



IMPINGEMENT OF CELL PHONE TOWERS INSTALLED ON RESIDENTIAL BUILDINGS AND HUMAN HEALTH

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Abstract

These days, mobile phones are connected with fundamental aspects of our lives; as a result, this is frequently one of the most important and required modes of communication. As a consequence of this, a number of temporary towers are placed in order to conceal more regions, notably within congested cities and concrete locations. Now, the base stations that were built in these areas are equipped with transceivers that utilise radio frequency (RF) waves for interference in order to establish contact between users that are part of the mobile network. The variety of base stations that are required will rise as portable devices are used more frequently, as market rivalry heats up, and as new technical capabilities become available. The microwave frequencies that are used in mobile communication can result in both thermal and nonthermal impacts, both of which have a deleterious effect on the body's biological system. The frequency, intensity, polarisation, and length of time that an individual is exposed to RFEMW radiation all play a role in the amount of energy that is absorbed by human tissue. Because of the most important contributor to cancer, electromagnetic radiation (EMR) is widely acknowledged. In this review study, the possible biological and medical impacts of high-intensity portable tower radiation on one's health are discussed.

Keywords: *cell phone, towers, residential*

Introduction

Users are now being caught utilising their smart devices in their everyday routines as a result of the huge rise in technology and smart devices in recent times. The widespread use of intelligent gadgets has prompted leading companies in the communication industry to work on the creation of transmission

methods that are more technologically advanced in order to meet the rising demand. The mobile towers, which are made up of antennas and base transceiver stations, serve as the transmission mediums. These towers utilise radio frequency, or RF, to repair users' communication lines. 1 People use mobile phones for communication reception at work or anywhere else, but only a small percentage of them are concerned about the potential health effects and safety precautions associated with their usage. The vast majority of people are unaware of the dangers posed by mobile and cell tower radiations, which are extremely hazardous owing to exposure to electromagnetic radiation (EMR). 2 The use of wireless cellular communication has become commonplace. Wireless technologies rely on huge networks of base stations to link users by means of radio frequency (RF) transmissions. These networks connect users to one another. In the past ten years, there has been an extraordinary amount of worry over the potential adverse effects on human health that may be produced by human exposure to radiofrequency radiation (RF) in general and radiations from base stations in particular. The quality exposure contribution from the mobile tower has relevance for cumulative long-term wholebody exposure to radiofrequency electromagnetic fields, as demonstrated by three separate measurements of personal exposure to radiofrequency electromagnetic fields taken during a population sample in Switzerland. On the other hand, it goes without saying that its significance is negligible in terms of cumulative exposure to the very best of regular mobile users. 4 The technology behind the telephone has experienced fast expansion and offers a number of benefits. There are currently 80 crores of people using telephones in India, and there is around 4.5 lakhs telephone towers constructed to serve the country's communication services. Without taking into account the drawbacks of the technology, the number has increased dramatically as a direct result of the decreased cost of cell phones as well as their mobility. According to a statement released by Deloitte India, "For the following five years, cellphone towers are required to be constructed at 3 percent CAGR and thus the total number of towers is forecasted to grow to quite 511,000 by the financial year 2020." Out of these 511,000 towers, 30,000 towers are expected to be only providing data sites. It is the report. At the end of the day, what matters most in the Indian Tower Industry is According to data, there are around 400,000 mobile towers, of which only 700 are independent 3G and 4G towers. Over the course of several years, Rowley and Joyner (2012) collected the data on the tower electromagnetic field (EMF) radiation that was obtained from measuring operations carried out in 21 nations all over the world. The database contains over 173,000 individual data points, and it reveals that the worldwide average exposure level from towers is as low as 0.73 mill watt per square metre. This value is over 5,000 times lower than the radiation norm that the WHO has endorsed for mobile towers, which is 4 watts per square metre at 800 MHz. 5 The vast majority of these towers are positioned in close proximity to residential and commercial buildings in order to provide reliable mobile service to the customers. A mobile tower and the transmitting power it uses are constructed in such a manner that they can cover a distance of at least a couple of kilometres. This means that a mobile device located at this distance should be able to send and receive sufficient signal for accurate communication.

A structure that is located tens of metres away from the tower will get signals that are ten thousand times stronger than what is necessary for mobile connectivity. A significant number of people call high radiation zones their home in cities such as Mumbai, Delhi, and Bangalore, amongst others. Not all of the rules and recommendations that are followed across the world have equal exposure levels that are advised. For instance, some of the published exposure limits in Russia and a few other eastern European nations are, on average, more stringent than the recommendations for exposure that are now in place or that are planned in North America and other regions of Europe. 6 The majority of individuals who use cell phones are unaware of the negative effects that mobile phones can have on human health, despite the fact that the number of people who use cell phones is rapidly growing. Within the presence of various RF

sources, including telephone handsets and broadcast antennas which contribute to the general environmental exposure have become a prominent concern about the safety of this new technology as well as human health. It is almost clear from the research that the radiation from the phone is liable for many diseases such as a brain tumour, headaches, STM loss, various types of heart diseases, and so on.

Cell tower radiation

The frequency range that the GSM900 base station antenna broadcasts on is 935 to 960 MHz. This waveband, which has a frequency of 25 MHz, has been subdivided into twenty subbands, each with a frequency of 1.2 MHz, and given to a variety of operators. A better limit of 6.2 MHz bandwidth might also be imposed on the amount of various transmitter frequencies that are given to at least one operator. These frequencies could range from 1 to 5. Each carrier is responsible for the transmission of 10 to 20 Watts of electricity. Therefore, the total power that may be communicated may range anywhere from 200 to 400W, depending on how many operators are present on the respective rooftop or tower. A single operator may transmit between 50 and 100W of electricity. In addition to that, directional antennas are utilised, and they may typically have an increase of around 17 dB. (numeric value is 50). Because of this efficiency, it was also possible to send several kilowatts of electricity in the direction of the primary beam. 8 There is a one-to-one correlation between the number of people living in an area and the number of cell towers. Additionally, the configuration of the directional antennas is an incredibly important aspect of the overall transmission system (see) (Figure 1).

Frequency ranges of towers

Antennas on Cell tower transmit in the frequency range of:

869 - 890 MHz (CDMA)

935 - 960 MHz (GSM900)

1805 – 1880 MHz (GSM1800)

2110 – 2170 MHz (3G).8

Electromagnetic spectrum and Rf-Emf radiation

Ten megahertz to three hundred gigahertz is the frequency range that RF-EMF radiation covers. Mobile phone technologies employ frequencies mostly between 800 MHz and 3 GHz, 4 GHz, and cell tower aeriels use a frequency of 900 or 1800 MHz, pulsed at low frequencies, typically known as microwaves (300 MHz–300 GHz) frequency range.

Electromagnetic radiation and types

Because electromagnetic radiation travels over space, it may also be a kind of energy that has wave-like behaviour. The electromagnetic stream is composed of magnetic and electric components, which fluctuate in state in a direction that is perpendicular to both them and the direction in which energy is transmitted. Depending on whether or not an electromagnetic wave is capable of ionising atoms and breaking chemical bonds, scientists frequently divide them into two categories: ionising radiation and non-ionizing support. There are two primary potential dangers that are linked to non-ionizing radiation, and those are biological and electrical. When an induced charge is greater than the division voltage of the medium that surrounds it, radiation with an exceptionally high power level can cause electrical fluxes that

are strong enough to make sparkles, also known as electrical arcs. These flashes have the potential to ignite flammable substances or gases, which will most likely result in an explosion. Magnetic regions have an effect on the flow of currents within the body, and as a result, the strength of the magnetic flux that results from those magnetic regions is exactly proportional to the strength of the magnetic field. These currents cause venations and the stimulation of tissues, which in turn impacts the physiological processes. An individual's susceptibility to faint electromagnetic radiations, which, if received, accentuates the physiological field patterns, an increase of energy and information into the liquid body substance, and a change within the functional movements of the cell, all of which ultimately results in some disease, is often understood as a series of events. These events include susceptibility to faint electromagnetic radiations, which, if received, accentuates the physiological field patterns. 10 In order to communicate with base stations, the mobile device must be able to send out frequency energy at sufficient quantities (antenna towers). There are concerns regarding the safety of this technology due to the fact that the energy is transferred in the form of microwaves within the immediate vicinity of the user's head. There are papers derived from cell research as well as animal studies that suggest there may also be a significant chance of developing cancer tumours, which may ultimately result in brain tumours within the individual who uses a mobile phone. Radiation may have unfavourable effects on people directly, as well as their generations, indirectly, depending on the amount to which information is disclosed. Transmission can damage cells in the body, increasing the risk of cancer or serious hereditary variations that will be passed down to subsequent generations; or, if the volumes are sufficient to cause extensive tissue injury, which is going to cause mortality within a couple of weeks of vulnerability to the condition. 11–13 It is possible to classify electromagnetic radiation according to the capacity of a single photon to ionise oxygen or destroy chemical bonds when the photon's energy is more than 10 electron volts (eV). Radiation may be divided into two categories: ionising and nonionizing.

1. Ionizing radiation is electromagnetic radiation that has enough energy to create ions when it combines with matter (about 10 eV in biological systems). Examples are UV rays, X-rays, gamma rays, cosmic rays, etc. Damage to living tissues (acute) and alterations in the molecular structure, which can lead to changes in cell genetic tissue are the primary negative consequences that ionising radiation has on human health (chronic).
2. Radiation that does not ionise the surrounding medium: RF energy is an example of this type of radiation. Electromagnetic waves at a frequency of radio frequency (RF) do not have sufficient photon energies to cause the ionisation of atoms and molecules. Radio waves, microwaves, and infrared waves are some examples of other types of waves. The generation of warmth in biological tissue is the principal adverse effect of non-ionizing radiation on human health.

Radio frequency radiation

- I. It is common practise to refer to radio waves, RF radiation, or RF radiations when discussing RF energy in the wavelength range that includes LF, MF, HF, VHF, UHF, or Microwaves. For the sake of this discussion, the term "RF energy" refers to all frequencies ranging from 30 kHz all the way up to 300 GHz. Associated with radio frequency energy are the following facts:
- II. The physiological effects of RF energy are equivalent to the rate of energy consumption, and the level of consumption varies light with frequency.

RF radiation has the ability to heat human tissue in a manner similar to that in which microwaves cook food; this heating can be harmful if the expression is sufficiently intense or prolonged. Because the

human body is not designed to process the excessive amounts of heat that are created by radiofrequency (RF) energy, it is susceptible to tissue damage when exposed to high quantities of this type of energy. Burns to the skin and deeper burns, heat exhaustion, and maybe even heatstroke are all possibilities. Cataracts can develop on the cornea if there is insufficient blood flow to the area, which increases the risk of cataracts. Eyes are particularly vulnerable to prolonged exposure to RF radiation.

Effects on human health

Biological effects: Because the human body is composed of 70 percent fluid, an individual who is subjected to electromagnetic radiation will get radiation as a result of the exposure. There is a good chance that it will cook in the microwave oven. Within the body, there will be a variety of vibrations caused by broadcasting frequencies, which will provide a localised warming effect within the body. This results in boils as well as a dehydration of the fluids surrounding the eyes, joints, brain, belly, and heart, among other organs. Different people have different reactions to the same levels of electromagnetic field exposure. Headaches, sleep difficulties, decreased memory, psychological excitation, agitation, stress, anguish, hunger discomfort, and lethargy are some of the potential small-time effects that might result from the revelation of cell tower transmissions. These results may only affect a few people. The existing international regulations (which are based on references from the ICNIRP) are entirely focused on the thermal effects of radiation, but a number of epidemiological and empirical investigations have shown that critical physiological impacts can occur well below these limits. The non-thermal impacts of radiofrequency pollution spread out over time, and the dangers become more apparent once the effects have been expressed for eight to ten years. Due to the fact that the body possesses special defence systems and the strain is placed on the body's stress proteins, in particular the heat shock proteins, the repercussions are not noticed in the first years of susceptibility when the condition is present. This suggests that the body recognises these electromagnetic radiations as a possible source of injury. [Cause and effect] In addition, there is a diminished response if the pressure continues for a prolonged period of time, which results in the cells having less of a defence mechanism against the loss. This is a secondary worry. Because of this, even extremely low quantities of the expression can be harmful if it is allowed to continue for a long time or if it is chronic. There has been a discernible correlation established between the radiation emitted by phone antennas and an increase in the incidence of brain tumours.

Neurological effects

Researchers have used animals in controlled lab settings to investigate whether or not low-level exposure to RF fields associated with mobile phones might have an effect on brain function and behaviour. The answers that were summarised in response to the fictitious RF exposure covered a wide variety of nonspecific indications. Insomnia, weakness, dizziness, digestive abnormalities, focus problems, and concentration issues are the symptoms that are mentioned most frequently. Research that was well controlled, effectively carried out, and carried out using a double-blind methodology found that symptoms are not connected with RF sensitivity. More evidence suggests that these markings may have been caused by preexisting conditions such as anxiety reactions that occurred as a result of worrying about perceived RF health effects rather than the RF exposure in and of it. Up to this point, only the complicated and transient impacts have been enumerated, and the implications for one's health continue to be murky and debatable. The head from mobile phone usage is being compared in certain studies to the much lower RF levels associated with a typical public appearance from base stations, although the expressions employed are similar to those used in the head from mobile phone use. Investigations on the evidence of electromagnetic hypersensitivity have proven complicated. Comprehensive and accurate

research identified appropriate blind or double-blind incentive trials of persons who were perhaps hypersensitive to the presence of electromagnetic fields (EMF). A meta-analysis found no evidence that "hypersensitive" individuals had an improved ability to detect electromagnetic fields (EMF). In other words, it was concluded that low electromagnetic fields are not likely to be the agents that cause neurological symptoms because of their low intensity. Researchers looked for possible differences in blood cells among patients reporting EMF hypersensitivity as well as normal individuals. However, they did not find any differences in the lymphocyte response to RF from GSM portable handsets. 24 Similarly, some researchers have arrived to the conclusion that "based on the insufficient studies that are now available, there is no convincing evidence for a correlation between poor well-being and vulnerability to mobile phone radiation."

Carcinogens effect

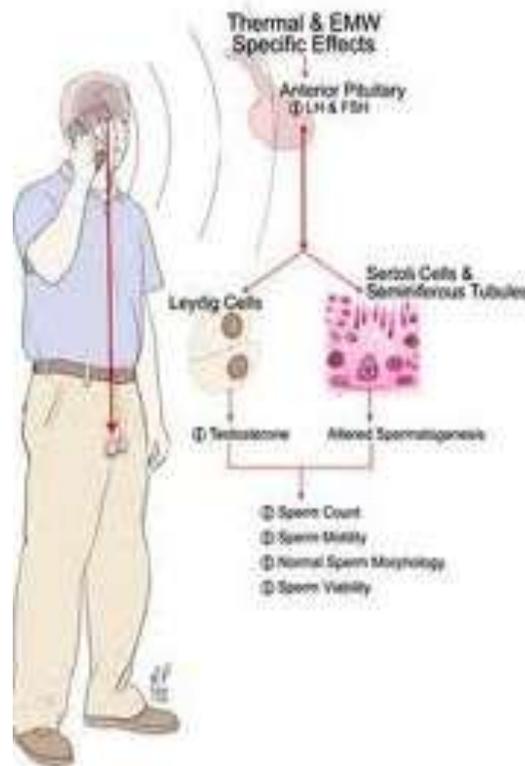
The International Agency for Research on Cancer (IARC) has classified RF areas as "possibly carcinogenic to humans." The reasoning behind this classification is that there is insufficient evidence to support a potential rise in the risk of brain tumours among users of mobile phones, as well as a lack of evidence for other types of cancer. The International Agency for Research on Cancer also made the observation that the risk to the brain posed by radio frequency fields emitted by telephone base stations (which are often situated on roofs or towers) is less than 1/100th the level posed by mobile devices.

The Environmental protection agency (EPA) states

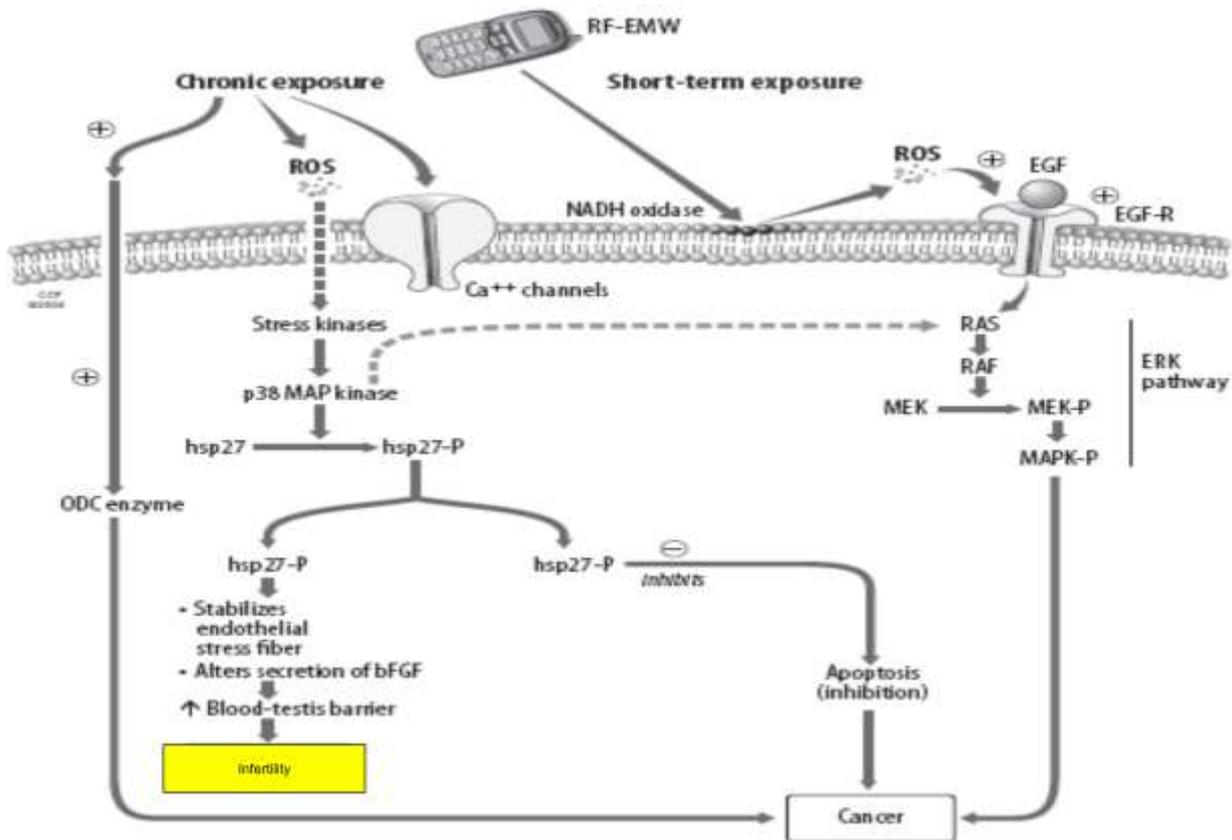
At these severe levels, RF energy is of the utmost importance. It has the potential to quickly ignite the membranes of the body. However, these high levels are only found in the immediate vicinity of certain equipment, such as very effective antennas for long distances. Radio frequency (RF) is emitted by mobile phones and wireless channels, although not at levels that significantly contribute to global warming. In addition, the amount of RF energy decreases immediately with increasing distance. At sea level, the degree of radio frequency (RF) exposure from sources such as mobile phone towers is normally rather low. Concerns have been raised by certain individuals regarding the potential adverse effects on health, most notably on the maturing minds and bodies of youngsters. According to the findings of certain experts, consistent and prolonged usage of cellular phones may have consequences for one's health. According to the findings of other studies, using a mobile phone does not have any negative effects on one's health. Animals that were subjected to the radio frequency radiation (RF) that is prevalent in wireless networks (Wi-Fi) for extended periods of time have not been discovered to experience any negative health impacts as of yet. The next step in the investigation of the consequences of long-term exposure to low levels of RF is being taken by the scientific community. It is also possible for mobile phone base stations to take the form of freestanding pillars or to be fixed on pre-existing structures such as trees, water tanks, or towering buildings. The aerials needed to be of a height that would allow them to adequately cover the whole earth. The typical height of a base station is between 50 and 200 feet. Radiofrequency (RF) streams are the primary means through which mobile phones communicate with neighbouring cell towers. These streams are a kind of energy that may be found on the electromagnetic spectrum between FM radio waves and microwaves. They belong to the category of non-ionizing radiation, which also includes light, microwaves, FM radio waves, and heat. This indicates that they are indirectly causing damage to the DNA found inside of cells, which is the mechanism through which more stronger forms of radiation such as x-rays, gamma rays, and ultraviolet (UV) light are believed to be capable of causing cancer. When exposed to very high levels, bodily membranes can be heated by radiofrequency (RF) radiation. However, the amounts of energy that are consumed by cell phones and

towers are far smaller. When a person makes a call on their phone, a signal is sent from the phone's antenna to the wire that is connected to the closest base station. In response to the current signal, the base station identifies the channel in question as one of the accessible radiofrequency channels. The voice message is transmitted to the bottom station through radio frequency waves. After some time has passed, the voice signals are sent to a switching station, which then gives the decision to its intended recipient. Afterward, over the course of the call, voice signals will be sent back and forth.

Effect of Electro-Magnetic Field (EMF) on Human Health



Pathophysiology of cell phone radiation: oxidative stress and carcinogenesis with focus on male reproductive system



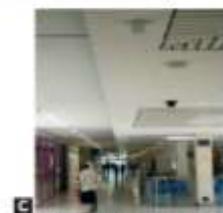
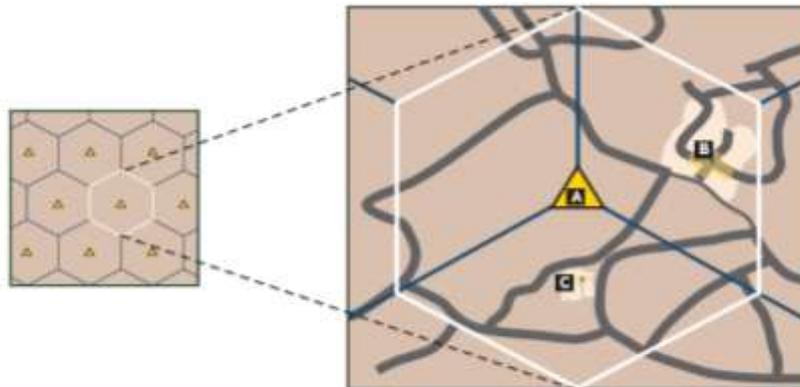
Things you can do to reduce the adverse effects

- Children should only use cell phones next to their heads for emergencies
- While talking on your cell phone, try to keep the cell phone away from your body as much as possible
- Avoid using your cell phone when the signal is weak
- Avoid carrying your cell phone on your body at all times
- If you must carry your cell phone on you, make sure that the keypad is positioned toward your body

Pulprilhad Pur, New Delhi



Rahugupta T-10B Pulprahilad Pur New Delhi



B Microcell providing extra capacity in town centre

C Picocell providing coverage in shopping centre

FIGURE A2 Arrangement of cellular networks showing macrocell, with microcell and picocell base stations used to provide additional coverage (Figure courtesy of the Health Protection Agency)

Methodology

The research was conducted in the residential communities of northern nations. The region encompasses a total of four Delhi. Our major focus is on the risk of exposure as well as the health impacts that are posed to those people who live directly below the 14 cell towers that were chosen. Within a time frame ranging from five to ten years, each skyscraper was constructed. The following is how we separated the region that was under investigation into the five distinct zones depending on the distance from the closest cell tower:

Distances of fewer than fifty metres separate the first zone. Zone 2: Distance between 50 and 100 metres away Zone 3: Distances between 100 and 200 metres away Zone 4: Distances between 200 and 300 metres away Zone 5 - Distance exceeding 300 m

We took readings both inside and outside of residential structures to determine the power density of electromagnetic fields as well as the intensities of time-varying electric and magnetic fields. Personal interviews were used as the data collection strategy for a survey. As a result, 229 people spanning a wide range of ages and genders were taken into account, and inquiries were conducted on 32 distinct ailments that were thought to be caused by radiation. Our purpose was to determine if or not there is a connection between the illnesses and the radiation exposure. Tests of statistical significance, including the T test

DEVICE USED MECO's In order to obtain accurate results, an Electrosmog Meter Model 9720 was utilised. The instrument was a three-axis metre that could measure E, H, and power density on a number of scales simultaneously. On the other hand, the sole topic we will be discussing in this paper is power density measurements. The frequency range of the gadget extends from 50 MHz all the way up to 3.5 GHz. With the three channel measurement sensor, it is feasible to conduct measurements that are isotropic and non-directional. Due to the fact that this system processes digital results using three channels, it is capable of producing a large dynamic range. Figure 1 (a) is a snapshot of the gadget, and Figure 1 (b) is a diagram illustrating how the device should be used.

RESULTS AND DISCUSSIONS

The purpose of this research is to draw some conclusions on the impact that exposure to radiation plays in the development of 32 different illnesses. According to our findings, only four illnesses were shown to have a clear connection to the radiation from cell towers. These symptoms include aching joints, trouble sleeping, headaches associated with migraines, and stomach issues. The next sections provide an extensive study of how the illnesses are connected to the exposure to the cell towers.



Figure 1: (a) Photograph of the MECO's Electrosmog Meter 9720 and (b) its usage.

Diseases and cell power radiation

Joint Pain

The researchers observed that joint discomfort afflicted around one quarter of the persons who participated in the study. According to the findings of the statistical tests, the victims were living in an environment with an exposure level that had a Mean Power Density (MPD) of 410.28 mW/m² and a Standard Deviation (SD) of 297.25. Table 1 displays the victim count percentages broken down by geographic region.

Table 1: The zone wise percentages of victims (joint pain).

Zone	Percentage of people affected
1	35
2	32
3	16
4	10
5	7

Next, when the afflicted persons were categorised according to their gender, it was discovered that 58 percent of those impacted belonged to the female category, while only 42 percent belonged to the male category. A comparison of age groups is also done on the class that was affected, and the results of that comparison are presented in figure 2.

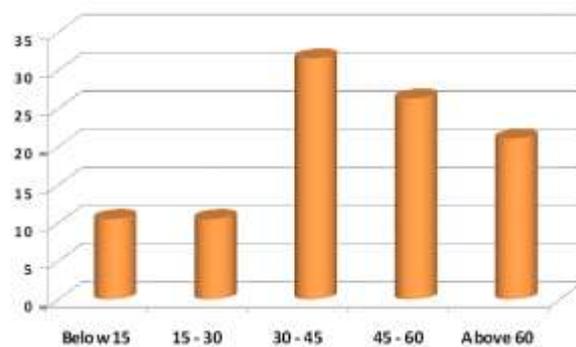


Figure 2: Age group comparison (joint pain).

According to the findings of our study, the societal average for joint pain (originating from zone 5) would have been 7.02 percent lower if there had been no radiation from cell towers. I'm sorry to say that it's currently at 25.11 percent. According to the findings of the study, cell tower radiation is responsible for a rise of 18.09 percent in the number of cases of joint pain. The patients were exposed to 410.28 mW/m² with a standard deviation of 297.25.

Conclusion

The majority of people are unaware of the negative effects that cell phone towers have on personal well-being, despite the fact that the use of mobile phones is dramatically increasing on a daily basis. The only

way to overcome these contradicting aspects of the most modern technologies is to replace them with technologies that are more trustworthy. Radiation from electromagnetic fields and radio waves may be found everywhere. It is possible that there are more extraordinary communication tools, as well as an artificial electromagnetic wave. It would appear that there is no way to correct this slide in the current course of events. It is imperative that professionals and experts develop wireless devices and systems that are more dependable and trustworthy. In the future, mobile phones will be able to emit considerably less power thanks to the development of technologies such as more small cell size, more appropriate base station aerials, and other more unorthodox technologies. Technology will become a great blessing. When mobile phones are being used so close to the top of the user's head, the user is exposed to very high amounts of microwave radiation from sources that are nearby. Never before in the history of the world have such lofty statements taken place so regularly in such a significant portion of the population. As a consequence of this, there is a possibility that disclosure will result in subsequent negative health consequences, namely leading to an increase in the incidence of cancer. The state, society, and companies are obliged to negotiate in a blameworthy manner with the relatively mobile phone tower in order to avoid residential areas and the inherent health risks that are associated with them, despite the fact that the systematic body of evidence is insufficient. The fact that there are also financial incentives linked with it is another factor that contributes to the elevated status. Nevertheless, any risk assessment and preventative measures should be focused on specific geographic locations. In order to win the community's support of the system that was developed as a consequence, it is imperative that these specific reasons be communicated to the society in an exceedingly clear manner.

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