

A Precautionary Study of Mobile Phone Radiations

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Abstract- In the earlier days, mobile phones were used only for communication, but nowadays with the advancement of technology, mobile phones become the essential part of our daily life. Mobiles are used not only for communication but also include gaming, SMS, GPRS, social networking, online games, online shopping etc. Now mobile phones are available with variety of smart application. But the radiation emitted by mobile phones are very dangerous to our health. We must be aware of its harmful effects and should follow the precautionary methods to avoid it. In this paper, we have discussed mobile radiation, SAR limits and its precautionary methods.

Keywords- Mobile Phone, Electromagnetic Radiations, SAR, ICNIRP, Non-Ionizing Radiation, Ionizing Radiation.

I. INTRODUCTION

Radiation is one kind of energy i.e. generated from a source and travels in the space. This energy may also penetrate into various objects like materials, human body and other things present in the environment. A spectrum has been formed by radiation energies i.e. known as an electromagnetic spectrum. This spectrum categorizes the radiation into two categories:

A. Non ionizing radiation

Light, heat, mobile phone wave's energy etc. come under this category of radiation.

B. Ionizing radiation

Cosmic rays, X-rays, and radioactive particles etc. come under this category.

Radiation is a part of life. There is an ocean of radiation around us. Sun emits light and heat that are natural form of radiations and these types of radiations are very essential for human being to exist on earth. There are some other forms of radiation which are generated by human. E.g. one example, a cooking appliance microwave oven spreads electromagnetic radiation, i.e. very hazards to human health. Another example is radio waves that are used for communication purpose. Mobile phone radiation comes under the category of non-ionizing radiation. We are living in an environment where mobile play a very important role in human life. Without

mobile phone human life cannot be fully elaborated nowadays [8]. In mobile phones electromagnetic energy are used in the range of microwaves [4]. Human health growth is reducing due to mobile radiation energy day by day [1]. In 2011 international agency for research on cancer (IARC) categorized mobile radiation as GROUP-2B. GROUP-2B is possibly carcinogenic. This means that usage of mobile phones causes some risk of carcinogenicity because mobile device emits radio waves that are absorbed by the body [6].

II. MOBILE RADIATIONS: PRESENT SCENARIO

From the recent studies it was cleared the global mobile connections are increasing day by day due to falling in prices and increasing speeds [7]. The Fig.1: shows the global mobile connections statistics for year 2013 (source: www.4gamericas.org). This is the main reason for the increase in amount of radiations in our environment.

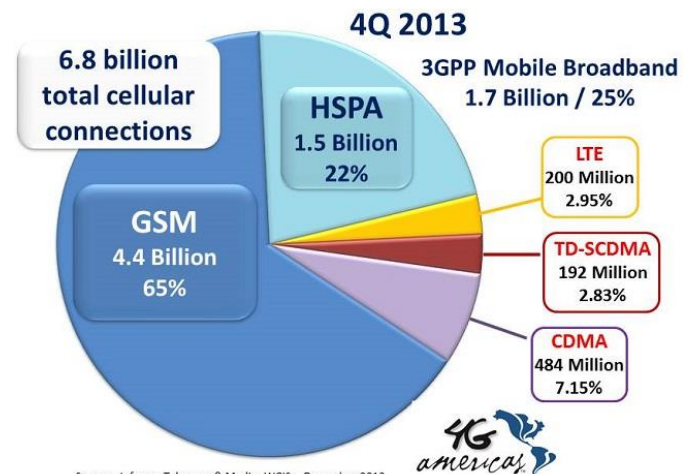


Fig. 1: Global Mobile Connection

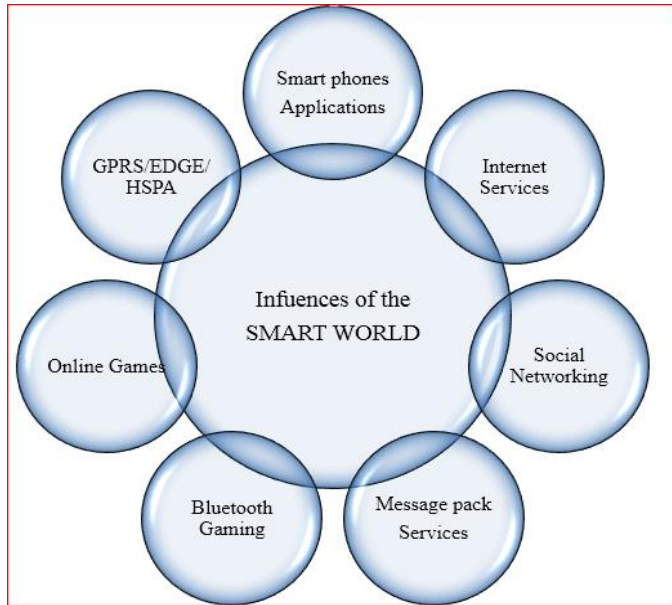


Fig.2: Influence of smart world

III. SAR (SPECIFIC ABSORPTION RATE)

SAR is the measure of radiation absorbed by human body. SAR value has been set by governmental regulation agencies. In many countries SAR is limited by communication commissions [5]. The table shown below gives SAR standardization of two countries.

TABLE 1: SAR VALUE LIMITS

Country name	SAR limit (Watt/ Kg)	Head tissue (Gm)
U.S.A	1.6	1
EUROPE	2	10

SAR is expressed in watt/unit mass of tissue. SAR can be calculated by this given expression:

$$SAR = \frac{\sigma |E|^2}{\rho}$$

Where σ = tissue conductivity.

ρ = mass density.

E= field strength root mean square value.

A high value SAR mobile phone radiate more power, whereas low value SAR, lower will be the radiation [2].

IV. PRECAUTIONS

More use of mobile can damage our eyesight or increase our blood pressure. There are numerous effects of mobile phone on human body like high blood pressure, brain tumor, and cancer etc. We are living in a technology era, in which cell phone usage are increasing day by day [9]. This is very dangerous to human health [10]. We all are habitual to

mobiles and cannot live without mobile phone. So to save ourselves use mobile phone with some precautions, those are listed below:

A. Do not keep your phone under pillow

When a mobile phone even only switched on, then it also affects our body neurons [3]. So when a mobile phone is switched on, never put it near to the lower portion of body. Lower portion of body is more conductive as contrast to upper portion. A study proved that a mobile phone near the lower portion of the body reduce sperm count as much as 30 percent. Do not put mobile phones below the pillow at night, when it is switched on.



Fig. 3 (a): Precautions (Do not keep mobile under the pillow)

B. Keep Phones away from children

Keep mobile phones away from children. Mobile phones radiation affects children most, because children have developing neurons in their body. So suggest kids to use mobile in emergency only.



Fig. 3 (b): Precautions (Avoid children to use mobile)

C. Wait for the call to connect

If one person is using mobile phone without earphones, then he must wait for call to connect before placing the phone near the ear. It is because a mobile radiate more power at initial level to connect a call.

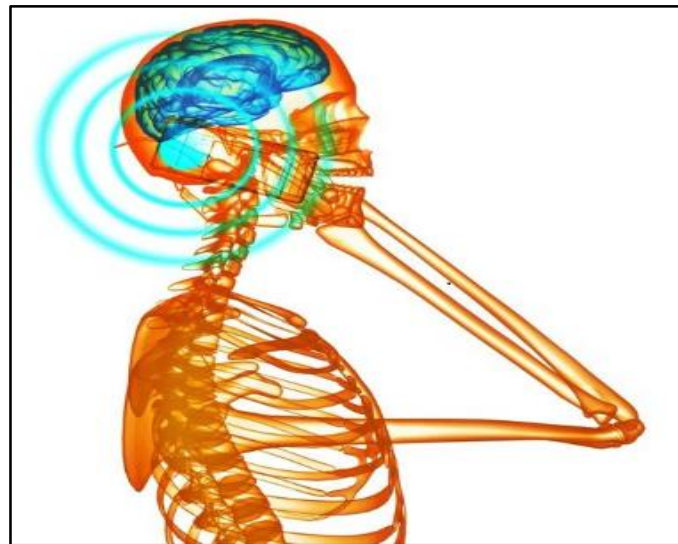


Fig. 3 (c): Precautions (radiation affects brain neurons)

D. Use Earphones/Bluetooth

Always use an extension cable (ear phones) or Bluetooth headset. When a person use mobile phone, better to use Bluetooth headset at place of wired headset. This is because; the wired headset attracts electromagnetic fields present in surrounding. So, wired headset is more intensive as contrast of Bluetooth headset.



Fig. 3 (e): Precautions (Use Bluetooth head phone while talking)

E. Check Signal Strength

To make a call always check the signal strength. If the signal strength is high, then only make the call. In those areas where the signal strength is poor, never do conversation on mobile. The signal strength graph (indicated in each mobile) for full signal, no signal, weak signal, average (OK) signal strengths is shown in fig 3 (f).

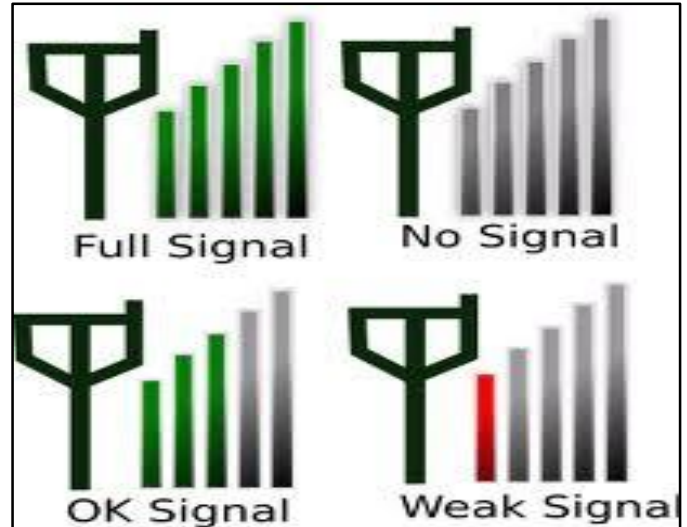


Fig. 3 (f): Precautions (signal strength indications)

F. Always Check SAR Value

SAR is most important parameter to check radiation per Kg for number of tissues. Always prefer lower SAR value when purchases a new mobile phone. Lower the SAR, lower will be the radiation. Now a days some companies are listing SAR on a sticker that places on back side body of mobile phones. Purchase that product which meets India's national SAR limits.



Fig. 3 (g): Precautions (Check the SAR limits)

G. Switch Off when not in use

When a mobile is not in use, turn off it. It is the best way to protect ourselves from the mobile radiation.

H. Old Fashioned Era

Switch to old fashioned era. Always use land line phones that has a long cord. These land line phones are not harmful as mobile phones.

I. Avoid phones on move

When a person using vehicles, elevators, trains, or sits in other metallic chamber, never use mobile phones. When a call establishes, mobile phones radiate signal with more power. Metals reflect the radiation back to the occupants. So mobile radiation increase in metallic surface areas.

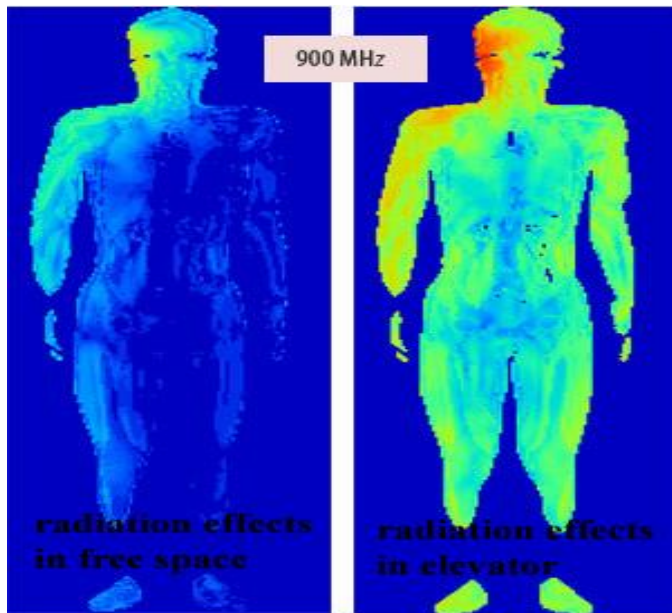


Fig. 3 (h): Precautions (radiation effect in elevator)

V. CONCLUSION

With the advancement of technology, mobile phones become the essential part of our daily life. Mobiles are used not only for communication but for various other purposes. Now mobile phones are available with variety of smart applications. But the radiation emitted by mobile phones is very dangerous to our health. We must be aware of its harmful effect and should follow the precautionary methods to avoid it. We should have to think over this and use mobile phones in limits in order to protect ourselves from electromagnetic pollution.

VI. REFERENCES

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