Study of Adverse Effects of Mobile Communication

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ABSTRACT: Mobile phones have become an essential part of the daily lives of teenagers in recent times.The growth in the use of mobile phone has raised the concerns about the possible interaction between the electromagnetic fields (EMF) radiation and the biological effects on human tissues, particularly the brain and the human immune system. These concerns have induced a large volume of research studies. This paper gives a brief review of all possible effects of mobile phone radiation with human tissues including both positive and negative effects. . Some positive health effects due to the exposure to the EMF radiation such as improve bone healing and reduce toxic effects of chemotherapy are highlighted. Finally, some studies have also showed no effect due to exposure to EMF. More long-term studies and analysis are much needed.

Keywords: electromagnetic radiation, radiation hazard, adverse effect, SAR.

I. INTRODUCTION

Worldwide, mobile phone usage has been increased dramatically which could affect the health of the people. This effect has raised concerns about the public exposure to radiation emitted from cell phone and the possible interaction between the radio frequency (RF) electromagnetic radiation and the biological effects on human tissues, particularly the brain and the human immune system .

Mobile phone radiation occupies the range of 800 MHz to 2000 MHz and it is a part of microwave (MW) radiation (300 MHz-300 GHz). Microwaves lie between radio frequency (RF) and infrared waves in electromagnetic spectrum. We are surrounded with abundant electromagnetic energy from the sun and some natural electricity such as lightning. The EM fields generated by the mobile phones is a combination of oscillating electric and magnetic fields that can interact with complex and non-complex biological systems such as plants, animals, humans and other microorganisms[2]. Ionization is a process where electrons are stripped away from their normal locationsin atoms and molecules. Ionizing and non ionizing are two types of radiation which can have negative effects on human beings. Ionizing radiation can affect the atoms in the cells of living tissue by changing their normal neutral charge and alterthe normal function of the cells. Non-ionizing radiation is an electromagnetic radiation which does not alter atomic structure. When compared to ionized radiation, non ionized radiation is not dangerous[1].

Mobile phones are low power radio devices that transmit and receive radio frequency radiation in the microwave range of 900 - 1,800 MHz through an antenna used close to the user's head. Various types of analogue and digital cellular phones are in use across the globe. Analogue telephones transmit modulations of the amplitude or frequency of electromagnetic waves which are transmitted continuously. On the other hand, the digital telephones transmit data in series of pulses or fast bursts. The advantage of the digital systems is that they allow simultaneous transmission of messages of different users on the same frequency which increases the capacity of the transmission channels. Digital systems have recently replaced analogue[4].

II . ELECTROMAGNETIC RADIATION

Electromagnetic radiation is a form of energy exhibiting wavelike behaviour as it travels through space. Electromagnetic radiation has both electric and magnetic field components, which oscillate in phase perpendicular to each other and perpendicular to the direction of energy propagation. Electromagnetic radiation can be classified into ionizing radiation and non-ionizing radiation, based on whether it is capable of ionizing atoms and breaking chemical bonds Nonionizing radiation is associated with two major potential hazards: electrical and biological [2]. Extremely high power electromagnetic radiation can cause electric currents strong enough to create sparks (electrical arcs) when an induced voltage exceeds the breakdown voltage of the surrounding medium. These sparks can then ignite flammable materials or gases, possibly leading to an explosion. The biological effect of electromagnetic fields is to cause dielectric heating. Complex biological effects of weaker non-thermal electromagnetic fields also exists, including weak Extremely

Low Frequency magnetic fields [4],[5] and modulated Radio Frequency and microwave fields [6]. Magnetic fields induce circulating currents within the human body and strength of these magnetic fields depends directly on the intensity of the impinging magnetic field. These currents cause nerves and muscles to stimulate which in turn affects biological processes. The influence of the weak EM radiations on human can be realised as sequence of events which includes exposure to EM radiations which when absorbed modulates the biological field patterns, accumulation of energy and information into the body fluid, change in the functional activities of cell which finally results into some disease [7]. The number of mobile phone users has increased exponentially recently and it has become an important device in human daily life. Estimates suggest there are around 1.6 billion mobile phone users throughout the world and the numbers are increasing [8] and hence the level of background electromagnetic radiation. Figure (1): shows the level of electrical activities generated in brain. The voltage level ranges from blue to red and represents electrical activities ranging from minimum to maximum.

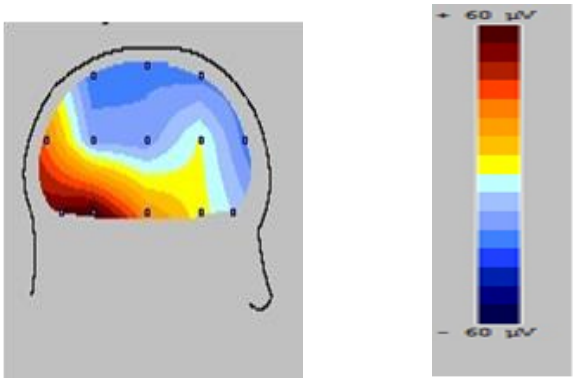

Figure (1): Effect of electromagnetic radiation on human brain

III. RELATED RESEARCH AND DETAILED DISCUSSION

Kul Prasad et al. studied on the title “Mobile Communication and its Adverse Effects”. Extensive use of cell phones and its related technology has enhanced the number of service providers, cell phone towers and users in the country. Wide spread use of mobile system has caused great concern about the adverse health effects caused by the radio frequencies (RF) fields emitted by cell phones and related base stations. He described the specific absorption rate (SAR) values of some of the mobile phones from different manufacture. In this paper, he stated that the adverse effects by using mobile phone and effects of RF on plants, animals and birds[5].

Mohammed M. Elsobeihi et.al (2017) Implemented Effects of Mobile Technology on Human Relationships .Aims of this study to find out the relation between mobile technology and its effects on face- to- face communications at Al-Azhar University in Gaza. In this research mobile addicted is weakening the quantity and quality of face- to- face interactions. This study found out that the use of mobile technology have negative impact on both the quality and the quantity of face-to- face communications. According to analysis and study, face –to- face communication with their family members and friends has reduced, spend more time on the mobile and internet therefore have little time for interaction with their friends and family as a result of the use of technology[6].

Kenichi et. al (2011) studied on the adverse effects of mobile phone use among Japanese adolescents. The study points out that both female and male adolescents use SMS more often than voice calling. The reasons for using mobile phone for voice calls was to give an urgent message and the reason for using mobile phone for text message service was to coordinate a meeting or appointment. The difference between voice calling and text messaging denotes that the instrumental purpose is selected relatively more often for making a voice call, while the consummatory purpose (e.g., talking without a purpose or killing time) is preferred for text messaging. These results indicate that adolescents use two channels, voice calls and text messages, for different purposes and motivations. A plausible explanation as to why these channels are associated with different motivation is that Japanese adolescents wish to use mobile texting more often than voice calling in order to avoid direct communication with friends. Therefore, if both male and female adolescents are motivated to communicate with friends for an emotional purpose, they are more likely to use text messaging service rather than make a voice call [7].

Lusekelo Kibona et al. (2015) implemented Smartphones’ Effects on Academic Performance of Higher Learning Student . Nowadays ,all students are more addicted to applications found on smartphones like WhatsApp, twitter, Facebook and the like. This propose system study was to find out the impact of smartphones on academic performance of higher

learning students.In this paper,one hundred students having smartphones were surveyed regarding the usage of smartphone to their academic performance. After this data collected and analyzed by using excel tools and SPSS(Statistical Package for Social Science). And then percentage analysis were done to find the key contributors towards academic performance and smartphone usage .According to analysis and survey ,female (75%) below 25 years old are more addictied to smartphone usage than male (57%) they are not self controlled. Therefore to conclude, there is negative impact of smartphone usage on higher learning students in Tanzania[8].

Jo Fowler et al. (2016) A study of the health implications of mobile phone use in 8-14s.This research study has demonstrated the high involvement and investment of time in mobiles by this 8-14 age group. When matched against the literature on health hazards and the research of social health concerns associated with young people's use of mobile phones. This suggests that young users should be cautious about heavy use, especially with voice calls and many would be at risk of specific brain tumours by their mid-teens. Advice also says young people should never leave their phones by their beds or under their pillows and never to keep them in their pockets. Futher, recommendations for mobile phone use, are necessary to encourage educational awareness and understanding, and to prevent harm[9].

Muhammad et. al (2013) studied about "the impact of Smartphone's on society". Nowadays, Smartphone are used in social life. One of the major negative consequences of addictive mobile phone use is really expensive mobile phone bills. However, mobile phone users reported better relationships with their friends and family. Smartphones also help people in their professional life letting them handle things in an easier way. Some advantages smartphones provide that better means of communication, learning options to users, great exposure to the latest things, ways to personality development, simple ways to access applications, ideas to succeed in business, platforms to grow their applications and more. [10].

Aruna Tyagi et.al (2011) The proposed system discusses on conducted to study the effect of electromagnetic radiation of two mobile phone technologies with different frequencies and power level via experimental works. Electroencephalogram is used to monitor and capture the brain signals during the experimental analysis for 10 minutes interval. According to various studies ,describe the emissions from a cell phone can be extremely harmful, causing genetic damage, tumours, memory loss, increased blood pressure and weakening of the immune system. The result shows that mobile phone serving GSM has the larger effect on brain compared to mobile phone serving CDMA. Scientists and engineers must develop better systems and devices as : smaller cell size, better base station antennas, to radiate lower power and other more advanced technologies will allow future cell phones[11].

Sumit Katiyar et. al. surveyed the radio frequency pollution reduction in cellular communication. He studied that the analysis of human interaction with the RF, emitted from the cell phones/cell phone towers. Cellular phones are widely used for mobile communication system which has become an essential part of our life style. Communication technologies need significant development. However, the pollution caused by RF in cellular communication is considered as the greatest environmental hazard. Hence, the suitable solution to mitigate the RF pollution by the installation of low power base station in residential areas instead of high power macro cell base stations. It will result in reduction of interference and R. F. pollution substantially [12].

Muhammad et. al (2008) summarized the results of reviews with respect to health consequences from mobile phones use. Despite its unambiguous advantages, mobile phones use has been associated with harmful or potentially disturbing behaviors. He studied that gender and mobile phones addiction, symptoms of problematic mobile phones use and usage of mobile phones among medical students. Finally, the findings of the present study indicate that the impact on psychology and health of the users to prevent from the adverse effects of mobile phone use [13].

Dejan et al.(2012) Implemented Predicting the Biological Effects of Mobile Phone Radiation: Absorbed Energy Linked to the MRI-Obtained Structure.In the proposed system requires approximate anatomical models which are used to calculate the fi eld components and absorbed energy. New approach system in exploring biological effects by combining of two different techniques: 1) numerical electromagnetic simulation, which is used to calculate the field components in a similar anatomical model and 2) Magnetic Resonance Imaging (MRI), which is used to accurately locate sites with increased absorption. By using this system to determines the distribution of absorbed energy into brain structures would improve our understanding of the harmful effects of mobile phones, emphasizing the different habits of mobile phone users - use of certain models, how one holds the phone, period of usage, etc[14].

IV. RECOMMENDATION AND FUTURE WORK

For the student grade to improve even though they are with their smartphones, some restrictions must be made on the usage of smartphone like making regulations that no student is allowed to enter into lecture room with his/her smartphone switched on in order to make them concentrate on listening and taking notes from the lecturer. In the future, research must be done to find out the impact of smartphones on brain or human head, in the sense that do they cause any biological effects on human head or brain leading to the addiction students are having on them? Or do they cause any harmful effects biologically on human skin or fingers? Because most of the students are concentrating with their fingers to chart while they are in the lecture room?

V. CONCLUSIONS AND DISCUSSION

Overall evaluations showed that the effects of mobile phone radiation on skin diseases are weak and have no statistical significance. Some studies have shown weak impacts, and some studies have found that over ten years of mobile use have been effective, but mobile phones are still a new technology and little evidence about long-term side effects is available, as a result, prevention is the best approach. Epidemiological studies on this topic are limited, and its long-term effects have not been evaluated, and there is a gap in the assessment relationship between mobile phone radiation and skin diseases. People are worried about the health effects of mobile phones, especially since it is part of daily life. As a result, the implementation of standard policies and strategic planning for primary health care by government officials on this topic is necessary to reduce people's concerns in order to provide suitable solutions for high-risk people. These programs require extended studies on mobile phone technology and its impact on the safety of mobile users. Our study has limitations. First, only few studies on the study of mobile phone radiation and skin disease are available. Second, we did not have the ability to access the full text of some articles and low levels of evidence. The prevalence of mobile phone usage was high. There was significant association between selected health problems and mobile phone usage. In future, higher studies are required to confirm our findings.

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