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RADIATIONS AND DIRTY ELECTRICITY AFFECTING HUMAN HEALTH

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ABSTRACT

Due to the constant exposure to the electromagnetic radiations, the issues related to the radiations affecting the human health are increasing. With the continuous improvement in the modern science and technology we have seen a huge escalation in the growth of radiation generating equipments. Whether it be cell phones, cell phone base stations, lightening lamps etc. we are continuously or uninterruptedly getting exposed to the electromagnetic radiations. With the continuous growth in the coverage area, internet speed etc. there are more and more mobile phone stations being installed and the issues relating to these are of high interest to the entire society. The growth of such electronic equipments that generates radiations and their interaction with the human health has raised the concern of whether the radiations are harmful to the human health or not. This review paper will give an insight into the negative impacts of these radiations on a human body.

Keywords: Cell Phone, Chronic Exposure,Electromagnetic Radiations, ,Human Health, Lightening Bulb

I INTRODUCTION

All the lightening bulbs whether it be a incandescent bulb, fluorescent bulb or any other emit radiations which are a part of the electromagnetic spectrum. The incandescent lamps produce heat in infrared range, the emission of heat is the reason for energy inefficiency. On the other hand fluorescent lamps emit radiations in the range of radio frequency and ultra violet. These fluorescent lamps also emit heat but far less as compared to incandescent bulbs. Hence the fluorescent lamps are considered more energy efficient than the incandescent light bulbs.

CFL, similar to fluorescent lamps uses approximately 4mg (global average) of mercury which is a well known toxic element affecting the health and the environment. In many countries the disposal of CFL is not done with regular waste or garbage,it is done using special collection system that dispose of CFL and other hazardous waste separately. Apart from the use of toxic mercury in CFL,another issue associated with CFL is the dirty electricity.Dirty electricity is nothing but a flickered sine wave as shown in the Fig.1,which is being compared to smooth electricity that has no flickering as shown in the Fig.2.The electronic wiring on CFL has a property that it generates electromagnetic pollution that results in poor power quality,this poor power quality is the reason for spikes on the smooth sine wave as shown in the Fig.1.The spikes are nothing but high frequency transients that affects the electrical equipments.Research also shows that these spikes are the primary reason for CFL

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affecting the human health.These spikes are difficult to avoid so the dirty electricity remain associated with these compact fluorescent lamps.

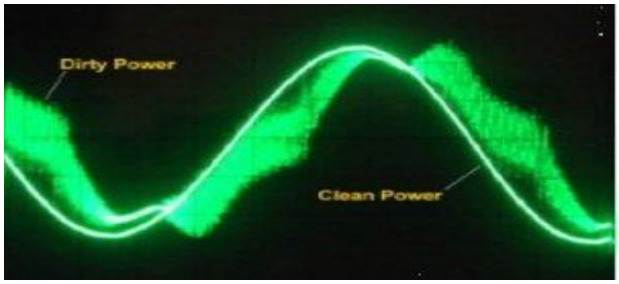

Fig.1 Flickered sine wave

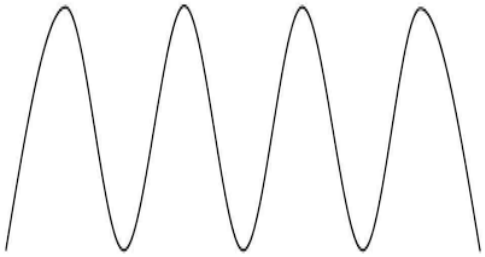

Fig.2 Smooth sine wave

Now if we see cell phones the range in which the cell phone emit radiations lie between 800 Mhz to 2000 Mhz.These radiations come under the microwave range that is between 300Mhz to 300 Ghz,In electromagnetic spectrum the microwave lies between the radio frequency and infrared frequency range.According to the report "forecast of mobile phone users worldwide" by Statista 2016 the total number of mobile phone users worldwide will reach 4.8 billion while the population will touch 7.4 billion mark and will reach 7.6 billion by 2019 and the number of mobile phone users will pass 5 billion number by 2019.The report also stated that 60% of the world's population were the mobile phone users in 2014 which is likely to increase to 67% by 2019.The power a cell phone radiates or generates depend upon the number of base stations in and around that area,distance of the mobile phone from its base station,the mobile phone traffic in and around that area and the position of mobile phone. The electromagnetic fields from the cell phone is the sum of both the electric field as well as the magnetic field.These electromagnetic fields can interact with the complex and non complex biological systems such as plants,animals,humans and other microorganisms.The research has shown that the interaction with the radiations that is the exposure to the radiations for a long period of time can have health impacts and the scope of impact depends on the intensity of radiation,duration of exposure and the distance from the source,less the distance more the intensity. Worldwide the exposure to the human body from cell phones radiations are calculated by term called SAR,an abbreviation for specific absorption.Rate of absorption of energy by human body when exposed to radiations is the SAR value.The units of SAR is Watts per kilogram (W/Kg)

Worldwide the exposure to the human body from cell phones are calculated by term called SAR,an abbreviation for specific absorption is a measure of rate at which the human body absorbs energy when exposed to radiations.The units of SAR is Watts per kilogram (W/Kg)

$$\text{SAR} = \frac{\sigma |E|^2}{\rho}$$

Here σ is the electric conductivity,E is the RMS value of electric field , ρ is the denstiy of sample. The limit for SAR in 2 units set by ICNIRP(international commission on non ionized radiation protection).

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II. EFFECTS OF RADIATIONS ON HUMAN HEALTH

There have been numerous studies in which the researchers have related the radiations from lightening bulbs or cell phones as a health hazard for humans.The researchers have revealed that the chronic exposure to the electromagnetic radiations can lead to life threatening diseases.Studies of various researchers on CFL bulbs and cell phones have been discussed.

2.1 Effects of radiations from CFL bulbs

The electromagnetic radiations from the lightening bulbs especially the CFL bulbs have been associated as a health hazard for human.Some of the studies by various researchers discussed below showed the extent of harm of radiations from these bulbs on human health.

Milham, S. and L.L. Morgan .[1] did a study in a school on California and found the risk to cancer increased due to dirty electricity.The values of CFL bulbs were 2000 GS units in which the teachers were teaching and study found that the risk to cancer increased five times that is every one teacher out of five were at risk to cancer while the teachers who never taught in that class rooms the ratio was 1:8 that is one out of eight were at risk of cancer.

Havas M. et al.[2] did a study in a school in Toronto,the study suggested that the poor power quality that is the dirty electricity may be hindering or interfering students in their education and the performance of teachers.The study further states that if the improvement in wellbeing,behavior and performance is related to the improvement in the power quality then the portion of population electrically sensitive may be 20-60% than the 2% mark reported in Sweden[3].

Havas, M. and A. Olstad , [4] did a repeated study at 3 minnesota schools.the study now focused on people with diabetics and sclerosis.The study found that the symptoms diminished when these people were under reduced intensity of radiations.Another conclusion that the study revealed was that the blood sugar level lowered down in both types of diabetes and the insulin was less required in type 1 diabetes in relatively clean environment[5].

2.2 Effect of radiations from cell phones on Auditory nerve and brain

The electromagnetic radiations from mobile phones have effects on auditory nerve and brain.Vestibular schwannoma are also called acoustic neuromas are benign (non cancerous) tissue growths that appear on the eighth cranial nerve.They conncet inner ear with brain.Acoustic neuromas are slow in growth and are present in auditory nervous system. They donot spread in other parts of body but if they are left unchecked they will continue to grow and can be life threatening. H.C. Christensen et al [6] did a study on effects of radiations on nerve and brain,the study reported that an increased danger of 40% for gliomas (Brain tumor) and and the results were more prominent on people who uses mobile phone one the same side regularly..A study done by Muscat J.E. [7]showed results that also depicted a statistically increased risk of acoustic neuronal due to exposure to EMF radiation.

Studies have also shown effects of radiations from cell phones on Melatonin. It is a hormone secreted by the brain.Melatonin is known for its action directly on sleep.Melatonin provides immunity again certain disease. Aakanksha Aggarwal et al.[8] did a study that showed the effects of electromagnetic radiations on melatonin production.The production of melatonin decreases when electromagnetic radiations come closer to the brain.

Roshakimah Mohd. Isa et al.[9] did a case study in which 45 person were taken that were healthy in condition.They were divided in three categories-first category in which the cell phone was given to be placed on right ear such that the radiation exposure to the brain will be through right ear,second category in which cell phone was held on left ear and the third category where a switched off cell phone was provided. The duration to hold the cell phone was five minutes.Electroencephalography (EEG) was conducted on each of them before, during and after the exposure. It was found that the nueral oscillations(high frequency brain waves) got decreased in the first and the second group while in the third group for which a switched off phone was used, showed little or no change in neural oscillations.The study concluded the effects of mobile phone radiations over brain waves leading to hindrance in the functioning of brain.

2.3 Effect of cell phone radiations on cognitive function

Cognitive functions can be defined as cerebral activities that lead to knowledge, including all means and mechanisms of acquiring information. Cognitive functions encompass reasoning, memory , attention, and language and lead directly to the attainment of information and, thus, knowledge.Preece A.W. et al.[10] did a study to see if the electromagnetic radiations from the cell phones have effect on cognitive function or not.The study revealed that the exposure to radio frequency radiations from mobile phones at frequency of 915 MHz have effects on cognitive functions in humans.Among 15 different cognitive function tests done,choice of reaction time in particular showed a significant change (either increase in reaction time or decrease in reaction time) depicting the dependency of cognitive functions to RF power.The significant change was taken relative to the control subjects.

Kovisto and research group[11] also did a similar study to examine a relationship between cognitive function and cell phone radiations.The results found by the research group indicated that the attentional functions were differentially enhanced after exposure to the electromagnetic radiations from mobile phones.However they finally concluded the study reporting that the findings are just statistical noise or the effect is so small that it can be detected on a behavioral level only occasionally.

2.4 Effects of cell phone radiations on eyes

The effect of radiations from cell phone are observed more where the movement of fluid (blood or water) is less such as eyes,brain and joints.According to a report by national radiological protection board of England that states that due to the heating effect radio waves may cause cataracts. Exposure to the radiations over a longer period of time can induce chromosomal breaks in corneal epithelial cells and can also increase eye temperature.. There had been medical case reports of cataract formation in humans after accidental exposure to microwave radiation.[12],[13].

III.CONCLUSION

The discussion in the paper has reviewed some of the prominent studies done to see what are the ill effects of radiations from mobile phones and lightening bulbs like the compact fluorescent lamps.The CFLs emit light in the range of radio frequency and ultravoilet,along with the content of mercury which is a known neurotoxin the lamps have,are a cause of concern to the human health.As the incandescent bulbs are rarely used and the CFLs

are used almost everywhere it is an issue of attention.The growing number of cases of electromagentic hypersenstivity indicates a new health issue which requires rules and regulations to limit the electromagnetic pollutants from over emittance.It can be concluded from the literature survey done on cell phone radiations shows that the long term exposure to mobile phone radiations could cause severe health issues such as brain cancer and benign tumor. To avoid negative effects of cell phone radiation, it is better to reduce the frequent use of cell phones.

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