

## Effects of Mobile Tower Radiations & Case Studies from different Countries Pertaining the Issue

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*Abstract*— Mobile Phone usage has been rapidly spread globally and to provide proper coverage (signal strength), numbers of cell towers are also increasing worldwide generating a public concern as to whether frequent utilization of such devices is unsafe. Effects of Mobile Tower Radiations are seen in many countries. So, in this paper, we have discussed Effects of Mobile Tower Radiations and case studies of different countries to address the issue.

**Keywords**— Mobile Tower Radiations, Electromagnetic Radiations, Signal Strength, Mobile Phone

### I. INTRODUCTION

People use mobile phones for the purpose of communication at home, work or anywhere they are but only few are concerned about the their health implications and possible safety measures. Most of the People are not aware of Mobile Phone and Cell Tower Radiations which are very harmful due to electromagnetic radiation (EMR) exposure. This paper is divided in to two sections. In first section, effects of mobile towers radiations have been discussed while in second section, we have reviewed case studies of different countries.

### II. RADIATION FROM THE CELL TOWER

GSM900 base station antenna transmits in the frequency range of 935 - 960 MHz This frequency band of 25 MHz is divided into twenty sub-bands of 1.2 MHz, which are allocated to various operators. There may be several carrier frequencies (1 to 5) allotted to one operator with upper limit of 6.2 MHz bandwidth. Each carrier frequency may transmit 10 to 20W of power. So, one operator may transmit 50 to 100W of power and there may be 3-4 operators on the same roof top or tower, thereby total transmitted power may be 200 to 400W. In addition, directional antennas are used, which typically may have a gain of around 17 dB (numeric value is 50), so effectively, several KW of power may be transmitted in the main beam direction [3]. The density of cell towers is directly connected to the density of population. Also, the radiation

pattern of directional antennas is something which is very critical in the whole transmission process (see fig.1).

### III. FREQUENCY RANGES OF TOWERS

Antennas on Cell tower transmit in the frequency range of:  
869 - 890 MHz (CDMA)  
935 - 960 MHz (GSM900)  
1805 - 1880 MHz (GSM1800)  
2110 - 2170 MHz (3G) [1]

Radiation Pattern of Cell Tower Antenna is shown in Fig.1.

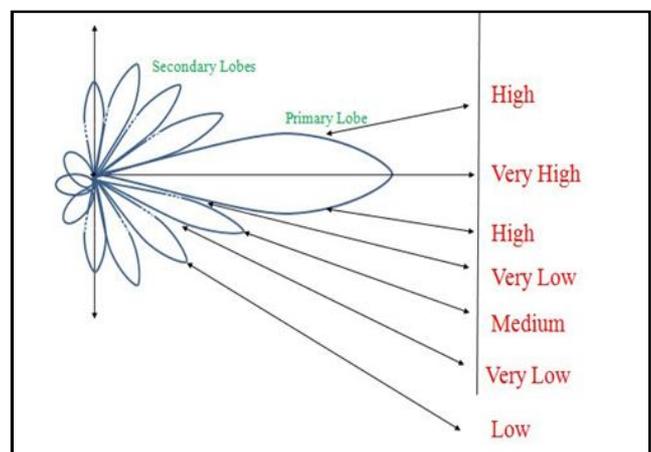


Fig.1: Radiation Pattern of Cell Tower Antenna

### IV. BASIC CONCEPT OF COMMUNICATION

MS (Mobile station) is used by a mobile subscriber to communicate with the mobile network. Several types of MS's exist, each allowing the subscriber to make and receive calls. GSM MS's consist of Mobile equipment (ME) and subscriber identity module (SIM). Mobile has 4 modes: Active, Busy, Ringing, and Idle. One MS is latched with minimum 6 BTS's (Base transceiver station) at a time; out of which 1 is selected which has maximum RX level (Range). From the MS to BTS, interface exist is *Um interface* (Air interface) on which

information from MS goes on channel RACH (Random access control channel) when user insert SIM in the ME. From BTS, control information is sent to MS on the channel BCCH (Broadcast control channel). Fig. 2 shows the basic block diagram of BSS (Base Station System) which consist of BTS & BSC.

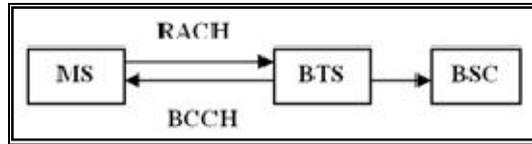


Fig.2: Block Diagram showing BSS

In the above fig., BSC (Base station controller) controls number of BTS's and have functions of Radio Resource and Radio Base Station Management which includes cell description data, traffic and event management, signal strength and quality during call, etc. Segment which controls number of BSC's is MSC (Mobile service switching center) which is the exchange performs all switching, signalling and routing functions. Operation of charging, billing and service provisioning is done by MSC [4].

## V. CELL PHONES AND CELL PHONE TOWERS

The radio frequency field given off by cell phones and cell phone towers is a type of non-ionizing radiation. It is similar to the type of energy used in AM/FM radio and TV broadcast signals. Unlike ionizing radiation (as emitted by X-ray machines), RF energy from cell phones and other wireless devices cannot break chemical bonds in your body. Cell phones emit low-levels of radiofrequency (RF) energy, some of which is absorbed into your body. The amount of RF energy you absorb depends on many factors, such as how close you hold the cell phone to your body and the strength of the signal. Cell phones are designed to operate at the minimum power necessary to connect and maintain a quality call. Cell phones send and receive radio signals from a network of fixed, low-power, cell phone towers (or base stations). These towers are usually located on rooftops, towers and utility poles. The transmitting power of a cell phone varies, depending on the type of network and its distance from the cell phone tower. The power generally increases the further you move away from the nearest cell phone tower [5].

## VI. BIOLOGICAL EFFECTS

### A Impacts on Human

Since its inception, there have been concerns about the ill-effect of the mobile towers and mobile phones. Despite being a relatively newly acknowledged form of pollution, EMRs and their negative impacts on biological systems and environment have already been reported by several studies. However most of the available scientific literature on the negative environmental effects of electromagnetic fields reports the results of experimental and epidemiological studies examining the impact on various aspects of human health [2]. When a human body is exposed to the electromagnetic radiation, it absorbs radiation, because human body contains 70% of

liquid. It is similar to that of cooking in the microwave oven. 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. This results in boils, drying up the fluids around eyes, brain, joints, heart, abdomen, etc. [7]. Individuals differ in their response to similar levels of EMF radiation. For some people, short term effects from cell tower radiation exposure may include headaches, sleep disorders, poor memory, mental excitation, confusion, anxiety, depression, appetite disturbance and listlessness [6]. Radiation from cell phone towers has been associated with greater increase in brain tumor. This is due to the damage in the blood brain barrier and the cells in the brain which are concerned with learning, memory and movement. Studies by Carl Blackman have shown that weak electromagnetic fields release calcium ions from cell membranes. Leakage of calcium ions into the cytosol acts as a metabolic stimulant, which accelerates growth and healing, but it also promotes the growth of tumors. Loss of calcium ions causes leaks in the membranes of lysosomes releasing DNA's that causes DNA damage. Another possibility of DNA damage is via increased free radical formation inside cells, which further causes cellular damage in the mitochondria [7].

### B Cancer Risks from Cell Phone Towers

A study performed by doctors from the German city of Naila monitored 1000 residents who had lived in an area around two cell phone towers for 10 years. During the last 5 years of the study they found that those living within 400 meters of either tower had a newly-diagnosed cancer rate three times higher than those who lived further away. Breast cancer topped the list, but cancers of the prostate, pancreas, bowel, skin melanoma, lung and blood cancer were all increased [6].

## VII. CASE STUDIES

### A I stopped opening my windows for fresh air, Javlika Shah, 58

When cell phone companies placed transmitters outside her bedroom windows eight years ago, little did Shah, a resident in south Mumbai, know that she would face the consequences years later. "My headaches are not something ordinary. The nerves are strained and it is unbearably painful," she says. She's also become an insomniac, and gets up in the morning feeling tired and uneasy. According to the radiation test undertaken in her house, all the rooms have high level of radiation. She says, "I stopped opening my windows for fresh air. The report shows that these areas have highest level of radiation". "The cell phone towers were put up in most residential buildings for better network. Without knowing the consequences, most society committees agreed to it. I cannot afford to put up these window films or wallpapers. They are too expensive. I want these towers to be removed for my safety and that of the others around", says frustrated Shah [8].

### B Sudhir Kasliwal, Jaipur

Sudhir Kasliwal has been living in a Jaipur colony with his family since the 1970s. A jeweller by profession, his life was going smooth until last year when one of his two brothers was diagnosed with brain tumor. He was rushed to Mumbai for treatment. Then his other brother was also detected with brain

tumor. "His doctor enquired about our surroundings. When we told him there are three cell phone towers within 20 meters of our house, he cautioned us," says Kasliwal. Around the same time, his dog fell victim to cancer.

### **C Hamedda Patel, Jaipur**

In another colony of Jaipur was Hamedda Patel who succumbed to cervical cancer last month. The 53-year-old used to live with her family in a one-room flat on the first floor. The room is 50 meters away from a building that has a cell phone tower and four antennas. "She was the first cancer patient in our family," says her son. Since 2010, five persons have died of cancer and five are battling the disease in Patel's colony that has about 15 cell phone towers [9].

### **D Brain Tumors, Animal Deaths, illness, UK**

My father died from a glioblastoma brain tumor after moving to a house in which a mast was planted in a close proximity. He was always a strong and healthy man until we noticed change some years ago. I have extreme difficulty with sleeping and I had many health problems when younger which didn't occur until the mast was close by. It is situated directly behind the street in which I live in and many occupants are getting cancers now. This wasn't heard of here before the mast arrived and a dog died within a few months of the installation of the mast. We had rabbits and they did not live long. I suspect this due to the radiation; also I am feeling the air pressure around this area is too heavy. I plan on leaving soon and so does the rest of my family for our health is important [10].

### **E Me and My wife, South Africa**

A Vodacom cell tower is 30 m from my home in Middelburg Mpumalanga South Africa, in 2004 i was diagnosed with limfgland cancer, and in 2008 my wife was diagnosed with brain and lung cancer, she passed away on 25 December 2009 [11].

### **F Feeling Violently sick all the time, Ireland**

I was employed by an international company aka Sylvan (Ireland) and I've become ill because of a Vodafone Mast located on the building rooftop. I'm in a lot of pain because of the tumors on my thoracic spinal column [12].

### **G Bearable Degree of physical symptoms (headache, nausea, etc.), USA**

Just a few years ago, I retired early, and moved from a big city out to a suburban townhome, underground wiring here. Symptoms: Ringing/buzzing in my ears, fatigue & flu-like symptoms started soon after. My dog developed epilepsy, and other immune disorder symptoms. Neither one of us has been well since we moved here [13].

## **CONCLUSION**

Most of the People are not aware of Mobile Phone and Cell Tower Radiations which are very harmful due to electromagnetic radiation (EMR) exposure. Pertaining this issue, we have discussed Case studies from different countries in this paper which concludes that one should aware of mobile tower radiations. People living near cell tower receive strong signal strength but at the expense of health. So, little bit poor connectivity is better to have better health.

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