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Review Article

A Review on Effects of Radiation on Adults and Children

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ABSTRACT

Mobile communication is now essentially ruling our daily lives through better connectivity and intelligent Smartphone services. There has been a tremendous growth in Indian communication industry along with growing concerns regarding health effects of mobile radiation exposure. As our lives are increasingly spent staring at phones, laptops and televisions. Possible adverse health effects in inhabitants living near mobile base station, Symptoms like headache, fatigue, dizziness, sleep disturbances, cardiovascular symptoms, depression and difficulties with concentration and memory. Children are also use laptops, tablets and other devices directly on their bodies are worrisome. Radiating fields are at the highest intensity at zero-distance, and are likely used in the lap for long durations of time. This increases the potential health risks, especially in children. Their parents may think giving their children cell phones is great for safety reasons, as children are then able to communicate with them or ask for help at any time. However, it is important for educated parents to realize that cell phones and other mobile devices may pose a danger in itself to their young.

Keywords: Mobile; Radiation; Electromagnetic; Health

INTRODUCTION

This topic of radiation risk and medical imaging applies to all ages. However, it is particularly important in children. Children are relatively more vulnerable to radiation than adults. This is in part due to the fact that there is a longer life expectancy in which to manifest potential radiation induced cancers, which can be life-long. Cell phones are used electromagnetic radiation in microwave range around 2.5GHS. Cell phone technology uses radiation in the giga hertz range [1-3]. Radio wave emitted from mobile phone is absorbed by human. The rate at which radiation is absorbed by the human body is measured by the Specific Absorption Rate (SAR) and its maximum level of handset is set between 1.6 to 2w/kg, averaged for 1gm tissue [4-6]. If SAR limit is above the limit, it may cause both thermal and non-thermal effects on the body especially on the ear, eyes and head [7-9].

LITERATURE REVIEW

Mobile radiation

Mobile phone radiation and health concerns have been raised, especially following the enormous increase in the use of wireless mobile telephony throughout the world. This is because cell phones use Electromagnetic radiation in the Microwave range. These concerns have induced a large body of research in animals and in humans [10-12].

Nuclear radiation typically results from a few primary sources including neutrons, gamma rays, beta particles, and alpha particles. Just as with cell phone radiation, these particles emit energy in the form of a wave that then passes through the human body. Unlike the waves emitted from the aforementioned sources, nuclear radiation is much more likely to cause bodily harm [13-15].

There are two types of radiation: ionizing and non-ionizing.

Ionizing radiation: Ionizing radiation, flow of energy in the form of atomic and subatomic particles or electromagnetic waves that is capable of freeing electrons from an atom, causing the atom to become charged (or ionized). Ionizing radiation includes the more energetic end of the electromagnetic spectrum (X-rays and gamma rays) and subatomic particles, such as electrons, neutrons, and alpha particles (helium nuclei each comprising two protons and two neutrons). Here we are concerned with only one type of radiation, ionizing radiation, which occurs in two forms: waves or particles. There are several forms of electromagnetic radiation, which differ only in frequency and wavelength:

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- Infrared light
- Visible light
- Ultraviolet light
- X rays
- Gamma rays

Longer wavelength, lower frequency waves such as heat and radio have less energy than shorter wavelength, higher frequency waves like X and gamma rays. Not all electromagnetic (EM) radiation is ionizing [16-18]. Only the high frequency portion of the electromagnetic spectrum, which includes X rays and gamma rays, is ionizing. (e.g., x-rays, radon, sunlight) is high frequency (and high energy) (Figure 1).

Non-ionizing radiation (low energy is low frequency) radiation: The cell phones have non-ionizing radiation. Your phone sends radio frequency waves from its antenna to nearby cell towers. When you make a call, text, or use data, your phone receives radio frequency waves to its antenna from cell towers. Smart phones, laptops and other held devices also transmit light. These reactions with eye can be poisonous to the photo receptor cell molecules rendering them damaged. Blue light from your phone may permanently damaging eyes. Too much screen time also wreck our eyes. Pure black background with white font is really hard to read and it causes the halation. Dark mode cause eye strain [19-21].

Cell phones and vision problem

Frequently using of mobile phones leads to eye strain, blurred vision, dry eyes, sore eyes and head ache. Lower level of radiation can cause permanent damage to the lens leads to vision loss and cataracts [22-24]. Higher dose can damage the iris, conjunctiva, sclera and retina's blood vessels. Low intensity of blue light from smart phones is killed human retinal cells [25-27]. Short wave length blue light produced by low intensity displays such as smart phones have been identified as being damaging the human eye cells by a group of Koran researchers. A short wavelength blue light doubles the death rate in human retinal cell. Its 24hrs of exposure to the shortest wavelength blue light (449nm) caused the largest increase in ROS production. Almost twice as much as in control group which is kept in dark [28] (Figure 2).

"Joshua Duanaief" who research aging of retina at the university of Pennsylvania said that white light with blue wavelength peak at 449 nm, double the amount of cell death in dark control group [29,30]. 'This study suggests that is prudent to adjust the screen brightness than needed to do the work or enjoy the entertainment (Figure 3).

Smart phone affect a children development

Children who use smart phones and tablets are risk of potential irreversible eye damage because of the blue light emission from the digital devices. When give equal radiation dose, risk for children and adolescents are greater than for adults. Children are grown quickly and their cells are also more sensitive to radiation. The most common vision problem in school age children is blurry vision, which are caused by near sight endless (myopia) far slightness (hyperopic) and astigmatism results in blurry vision [31-33] (Figure 4).

Physical health: Less sleep is less able to focus. Unhealthy sleep cycle as kids sleep more during day and less at night (every 15 mins

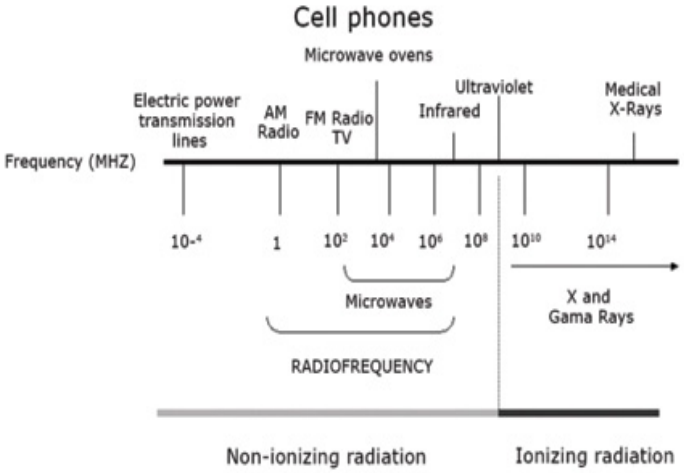

Figure 1: Various elements emiting radiofrequency and wavelength.

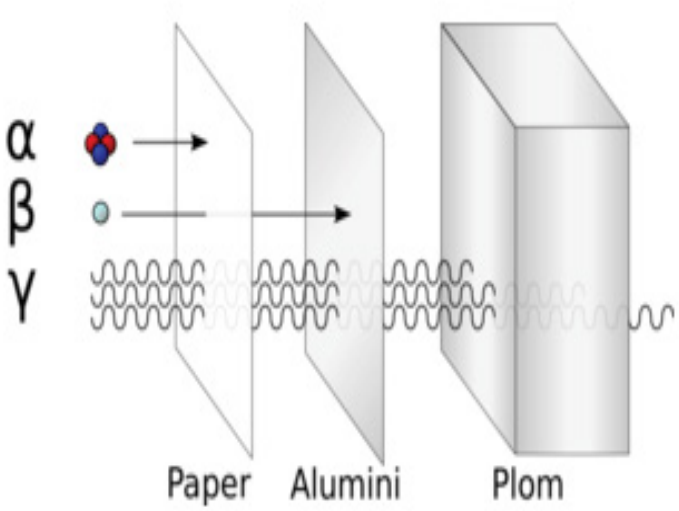

Figure 2: Transmissions of rays in various medium.

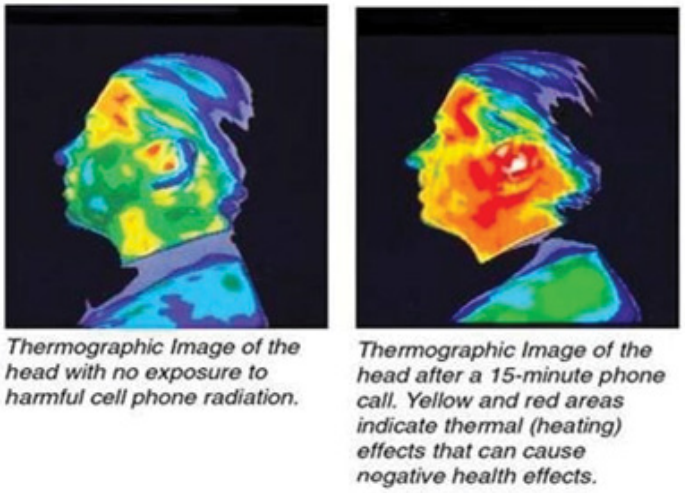

Figure 3: Before and after the cell phone usage of thermographic human head image.

uses a smart phone, they loss 60 mins of sleep). Children can affect various physical problems such as weight loss/gain, insomnia, headache, poor nutrition and eye sight problem [34,35].

Mental health: Smartphone's, those digital portals of constant information, have become so integrated into most Americans'

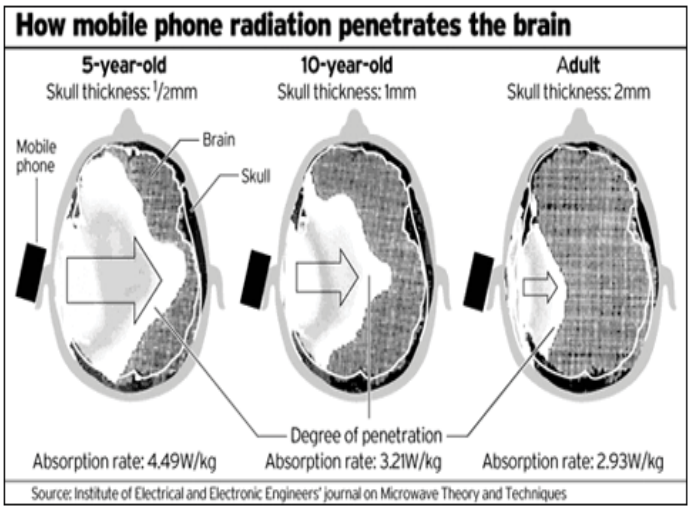

Figure 4: Explanation of the cell phone radiation penetrating the human brain.

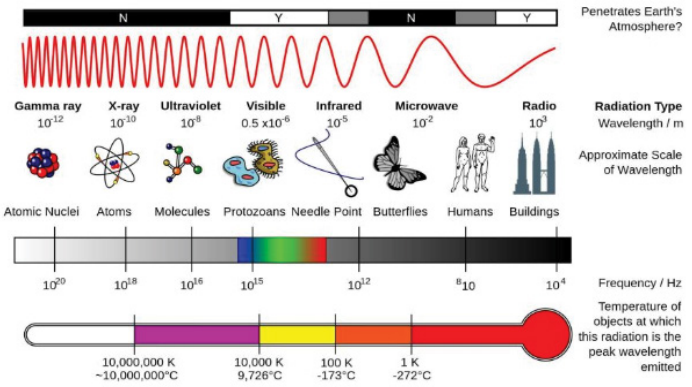

Figure 5: Explaining the various radiation wave lengths producing harmful effects in living organisms.

lives; they're like extra yet essential appendages. Some 72 percent of Americans own a Smartphone, compared to the global median of 43 percent. But studies have shown that overuse can have a negative impact on your posture, eyesight, and hearing, not to mention distract drivers and pedestrians. More recently, researchers who study the relationship of mobile phone use and mental health have also found that excessive or "maladaptive" use of our phones may be leading to greater incidences of depression and anxiety in users (Figure 5).

Behavior changes: May also become aggressive and easily irritable, Anxiety, loneliness, guilt, self-isolation, depression, agitation, and mood swings.

Physical symptoms looking at your phone screen night cause:

- Eye pain
- Eye strain
- Impaired vision
- Blinking dysfunction
- Eye dryness
- Migraines
- Photophobia
- Preventions
- Blink, blink and blink again
- Minimize glare
- Take breaks
- Adjust your brightness
- Tweak your text size and contrast
- Keep a clean screen
- Hold your phone farther away

Screen time guideline for kids

- **Younger than 18 months:** Avoid use of screen media other than vide chatting with family members.
- **Toddlers 18-24 months:** Choose high-quality programming. Parents should watch it with children and help them to understand what they are seeing
- **Pre-schooler 2-5 years:** Limit screen use time parents should co-view with children
- **Children aged six and older:** Does not take the place of adequate sleep, physical activity and other behaviour essential to health.

CONCLUSION

From this review we can know about how mobile radiation can affect the children as well as adults. More than adults the children are most affected by mobile radiation. The adults are to be aware when their children are left with mobile or any electronic gadget for entertainment, that there is risk for the child's health. We should provide good and healthy environment for our children.

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