



Non Ionising (EMR) Radiation of Communication devices and effect on young Brains

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The cell phone operates in the frequency range of 900 to 2400 MHz .The radiations emitted are electromagnetic in nature and are non ionizing .It is not only the user of the mobile phone who may be effected but also the society around the transmitting towers may be effected by the radiation hazard .Various factors like density , frequency and power out put play important role in transmission . Global System for Mobile communication or GSM operates in the 900MHz to 2400 MHz band ,in this Time Division Multiple Access(TDMA) technology is employed with the signal being divided into 217 frames per second and each frame is subdivided into eight periods i.e. time slots, .The aggression of the pulse can be harmful for young developing brins and continues till the age of 16. Brain-wave activity in a child are more vulnerable to aggression by the pulses of microwaves used in GSM The papers presents the data of various parameter associated with mobile phone radiations and compared with international safe limit and effect of signals on young brains .

Keywords : GSM, TDMA ,Cell phone ,Radiation

1.INTRODUCTION

The atmosphere has variety of radiations but broadly divided into natural and artificial radiations enhanced by human activity .The natural radiations are taken care of naturally and show little or no variation with time .The present work focuses on microwave radiations that has risen many folds for past 30 years [1,7].One of the basic reason for this increase is the use of modern communication technology .The most common of them ,the cell phone , has led to increase in exposure to microwave radiation in the society .Before going further let us understand briefly Microwave radiations .The term microwave frequency is generally used for those wavelengths measured in 30 cm to 1mm and 1 to 300 GHz .The cell phone operates in the frequency range of 900 to 1800 MHz .The radiations emitted are electromagnetic in nature and are non ionizing .It is not only the user of the mobile phone who may be effected but also the society around the transmitting towers may be effected by the radiation hazard due to 24 hrs emission of radiations from the towers which power billions of mobile phones world wide

1.1Unsafe Reality

The non ionizing radiation may look safer ,but, there is a mistake in assuming that if these extreme effect

don't happen then no other effects can take place .

This approach ignores the basic science of Biophysics . The basic fact that cells use oscillating electromagnetic fields for many vital function is overlooked . Microwave exposure can be associated with leakage of albumin through the blood-brain-barrier as the exposure may change the permeability of the barrier [3,14] and this can be more serious in young people below 15 years of age as the thickness of the skull is less and this results in higher conductivity and higher SAR(Specific Absorption Rate) [2,3]. SAR is a the measure of the quantity of radio frequency is absorbed by the body .Higher SAR means higher risk of exposure and more damage to metabolic system .The change in permeability can result in serious damage to CNS [11,13]

1.2Technical background

A cell-phone carrier typically gets 832 radio frequencies to use in a city. Each cell phone uses two frequencies per call -- a duplex channel , so there are typically 395 voice channels per carrier. Base stations are installed as required in the area depending on the usage . As you move toward the edge of your cell, your cell's base station notes that your signal strength is diminishing. Meanwhile, the base station in

the cell you are moving toward sees your phone's signal strength increasing . The two base stations coordinate with each other through the MTSO (mobile telephone

switching office) There are four common technologies used by 2G cell phones :

(a) Frequency Division Multiple Access (FDMA)

(b) Time Division Multiple Access (TDMA)

(c) Code Division Multiple Access (CDMA)

(d)Global System of Mobile Communication (GSM). Mobile communication according to the GSM standards operates in the 900MHz to 1800 MHz band ,In this Time Division Multiple Access technology is employed with the signal being divided into 217 frames ,fig1.1(information periods) per second and each frame is subdivided into eight periods i.e. time slots, fig 1.2. These pulse may not be suitable for young brains since child brain is developing and continues till the age of 16 [8]. The still developing nervous system and associated brain-wave activity in a child are more vulnerable to aggression by the pulses of microwaves used in GSM [9,10] .In neonates the head accounts for about quarter of physical height as compared with adults which accounts for only 10% , the multi-frame repetition frequency of 8.34Hz and the 2Hz pulsing that characterizes the signal from a phone equipped with discontinuous transmission (DTX), lie in the range of the alpha and delta brain wave activities, respectively. The fact that these two particular electrical activities are constantly changing in a child until the age of about 12 years when the delta-waves disappear and the alpha rhythm is finally stabilized [5,8,9] means that they must both be anticipated to be particularly vulnerable to interference from the GSM pulsing[6] . The thickness of the skull is also an important factor for penetration of waves inside the brain [4] .Skull is thinner in children as compared to an adult increasing the risk of exposure. The risk of exposure and SAR is thus increased in children [11,12]

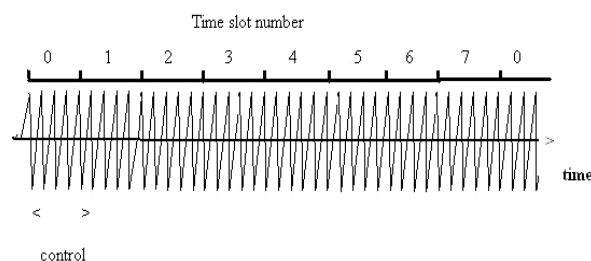


Fig.1.1

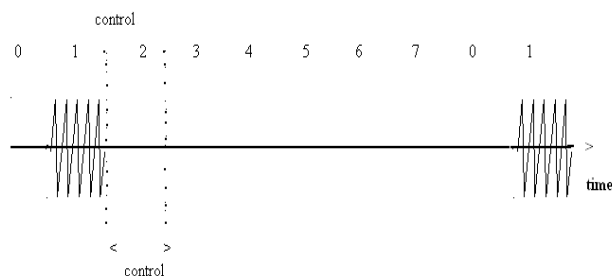


Fig 1.2

2.MATERIAL AND METHOD

Kanpur city has a population of 35,00,000 was studied and few key spots were marked . the table 1.1 below shows the observation .for the purpose Spectran HF 4060 (Aaronia ,Germany) R.F meter was use along with hypolog hand held antenna .The instrument comes with spectrum analyzer For measurement The places observed had floating as well as resident population .The recordings were made at different interval of time and repeated for 15 days. High frequency detector HF4060 with a range of 100 MHz –6GHz and high end broad band EMC antenna were used for the purpose both the units could be connected to computer and HF spectrum analyzer software was used to record the observations and the average power was calculated .It was observed that most of the places recorded power much higher than the safe exposure limit as specified by international bodies .

3.RESULT AND DISCUSSION

The observation of power output is alarming in Kanpur city . The study of Radiation Levels undoubtedly proves that this NIEMR is polluting and adversely affecting the child health . There is a primary need to control these pollutions and also to draw guidelines for the Maximum Permissible Exposure Levels in India . The towers emitting 24 hrs

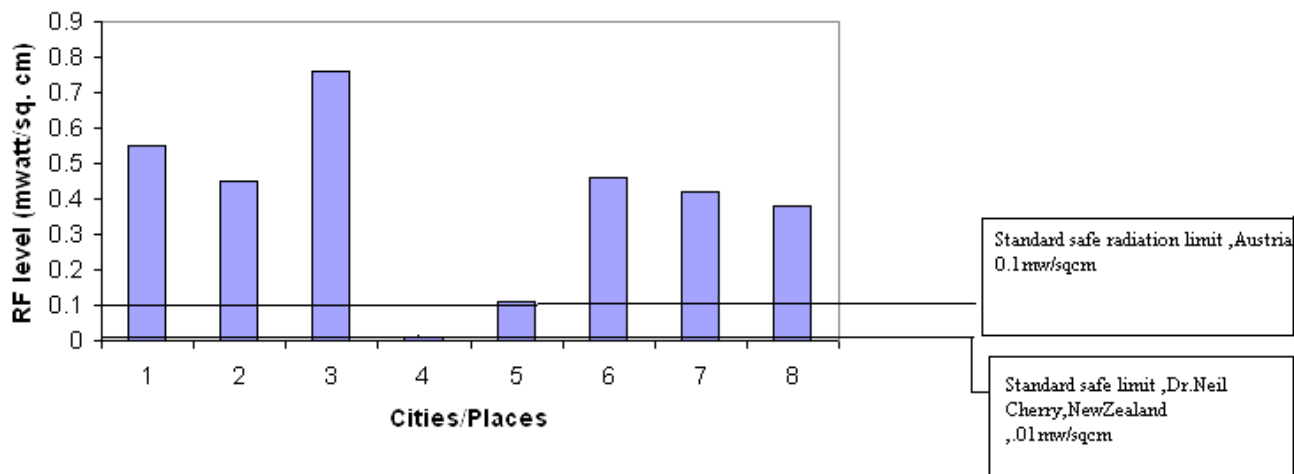
should be of lower power output . During the survey it was observed that Mobile Telephone Companies have installed Towers almost within the area of 100 Sq.Mtr .The additive effect of the effective power illumination is evident from table1.1 in almost all localities ignoring schools and hospitals nearby. Clustering of towers has given rise to additive effect of the effective power illumination on human body . Apart what authorities can do there are certain practice which we can do easily few important of them are

- 1.Moving your phone 20cm away from your head reduces radiation doses by about 98%
- 2.Hands free headsets dramatically reduce radiation emissions into the brain
- 3.Try not to talk for long time or, if you must, get a hands free kit
- 4.As far as possible keep children away from mobile phone conversation .

| MEASURED RF LEVELS IN KANPUR CITY (NORTH INDIA) | | | |
|---|---------------------------------|------------------------------|--|
| S No. | Place | Exact Location In that Place | Observed RF Level (Microwatt/cm ²) |
| Kanpur and Highway | | | |
| 1 | Mall road | Main road | 0.55 |
| 2 | Somdutt plaza shopping centre | Entrance Gate | 0.45 |
| 3 | Somdutt Plaza (11am – 5 pm) | Basement | 0.762 |
| 4 | Lucknow Kanpur highway | On Ganga River Bridge | 0.011 |
| 5 | NH 2 –Malwaan (40km from city) | Kanpur Allahabad Highway | 0.11 |
| 6 | Govind Nagar | DBS College Campus | 0.46 |
| 7 | Azad Nagar | Around Kanpur zoo area | 0.42 |
| 8 | NH2 –G.T Road | IIT towards Delhi 25 kms | 0.38 |

Table 1.1

RF RADIATION MEASURED IN KANPUR CITY



Cities/Places No. corresponds to Table 1.1 indicating RF level in the range of 900-1800 MHz

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