RF) with very different levels of energy. Using fluoride ox glucose injections and positron emission tomography concluded that exposure to radiofrequency signal waves within parts of the brain closest to the cell phone antenna resulted in increased levels of glucose metabolism, but the clinical significance of this finding is unknown[9].

## **6. BLUE LIGHT & MACULAR DEGENERATION**

The University of Toledo's very preliminary research reports that the blue light generated from our electronics may be through cases of macular degeneration. Macular degeneration happens when the photoreceptor cells in our eyes are to die. The blue light from our phones triggers an eye molecule called Retinal, which in turn produces chemical reactions that damage and kill photoreceptor cells, according to the statement from the University of Toledo. Our blue light may not be strong enough to cause extreme damage to our eyesight.

The Sun also generates much higher levels of blue light and is by far the primary candidate for macular degeneration. Health problems caused by smartphone may not end with eye strain. Research has shown that you can reduce the production of melatonin by spending time on cell phone before bed, making it harder for you to fall or sleep [10]. The use of cell phones has also caused problems with the back and neck and frequent stress injuries in the hands[11].

## **7. HOW TO PROTECT EYES FROM MOBILE SCREEN'S LIGHT**

Smartphones are important to our lives and much worth their health risks to many people. Today, however, taking the right steps will dramatically reduce the risk of future problems with smartphone vision. Consider taking these quick steps to reduce the risk of smartphone-related eye damage if you are not actively avoiding eye strain: Switch the Glare down: Chances are, the brightness setting of smartphone is much higher than necessary. Reducing screen's glare will make it easier for eyes to use phone and can also help preserve battery life. Simply access the settings of phone and adjust to a lower, more comfortable level of brightness. Adjust Text Size: If you have to squint to read on phone, try making the default font larger so that you're on-screen text will be bigger and easier to see. Remember to Blink: It may sound strange, but remembering to blink while using smartphone will reduce the stress you place on eyes.

## **8. ADVANTAGES AND DISADVANTAGES OF MOBILE PHONE EFFECT**

Innovation is growing faster as time goes by and moving faster. Mobile phone technology is the most significant and popular aspect of technology in our lives. A mobile phone began as a simple device that only had numbers, and most people only used them for emergencies. Cell phones now have as many gadgets as many apps like phone calls, text messaging, taking pictures accessing the internet, using calculator, etc.

People become addicted to cell phone because they use it to get a lot of services. For example, if they go outside, due to their size, network range, full charge battery, essay link, etc., they can take the phone with them. There is no question about the advantages of mobile phones. There are so many benefits for mobile phones, but there are also some drawbacks. For every individual it has become a vital element, but nowadays it is also becoming an addiction to the young generation. When talk about Bangladesh, there's a mobile phone owned by nine out of ten young people in the city area. They use it for different purposes. Their mobile phone attraction is growing day by day. Medical science says mobile phone radiation is too bad for human health.

## 9. CONCLUSION

Cell phone use is growing enormously high, but most of the world's people have no understanding of how cell phones affect human health. The new mantra is globalization. It's very hard not to have technology in this era. But as shown in this study, there are certain hazards that come with every technology invented to facilitate human beings. Only a new, improved technology is the way to beat these negative aspects of new technologies. Everywhere is the electromagnetic radiation. As the artificial electromagnetic radiation is expected, more and more wireless communication services are expected.

There seems to be no way of stopping this pattern. Wireless systems and devices need to be developed better and safer by scientists and engineers. Smaller cell size, improved antennas for base stations and other more advanced technologies would allow future cell phones to radiate much less power and make technology a real boon. Mobile phones run close to the user's head in a comparatively high degree of near-field microwave radiation. Never before have had such high concentrations existed in such a large proportion of the population on a regular basis in history.

Consequently, there is concern that exposure can lead to long-term adverse health effects and an increase in the incidence of cancer in particular. State, society and industry are forced to deal with the relatively new mobile phone technology and its potential health threats in a blameable manner, despite the fact that the scientific evidence is incomplete. The situation is complicated by the fact that economic interests are involved as well. Nonetheless, any risk assessment and precautions should be based on systemic grounds. There is no alternative to presenting these systemic premises to the public in a fully open manner in order to gain approval of the resulting policy. Cell phone use is growing exponentially on a daily basis, but most people have no understanding of how cell phones affect human health. Research suggests that cell phone radiation is responsible for many diseases such as brain tumour, migraine, short-term memory loss, various types of heart disease, etc. In the presence of various RF sources, including mobile phone handsets and broadcast antennas that contribute to the overall environmental exposure, this new technology and human health has become a major concern for safety. Nonetheless, more efforts should be made to turn mobile radio communication into an effective, safe and convenient system that is useful for welfare in India and for global society.

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