

Study Of Cell Tower Radiation And Its Health Hazards In Human Body

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Abstract—Mobile Phone usage has been rapidly spread globally and to provide proper coverage, numbers of cell phone towers are also increasing worldwide generating a public concern as to whether frequent utilization of such devices is unsafe. Every technology has some positive as well as negative impacts. There has been a public concern over the adverse impacts of harmful radiation from mobile towers and mobile phones on human health. Continuous exposure to microwave radiations from Cell phone towers cause serious health problems over the years. Microwave radiation effects are classified as - thermal and non-thermal. The current exposure safety standards are mainly based on the thermal effects, which are inadequate. Measurements have been carried out at various places near the cell towers and it has been found that the radiation levels are very high. These project various epidemiological and experimental studies, which show significant biological effects far below the current standards. Also, the details of Radiation Shield are given, which consists of orthogonally polarized multiple broad band monopole antennas to absorb the undesired radiation.

Keywords: Cell phone towers, Mobile Phone, Microwave radiations, biological effects.

1. INTRODUCTION

Cellular wireless phones (Mobile phones) are now one of the important parts of our life. This wireless technology used in these phones is based on

complicated networks of base stations, which connect one user to another using RF signals.

From past years, a great debate is going on about possible health problems caused by exposure of human body to the cell tower radiations/cell phone radiations. The extensive increase in usage of mobile phones has made more significant to study and analyse the possible health problems related to mobile phone radiation's exposure. Arguments are made by the researchers that mobile phones produce radio frequency energy which is a non-ionizing radiation in nature, hence this energy is very low and unable to heat the human body's tissues. Therefore, it is believed that its health impact on human health should be negligible in comparison to those which are produced by ionizing radiations. There is still a need to explore and determine the actual impact of RF radiations on human body/health. Many researches and studies claim the impacts of mobile phone radiations on human body in the form of heat absorption at different parts of body, but no study explains exactly what other kind of health effects can be there due to the exposure of these radiations. Moreover, there is no evidence which proves that the reported health effects are exclusively due to exposure of these radiations only. EMR of radio frequency radiated from the cell phone towers interacts with the different parts of human body. This interaction is a very complex function with numerous

parameters. Health effects related to cell tower radiations are divided into two categories: i.e., Short term effects and Long term effects.

The short term effects are related to electrical activity of brain, cognitive function, blood pressure, heart rate, etc. However, the long term effects contains headache, tinnitus, fatigue, dizziness, muscle problem, synaesthesia of the scalp, sensations of warmth, memory loss, epidemiological and visual symptoms including cancer and brain tumours, etc. Cell phones/smart phones are widely used for the instant communication purpose at work, home or with any specific person, but very few people are actually concerned about the health issues they may face with its use/extensive use and what kind of possible safety measures can be taken to avoid these hazards. Awareness of people about the health hazards related to cell tower and mobile phone radiations on human body is not sufficient which may be very dangerous due to EMR exposure which is used in this communication system.

This project explains different range and applications of mobile towers radiations along with the calculation of penetration of EM Field inside the human body. Based on it, heat effects and some other reported effects are also summarized.

2. PROBLEM IDENTIFICATION

Continuous exposure to microwave radiations from Cell phone towers, TV and FM towers cause serious health problems over the years. Microwave radiation effects are classified as - thermal and non-thermal. The current exposure safety standards are mainly based on the thermal effects, which are inadequate. Measurements have been carried out at various places near the cell towers and it has been found that the radiation levels are very high. This project reviews various epidemiological and experimental studies, which show significant biological effects far below the current standards.

Also, the details of Radiation Shield are given, which consists of orthogonally polarized multiple broad band monopole antennas to absorb the undesired radiation.

3. EFFECTS OF CELL TOWER RADIATION

Public is being exposed to continuous, low intensity radiations from these towers. The EMR radiations, also known as electro smog cannot be seen, smelt or felt, one would not realize their potential harm over long periods of exposure until they manifest in the form of biological disorders. EMR is a form of energy emitted and absorbed by charged particles, which exhibits wave like behavior as it travels through space (Wikipedia, 2012). The effects of EMR (Wiki, 2014) upon biological systems depend both upon the radiation's power and frequency. For lower frequencies of EMR up to those of visible light (i.e., radio, microwave, infrared), the damage done to cells and also too many ordinary materials under such conditions is determined mainly by heating effects, and thus by the radiation power. By contrast, for higher frequency radiations at ultraviolet frequencies and above (i.e. X-rays and gamma rays) the damage to chemical materials and living cells by EMR is far larger than that done by simple heating, due to the ability of single photons in such high frequency EMR to damage individual molecules chemically (Wikipedia, 2012).

When a human body is exposed to the electromagnetic radiation, it absorbs radiation, because human body contains 70% of liquid. The human height is much greater than the wavelength of the cell tower transmitting frequencies, so there will be multiple resonances in the body, which creates localized heating inside the body. Continuous exposure to low intensity microwave radiations cause serious health problems over the years. This results in boils, drying up the fluids around eyes,

brain, joints, heart, abdomen etc. EMR is a form of energy emitted and absorbed by charged particles which can be harmful to human body depending upon the radiated power density and the distance from the transmitter.

4. RADIATION SHIELD

Since antennas are used for transmitting and receiving signals. A “Radiation Shield” consisting of multiple orthogonally polarized broadband monopole antennas, has been developed. The antennas are broadband planar circular monopole antennas and are designed to cover the frequency range from 800 to 4000 MHz. The antennas are terminated in matched load to absorb the harmful radiation to produce a safe radiation free environment. The details of these antennas and other measurements will be presented at the symposium.

5. RESULT AND DISCUSSION

Out of the designed questionnaire, the results of important questions are presented below in graphical form. The respondents were asked to tell the number of years of mobile tower installation in their locality. The following graph shows the response.

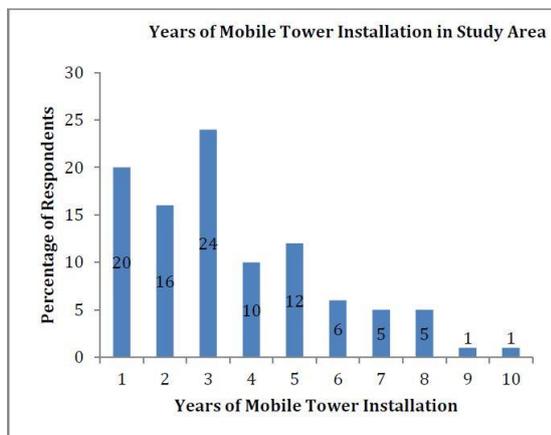


Figure 1: Year of Mobile tower installations

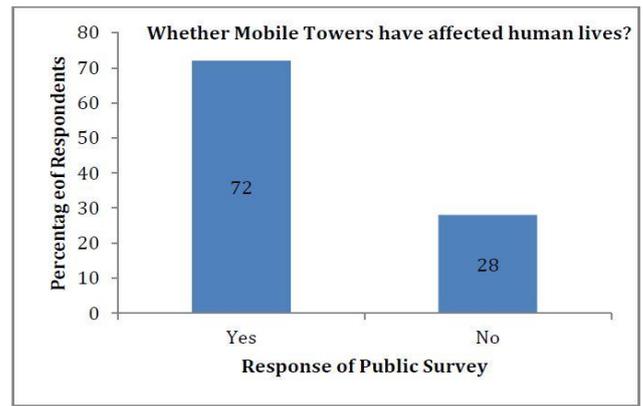


Figure 2: Response of public survey

It shows that most the towers are installed during last five years and hence their effect on human health will show only the short-term effects. Although, there were some mobile towers as old as 10 years of installation and they may represent some cases of long-term diseases, if any, reported by the respondents.

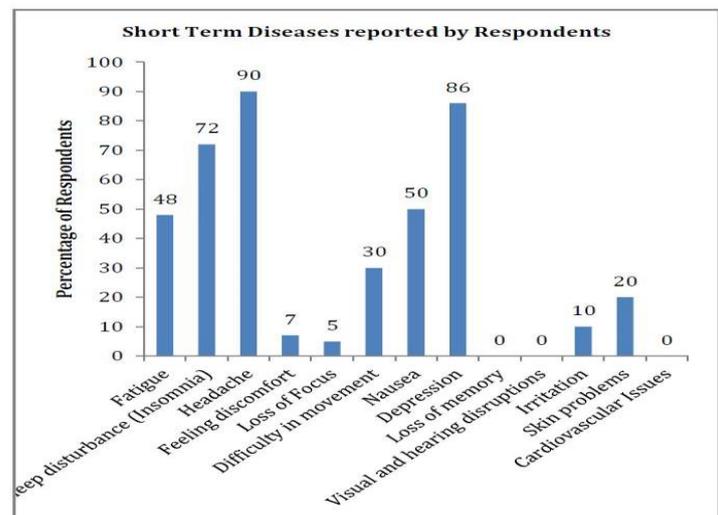


Figure 3: Short terms diseases reported by respondents

72% of the respondents accepted that installation of mobile towers in their locality has affected their lives in some or the other way, while 28% were not sure whether mobile towers have anything to do with their normal daily lives.

The respondents were asked about occurrence of any of the 13 types of short-term and common diseases. When asked regarding some kind of discomfort, irritation or disease after installation of mobile towers in their vicinity, the respondents replied positively and about 90% respondents admitted that they are facing problem of headache. 86% accepted that they are undergoing depression, 72% reported sleep disturbance (insomnia), 50% reported nausea, 48% reported fatigue and likewise others also told that they are facing some type of physical and mental illness due to these mobile towers. However, they were not aware of the exact reason of their illness and discomfort, but they agreed that before the installation of towers, there were less number of evidences of such common diseases in their families. The older persons in their families accepted that they never faced such type of diseases in their lives but these days, even young children are also complaining about such problems. Hence, it can be inferred that, although radiation from mobile towers may not be the exact cause behind these diseases, but there is some linkage between either the radiation or the overall scenario due to mobile towers (creating air or noise pollution) and the public health.

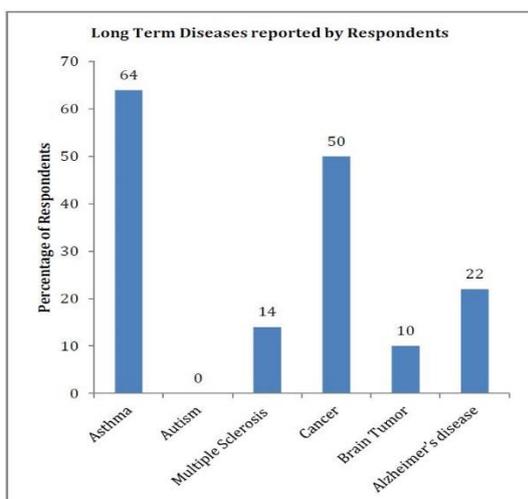


Figure 4: Long term diseases reported by respondents

Regarding long-term health effects of mobile tower installation, the 64% respondents complained that they have become patients of asthma, 50% respondents blamed these mobile towers for cancer, 22% for Alzheimer's disease, 14% for multiple sclerosis and 10% for brain tumour.

6. CONCLUSION

In addition to the continuous radiation from cell towers, there is radiation from cell phones, wireless phones, computers, laptops, TV towers, FM towers, microwave ovens, etc. We are exposed to all these radiations, which are additive in nature. Stricter radiation norms must be enforced by the policy makers across the globe. This does not mean that we have to stop living near these towers. We all know that automobiles create air pollution – have we stopped using them? Instead solutions were found such as unleaded petrol, CNG driven vehicle, hybrid vehicles, etc. Similarly, the solution to avoid excess radiation is to use radiation shield, which absorbs 10% to 50% of radiation depending upon its placement and direction of source of radiation. Multiple units can absorb radiation up to 80% to 90%. Mobile companies should not be in the denial mode, and accept that radiation causes serious health problems, only then people all over the world will carry out research to come out with solutions.

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