

Major Applications of Electromagnetic Radiation (EMR) and Its Health Impacts: A Critical Study

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Abstract - In recent years human life has been exposed to high rates of electromagnetic emissions due to technological developments, one of the world's most critical issues is the impact of “electromagnetic radiation (EMR)” on human health. The present paper recognizes potential jeopardy on human health owing to the exposure of Electromagnetic Radiation (EMR). As human lives are increasingly encompassed by electromagnetic radiations, the risks associated with the same have also ameliorated. Radiation effects are categorized into two major groups known as “ionization, and non-ionization radiation. ionization radiation comprising of high energy radiation can affect the atoms in the cells, altering the normal state the cells and potentially contributing to cancer and other lethal diseases. On the other hand, non-ionizing radiations are composed of electromagnetic radiation such as “waves of contact, microwaves, and electricity waves”. This form of radiation cannot alter the composition of the atom; it only affects the way it can cause irreparable damage.

This article highlights the potential impacts of “Electro-magnet radiation” on human health. It shows people's health hurdles in regular life practices, which in lifestyle is growing enormous. It also addresses health mitigation interventions to mitigate health challenges due to exposure to EMR across all age group worldwide.

KEYWORD: Electromagnetic Radiation, High-Energy, Ionization Radiation, Non-Ionization Radiation

I. Introduction

Several scientific studies have sporadically questioned the adverse impact on health from commonly exposed non-ionizing “Electromagnetic Field” radiation (EMF) exposure from certain electrically operated devices, in our daily lives.

Despite the dearth of ample scientific evidence to support the claim of harmfulness from the exposure to non-ionizing electromagnetic field radiation (EMF) exposure, epidemiological analyzes tend to indicate significant potential injury resulting from non-ionizing radiation exposure.

Due to the fact that medical study, to a certain degree, oversight the importance of environmental protection, the possibility of “EMF-related health issues is not fully understood. Consequently non-ionizing radiation and its effects remain misdiagnosed and ineffectively regulated. Exposure to electromagnetic radiation(EMR) from power lines and certain types of machinery have been identified as sources inflicting potential health hazard. The aim of the paper is to investigate the possible effects of EMR on human health in array of situations.[1]

II ELECTROMAGNETIC SPECTRUM OVERVIEW

"Non-ionizing radiation" alludes the oscillating energy waves composed of electric and magnetic fields. Further, they don't carry enough energy to ionize or alter the atomic and molecular structure by removing electrons. Non Ionizing radiations include “ultraviolet (UV), visible light, infrared (IR), microwave (MW), radio frequency (RF), and extremely low frequency (ELF)” distinguished by their varying wavelength range. Some waves are “high frequency, some of the low frequency, and some of the medium.” The “electromagnetic spectrum” is a term that describes a set of energy of different types, stemming from various sources. The energies released are called forms EMR. “Gamma rays, X-rays, and ultraviolet light reveal high frequencies; lower spectrum frequencies include microwaves, and radio waves.”

The emission of light waves, which occur at medium frequencies, provide the vision, while the light that we perceive to be a form of heat is permitted by infrared energy. Most forms of energy, like “X-rays, ultraviolet energy, and radio waves,” are invisible and imperceptible to humans. Detection of these energy radiations is not possible without specialized instruments. Considering the invisibleness of the radiation, the likelihood of exposure to these energy fields is evident. However exposure to such “high frequency energy like X-rays” is considered extremely dangerous to human cells. Modification of modifying the atomic composition of “cellular structures, causes formation of free radical which can coax damaged DNA or mutation, thereby raising the risk of malignancy or cell death.[2]

III. Non Ionization Radiation

"Non-ionizing radiation "typically refers to low frequencies energy sources, which have been held not to be dispensing any adverse effects. However increasing evidences suggest otherwise referring to the adverse effects on the genetics from exposure to Non-ionizing radiation.

Most work on the assessment of the health impacts of non-ionizing radiation consists of three general types of non-ionizing anthropogenic EMR as follows: first, extremely low frequency EMR from power lines, electrical devices and electronic equipment

Secondly, 'electrical pollution: the application of specific electronic equipment such as plasma televisions, other energy-efficient appliances, adjustable speed motors may generate frequency signals which then flow along and radiate from the cabling in the homes and other buildings in question.

Thirdly, there are microwave and radio frequency emission rates from equipment for Telecommunications networks, such as wireless telephones, cellular towers, antennas, and broadcast towers.

Electrical current continues to follow the shortest path direction and can navigate all reasonable distance such as ground, wires, and various objects. The electromagnetic power supply can thus transmit through the ground through building structures and devices such as metal pipes resulting in non-ionizing depletion of radiation through the adjacent environment. [3]

IV. EMF the Impact of Internet And Telecommunications

Mobile phones transmit and receive signals through EMFs, which are partially absorbed by the MP consumer. Due to the close contact with the mobile phones it could potentially inflict adverse health effects. One real problem with turning health risk facts into exploratory induced type is that the frequency of maximum absorption of "RF energy depends on body size, form, orientation and structure." [4]

- **“EMF and Cancer “**

Countless studies have validated the adverse effects from frequent exposure to the EMR frequencies, referring it to be as "cancerogenic". In a case study conducted in Japan to evaluate the impact of EMF on leukemia symptomatic children, it was found that high exposure to EMF is positively associated with the higher risk of "childhood leukemia". Children room's exposed to magnetic fields were taken into consideration for the study..[5]

- **EMFs and Sanitation**

While clinical studies that correlate EMF with negative health outcomes often have produced conflicting conclusions, studies that examined reproductive dysfunction appear to support the health risks pertaining to exposure of EMF. "Adverse effects during pregnancy may include miscarriage, death, premature birth, altered gender ratio, and congenital defects due to EMF exposure. Large number of researches supports the vulnerability of pregnant women in exposure to EMF. The researchers confirmed increased levels of cumulative exposure to the magnetic field in everyday routine life via a magnetic field detector worn by the participants.

The effects can instill both psychological as well as physical stress in an individual. It can physically affect the "central nervous system, musculoskeletal system, gastrointestinal tract, and endocrine. "Further it can imbue psychological stress and intense paranoia of exposure to EMR.

This constant unrelenting fear and consideration for health issues can have a significant impact on the well-being of the particular the moment where Health & safety individuals develop irrational fear and skepticism seeking to escape civilization. [6]

- **“EMFs Impact on Sleeping”**

Higher frequencies EMF radiation also seems to be affecting the sleeping pattern adversely. Anecdotal accounts of people who feel they are impaired by "radio frequency EMF, among other symptoms," have revealed sleeping disruption issues. Thus, EMF may interfere with regular sleep habits, possibly mediating other adverse health consequences.

Given the physiological sense that sleep is a specific biological process function of the central nervous system, it is critical to assess the potential risk of "sleep disturbance"

Besides, while the exact neurobiological processes are not yet fully known, the regular sequences of waking and dormant states are required for proper processing of "brain information, metabolic homeostasis," an intact immune function.

Sleep in particular is a well-defined biological state that behaves with great care to external influences. There is thus mounting evidence that variable frequencies can trigger and endanger the biological process.

At present, the attempt to address the effects of non-ionizing high-frequency electromagnetic EMF is based on the possibility of "cancer that can be explained by the carcinogenic effects of ionizing radiation"[7].

- **High-Voltage Radiation Impacts On Life And Environment**

The other most effective source of "non-ionizing electromagnetic radiation" is the "transmission lines with a voltage higher than 100 kV." With the activation of 220 kV transmission lines, the workers and technical persons are subjected to risks of increased radiation.

The application of higher transmission lines like 400kV and more have invigorating effects on environmental health and humans. Some of its effects are elucidated below:

Firstly, it induces reduced or stunned growth by altering physiological parameter the cells resulting in poor hormonal functions.

Secondly, it coaxes changed bio-chemical composition in plants due to excessive stress from EMF exposure.

Thirdly, EMF exposure directly impacts the production parameters inducing economic loss.

In humans the exposure to EMF radiations has adverse impacts leading to Pregnancy complicacies. Further, frequent exposure to the EMF was also associated with "testicular abnormalities, atypical sperm, chromosomal aberrations and congenital disabilities" in males. Scientists substantial increase in the number of chromosomal aberrations in switchyard workers" and an increasing proportion for congenital abnormalities among their children. It was also noted that parents working in factories with higher than average exposure to "EMF have offspring susceptible to tumors and spinal dysfunction. [8,9]

IV. Recommendations on public health

To ensure sincere efforts in the direction it is imperative to develop effective public health policy, scientific credibility and among researchers medical journals, and academic institutions.

Adverse EMR requires easily accessible measuring methodologies. For example, micro surge meters alleged to measure 'poor' electricity were introduced as well as gauss meters for measuring "ELF/radiofrequency radiation." New technologies need to be checked immediately and implemented if they are accurate.

The adverse biological impacts were described well below current EMR standards for exposure levels. To ensure sound protection of public health, allowable levels should be modified. Continued epidemiological research and monitoring of health effects on populations exposed to EMR should be undertaken and reported. Such research must be overseen by an independent body, free from conflict of interest.

Governments and supervising authorities are ought to pass regulations to reduce adverse EMR exposure. Highly unsafe "Telecommunications technology radio frequencies" should be monitored and controlled by officials.

Emerging protective equipment should be evaluated and implemented independently, where it is useful. For example, if properly installed, “graham-Stetzer filters” allegedly decrease dirty electricity and potentially lead to health benefits.

These findings should be scientifically scrutinized and disseminated. Though work is ongoing, cautious avoidance strategy should be considered. For example, it could be favorable to incorporate “protective air-tube headsets for cellular telephone use, and wireless zones in public buildings such as patient areas in hospitals and schools”. Public health officials and concerned practitioners must be adequately trained to mitigate the issue. “Clinicians will consider implementing precautionary avoidance for individual patients. The reduction of high smog from EMFs would help chronically ill people exposed to EMR. [10]

V. Conclusion

The present research deals with the radiation applied to the EMF and its effects on human health. The impact of corona effect pertaining to high voltage electromagnetic field is precisely evident in environment and human lives. The current study aims to provide substantial information on the impact of Electromagnetic radiation on our lives as many are not acquainted with its fatal repercussions from the exposure to both ion and non-ion radiation. A significant finding emerging from this report is recognition of danger from non-ionized radiation which can have impulsive effects on the nervous, cardiovascular system, thereby affecting the immune and reproductive systems. It includes damage to the nervous system by “altering electroencephalogram, changes in neural response, or changes to the blood-brain barrier, nervous system disruption.” Finally, it is recommended that all buildings use adequate protection for all high-voltage transmission lines.

Many transmission lines have to be built from the underground for metropolitan environments, as high-voltage radiation impacts can decrease, as well as other equipment that neutralizes radiation effects and prevent spreading harms from the effects of electromagnetic radiation, as electrical and communications firms agree to mount their goods.

Based on experimental evidence, the results confirm that influence on the value of electric field strength below the transmission line can drastically change the circuits and thus modify the distance between the conductive lines. The lines of transmission affect the distance between both the line of conductive parts and the surface of the earth. If local ground rises and falls, referring to the horizon, this can result in substantial increases and decreases in electric field intensity, resulting in the removal of the highest peak zone apart from the center of the line leading to symmetrical field distribution.

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