

## Electromagnetic Radiation Exposure: A Survey Report

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**Abstract:** People are concerned about exposure from mobile handsets & base stations. There has been a tremendous increase in number of Mobile Phones users which continues to grow like a hockey stick curve. Mobile phone usage is changing our lifestyle as well as increasing the risks of many diseases which originated from the exposure of mobile phone radiations. People are concerned about exposure from mobile handsets & base stations. In this paper, we have conducted a survey in order to know the exposure of mobile phone radiations on people mainly undergraduate students.

**Keywords—** *Electromagnetic Radiations, Cell phones, Mobile Radiations, RF*

### I. INTRODUCTION

Mobile industry has experienced a phenomenal growth in the recent past. According to TRAI, by 31<sup>st</sup> August, 2012, there were more than 93 Crores (930 millions) cell phone users in India and nearly 5 lakh cell phone towers to meet the communication demand. Fig.1 shows, as of June 2012, according to Informa telecoms & media, WCIS+, there were more than 6.3 billion subscriptions worldwide.

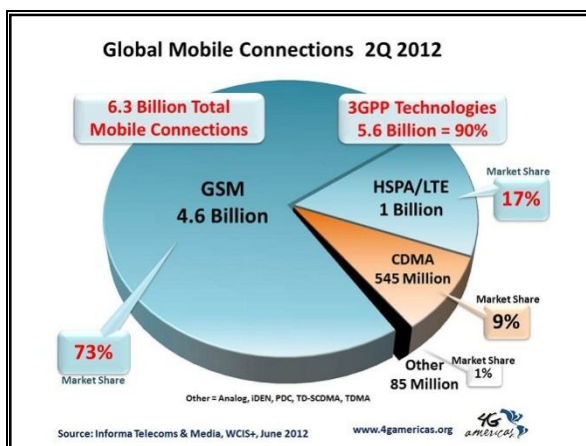


Fig.1: Global Mobile Connections [9], Source: [www.4gamericas.com](http://www.4gamericas.com)

The effect of mobile phone radiation on human health is the subject of recent interest and study, as a result of the enormous increase in mobile phone usage throughout the world. According to most of the Biophysicists, mobile phones are responsible for various health hazards [2, 10]. Fig. 2 shows the cell phone use pattern among various age groups (by 2011),

which clearly indicates that young teens and undergraduate students are exposed more to EMRs from mobile phones than other age groups.

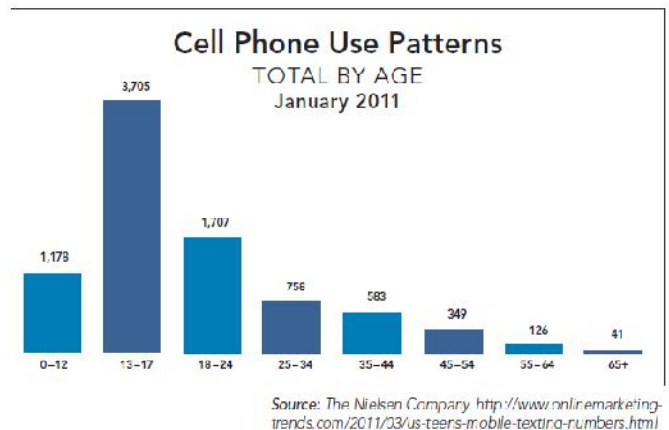


Fig. 2: Cell Phone Use Pattern (By Age, January, 2011) [11]

*In this paper, we have conducted a survey in order to know the exposure of mobile phone radiations on people mainly undergraduate students.*

### II. MOBILE PHONE TECHNOLOGY

When a call is made, sound energy is converted to radio frequency (RF) waves i.e. electromagnetic energy [1]. Radio waves travel for the nearest base station and, at the call receiver's end, waves travel from the base station to the receiver's mobile phone. The mobile phone re-converts radiofrequency waves to sound energy and the receiver hears this as voice in the ear piece. GSM 900 and GSM 1800 standards are used in India having frequencies ranges shown in table 1. Also, Table 2 shows CDMA frequencies used in India and worldwide.

Table 1: GSM 900 and GSM 1800 Case [5]

GSM 900		GSM 1800	
<i>Uplink</i>	890-915 MHz	<i>Uplink</i>	1710-1785 MHz
<i>Downlink</i>	935-960 MHz	<i>Downlink</i>	1805-1880 MHz

Table.2: Frequencies used in CDMA standard [5]

CDMA Worldwide		In India	
<i>Uplink</i>	824-849 MHz	<i>Uplink</i>	824-844 MHz
<i>Downlink</i>	869-894 MHz	<i>Downlink</i>	869-889 MHz

### III. HAZARDOUS EFFECTS OF MOBILE PHONES

Increasing net of the mobile radiation is very hazardous and harmful to human beings. Mobile radiations are very harmful for the living tissues for human body [4]. It is come to know that radio waves at the radiation level of the mobile phones may increase the permeability of blood brain barrier which regulates the passage of material between blood cells and blood stream. Mobile radiations are the main reasons of brain cancer and brain tumor. Species like house sparrows got extinct due to the effect of mobile radiations. Mobile phone radiations are also responsible for the psychiatric problems and memory impairment.

The long-term Electromagnetic Radiation exposure can lead to many diseases such as:

- Dementia
- Cataract
- Brain Tumors
- Reproductive
- Neurological
- Cardiovascular
- Endocrine [6]

Cell Phones are like Cigarettes of 21st century due to their harmful effects. Mobile radiations are even more harmful because we can't see, smell these radiations [7].

### IV. SURVEY REPORTS

A survey was conducted among 200+ undergraduate students of 5 Engineering Colleges in Punjab, India. A questionnaire was developed and the primary data in the form of Yes/No to these questions was collected and studied. The conclusions regarding exposure to mobile radiations were drawn on the basis of response from the students and are discussed in the following section of the paper. The respective safety measures/precautions are also discussed in order to prevent ourselves from the EMRs from cell phone.

#### *Survey Report*

People press their cell phone against their head while talking which is very harmful to their body.

#### *1) Explanation*

Users are advised to limit the duration of mobile calls and use text whenever possible. We should not hold our cell phone near our body or near our head while talking. Also, we should keep our self away from radiating devices.

#### *Survey Report*

People talk for 2 hours or more per day on their cell phone

#### *2) Explanation*

It is very harmful to talk for more than two hours as mobile phone radiations directly enters into our head because antenna located inside mobile phone is in direct contact with our head.

#### *Survey Report*

People carry their cell phones with them when it is switched on.

#### *3) Explanation*

Nowadays, there are up to 1.67 billion mobile users all over the world and the users are increasing day by day as the mobile technology has widespread all around. According to the medical researches, mobile radiations associate with the health risks which could cause significant health problems. The WHO also classified mobile phone radiation on IARC scale (International Agency for Research on Cancer) [3]. In 2006 a large Danish study about the connection between mobile phone use and cancer incidences was published. Blackberry also warns in its Mobile Phone Manual that "Keep your BlackBerry device at least 0.98 in. (25 mm) from your body" [8].

#### *Survey Report*

Most of the people make call while driving.

#### *4) Explanation*

This is an illegal to use a mobile phone while driving. Making calls while driving may also crash you as likely to be four times more. In an automobile, a person should only use his mobile phone when he needs to call in emergency. A person should attend his call while parking his/her vehicle aside road otherwise it may give chance to an accident or sometime it may be lethal. If anyone would catch using mobile phone while driving or riding a vehicle, it should be prosecuted. So it should be avoided by people.

#### *Survey Report*

Most of the people place their cell phone close to their bed at night.

#### *5) Explanation*

According to major studies it is concluded that using mobile phone before going to your bed can damage your health. Mobile phones emit harmful radiations which are very dangerous to health even they can damage our immune system. Sleep should be a time for renewal and rest. We should give a calm and quiet rest to our body mind to restore them.

#### *Survey Report*

People use their cell phone when the signal strength indicator is low.

#### *6) Explanation*

When signal strength indicator showing the low signal, at that time, we should not make/receive call because due to low signal strength, our mobile phone will try to send signal with high power which is above the sustained level. So, at low signal strength, we should avoid to make/receive call.

### **Survey Report**

People use their cell phone for streaming more than 2 hours per day.

#### **7) Explanation**

Many people says that we should use Messages when we have to communicate with someone for a long duration which we can say "Time pass", but it has disadvantages too. Sending messages can affect our fingers mainly thumb. So, we should aware of these things too.

### **Survey Report**

People make or receive call when cell phone is in charging mode.

#### **8) Explanation**

Whenever our mobile is on charging mode, some electrochemical reactions takes place inside the mobile phone which is responsible for getting mobile hot and when we receives/make the call in this situation, mobile gets more hot which directly effects our ears.

### **Survey Report**

People make or receive call when they are connected to internet on their Laptop/Desktop.

#### **9) Explanation**

Sometimes whenever our mobile is connected with laptop/desktop we receives the call which is very harmful to our body because most of radiations are releasing due to the internet and secondly some of the radiations are due to our call received, so there is double concern of radiations which should be avoided.

### **Survey report**

People think "Mobile Phones" are toys for small child.

#### **10) Explanation**

Small child has developing and very sensitive tissues on which effect of mobile radiations is more. So, Mobile Phone is not a "Toy" for a small child.

### **CONCLUSION**

The effect of mobile phone radiation on human health is the subject of recent interest and study, as a result of the enormous increase in mobile phone usage throughout the world. With In this paper, we have conducted a survey among undergraduate students to know their electromagnetic radiation (EMR) exposure. We have concluded that most of the students are under blanket of radiation which is very harmful for them. We have also addressed the issue by suggesting the possible preventive measures.

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