

CONSEQUENCE OF MOBILE PHONE RADIATION UPON HUMAN BRAIN

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ABSTRACT- As scientifically proved that abundant usage of mobile phone throughout a large portion of daily routine results into the deadly outcomes like genetic damage, tumors, loss in memory, high blood pressure and fading the immune resistance of humans. These impacts can be spotted by an electroencephalogram (EEG) which is worldwide helpful to measure the vacillations in brain which occurs due to ionic electric flows contained by billions of building blocks of brain called neurons. This paper spread the light upon the harmful and deadly consequences of mobile phone radiation upon the human brain.

KEYWORD: EEG, Brain, Radio frequency, Radiations, Health consequences.

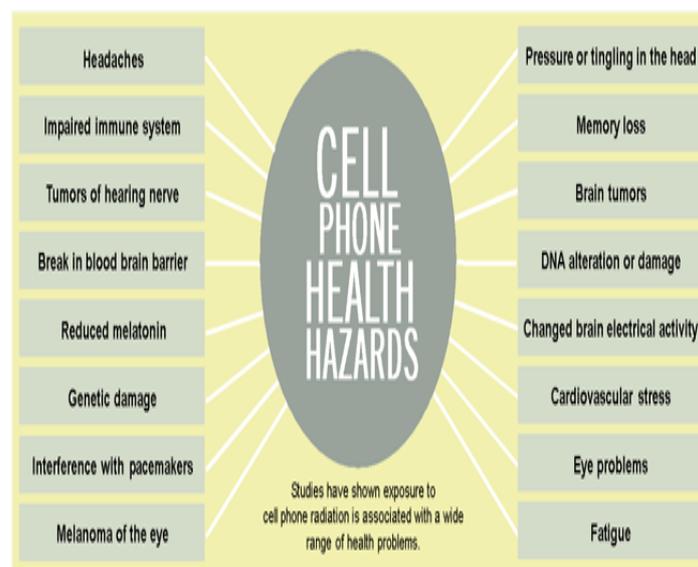
I. INTRODUCTION

Practice of mobile phone since last two decades has been intensely increased. As mobile phones are head oriented devices so its adverse radiation effects are rapidly increasing upon the nervous system. After the large investigations upon mobile phone exposure was done, an astonishing results came with warning that long period use of these devices can possibly damage health resulting into tumors in brain^{1,2}, head ache^[3], decline in sperm count and fertility^[4] and leading towards Alzheimer's and concentration consequences due to disturbance in neural networks because of mobile-phone radiation (MPR). Almost studies experimented during this decade is conducted with the help of electroencephalogram which the signal is deemed as linear signal and the analysis is guided on the basis of that. But practically the electric wave from brain is non-predictive, nonlinear and oscillating and minute change in mental condition shakes the signals. Mobile phones emit the radio frequency electromagnetic field (RF-EMF), a type of non-ionizing radiation ranging frequency from 100 kHz to 300 GHz. The radio waves by a GSM mobile can have a peak power of 2 watts whereas the CDMA uses the lower output power which is typically below 1 watt. The radiation absorption rate of human body is measured by Specific Absorption Rate (SAR). The maximum power output of mobiles is regulated by the mobile phone standard and regulatory agencies in each country. The SAR limit fixed by

Federal Communications Commission (FCC) is of 1.6 W/kg, when SAR >4 W/kg, then potential health hazards may occur.

II. EFFECTS

Numerous scientific experiments have investigated possible symptoms on health due to mobile phone radiation. Current assessment was printed in 2007 by the SCENIHR, which concluded that exposure to Radio frequency fields is unlikely to lead to rise in cancer. The researchers of the National Institutes of Health (NIH) and the Brookhaven National Lab (BNL) through the help of medical equipment called positron emission tomography (PET), have proved that radiation from a 50(fifty) minutes cell phone exposure can increase up Glucose Metabolism of brain⁵. Below figure displays the few effects of radiations.



Effects of radiations.

III. EFFECTS OCCURS DUE TO RADIATION ABSORPTION

Body do absorbs a part of radio waves emitted through mobile handset and radio waves by a GSMsets are typically below a watt^[6]. As the maximum power output of mobiles is regulated by the mobile phone standard and regulatory agencies in each country and in almost all systems the cellphones along with their base station regularly checks outs the reception quality along with the signal strength accordingly which the power level is amplified or decreased and this whole process is done within a certain span, to accommodate various situations like such as inside or outside of tall buildings and on road moving vehicles^[7]. As it is already specified that the radiation absorption rate of human body is measured by Specific Absorption Rate (SAR). The SAR limit fixed by Federal Communications Commission (FCC) is of 1.6 W/kg. An Europe has limit of 2 W/kg which is averaged over a volume of 10gm tothat of tissue as the value of SAR is immensely relied upon the averaging volume. Lacking knowledge about this averaging volume, the comparisons among various measurements is impossible to be made. That is why the European 10-gram ratings must beevaluatedbetween themselves, and so that of an American 1-gram ratings must be evaluated between themselves. When SAR >4 W/kg, then potential health hazards may occur.

IV. BLOOD - BRAIN BARRIER EFFECTS

Few researches from Lund University have studied the effects occurred in rat brain due to exposure in microwave radiation and what they found was the leakage of albumin into the brain by the permeated blood brain barrier^[8, 9], concluding that if this could effects the rat brain what might can happen wrong with human brain.

V. EFFECT ARRISES DUE TO ELECTROMAGNETIC RADIATION

Electromagnetic radiation are categorized into first ionizing radiation and second is non-ionizing radiation, knowing is it capable of ionizing the tiny atoms and breaking off chemical bonds or not. The dielectricheating is an effect on biologyoccurring due to electromagnetic fields. Magnetic fields induction into the circulating currents throughout the

body where this strong magnetic fields are directly dependent upon the intensity of the impacting magnetic field and causing nerves and muscles to stimulate resulting harmful effect on biological processes. This effect is a sequence of events including exposure to radiations of EM and which when absorbed by body modulates the patterns of biological field, causing alteration in the operational activities of cell and finally resulting into some dangerous disease. Due to increase in mobile users worldwide, the level of electromagnetic radiation also has made to increase which adds up more danger.Recent experimental studies have shown that the children are more effectible from these telecommunication radiations. Fig. 1 displays clearly about electromagnetic fields that they are likely to penetrate into the brain of children far more severely as compared to adults. Actually, because of children's thinner skulls, small size of brains and softer brain tissue, they are extremely vulnerable to damage from cell phone. This should be taken into account that this problem of EM radiation is needed to be solved before it's too late to reverse its impacts because they also affect the genies.

Cell Phone Radiation Penetrating Skull

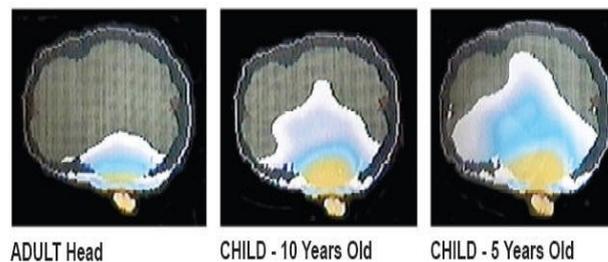


Fig. 1: ELECTROMAGNETIC RADIATION EFFECT ON BRAIN^[10]

- I. Absorption power of children is more than adults.
- II. Temporal lobe is less deadly than brain tumor.
- III. Children's cells are reproducing more quickly than adults.
- IV. Children's immune system is not as well developed as adults.
- V. Longer potential for life-time exposure for children than adults.

VI. ELECTROENCEPHALOGRAPH AND ITS MATERIALS AND METHODS

An electroencephalogram (EEG) marks scalp recordings of electrical activity inside human brain or in simple words it measures the brain waves emitted from nerve cells inside cortex of brain and this activity is displayed on the screen of an EEG machine in the form of waveforms of fluctuating frequency and amplitude which is measured in micro voltage. The neurons activates while producing the synaptic currents within the dendrites, and this current produces a magnetic field which are measurable with the help of electromyogram (EMG) machines where secondary electrical field over the scalp are measurable with the help of EEG systems. The current which is produced in the brain typically by pumping of +ve ions of sodium (Na⁺), potassium (K⁺), calcium (Ca⁺⁺), and the -ve ion of chlorine (Cl⁻) through the neuron membranes directed by the membrane potential and potential of 60–70 mV with -ve polarity is recorded under the cell body membrane. This potential fluctuates with variations in synaptic activities. The waveforms of EEG are generally classified according to their frequency, their amplitude, their shape and the sites upon the scalp of recording. This whole Information regarding waveform frequency and its shape is combined with that of the patients age, patients state of sleep, and location on the scalp to conclude significance. Fig -2 represents the experimental technique used in this study and then feature extraction and at last analysis. Electroencephalogram (EEG) system contain many electrodes and for each different channel there is a set of differential amplifiers which are followed by filters providing variable settings, stimulations, sampling frequency and few are equipped with provision of advanced signal processing tools for signals. It is very important to get correct EEG electrode placement in order to ensure right position of electrodes with respect to cortical areas so they can be reliably and exactly maintained from one to another.

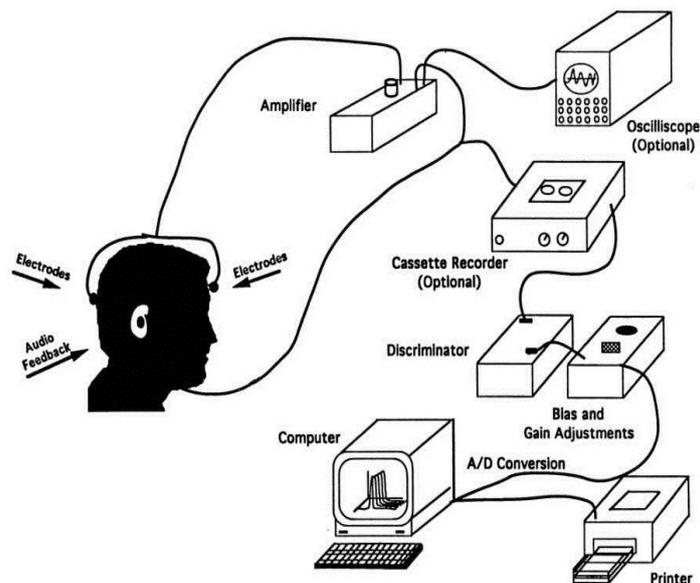


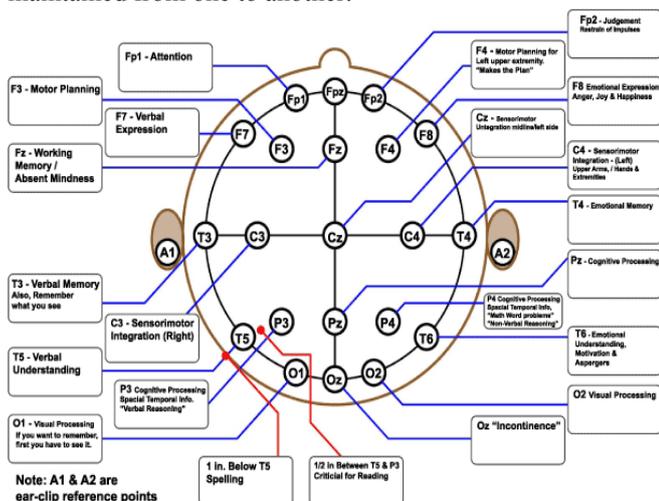
FIG-2: THE STEPS PERFORMED TO GATHER DATA

VII. PROTECTIVE MEASURES

Many national radiation advisory specialists, comprising those of Austria^[11], France^[12], Germany^[13] and Sweden^[14] already have suggested measures to reduce exposure of EM waves to their country citizens and examples of which of these measures are: (A) Use hands free sets to reduce the radiation effect upon the head. (B) Keeping the cell phone away from body. (C) Not using cell phones in a moving car having no external antenna. (D) Persons who attend lots of teleconferences must use a wireless headphone with attached mike. (E) Do not talk too long on mobile phone because short calls avoid undesirable radiation.

VIII. CONCLUSION

The whole motive of this paper is to bring this very delicate matter of brain health affected by mobile radiations in light. It must be noted that soon some precautions must take all over the world wide. As brain is the most important part of human and it this gets effects worldwide it might can effects very harmfully the coming generations.



HEAD POINTS WHERE ELECTRODES ARE EMPLOYED.

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