

The Effect of Wi-Fi Radiation on Human Body

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Annotation: Background: Wi-Fi (Wireless Fidelity) technology has become an essential part of current life that permitting wireless internet connectivity in homes, schools, public spaces and workplaces that which enabling communication and internet access. Wi-Fi transmits data using radiofrequency of electromagnetic radiation (EMR) that consider a type of radiation (non-ionizing) meaning they absence an energy to directly destroy DNA. In recent years, as worldwide requirement on wireless communication raises particularly among youths and children, therefore daily life has raised worries about their potential health effects of exposure for these Wi-Fi radiation, especially given the nearness of devices to the human body. So the hazard health on human of Wi-Fi by the electromagnetic radiation of its. However, this radiation emit may contribute to various health problems, for example heart disease, sleep disorders, brain tumors, hearing issues, and human infertility, all these happened when exposure for long time. Also the Wi-Fi radiation have potential effects on brain activity, sleep patterns, fertility, oxidative stress levels, and overall cellular function. However, existing research remains questionable and often inconsistent, with some studies reporting physiological changes while others observe no measurable effects, this different in idea may below to the long of exposure time. **Amis:** This review aims to study the harmful effects of electromagnetic radiation (EMR) as of Wi-Fi on

human health and suggest directions for future investigation.

Keywords: Wi-Fi, Electromagnetic radiation (EMR) and human health.

Introduction

1-Wi-Fi

Wi-Fi technology is generally used to offer wireless internet access in community places such as airports, hotels and shopping centers, and is too used in the home and workplace to permit a wide range of devices to access the internet and network with each other lacking the need for superior cables [1].

The initiation of the Wi-Fi has developed the method human beings interact, conduct various features to their lives and access information, as we investigate into the revision of its effect on persons, it becomes important to identify the harmful effects of Wi-Fi radiation on human body. In latest years, wireless Wi-Fi has become abundant in present society [2]. The name Wi-Fi, commercially used at least as early as August 1999, that referred for Wireless Fidelity [3]. Researchers recently noted the people preoccupation with the internet, staying online longer than originally intended and increasing the amount of time spent online [4]. Wi-Fi is a wireless communication method designed for local area networking. Wi-Fi using the 2.4 -5 GHz radio band, that it is like toward the frequencies (microwave range) that used in mobile telephone, each modern mobile phone and laptop is equipped with Wi-Fi [5]. Wireless technology be present first created in 1880 through person called Sumner Tainted and Alexander Graham Bell on the related time as the discovery of a telephone [6], [7]. Digital camera and Bluetooth device these devices that use Wi-Fi expertise connected with the wireless router [8]. Wi-Fi is a wireless system containing as a minimum one antenna for Wi-Fi that linked to the internet and a series of computers and additional wireless devices [9]. Wi-Fi is use electromagnetic radiation (EMR) [10].

2-Electromagnetic radiation (EMR) of Wi-Fi

Today, we noted cumulative in the volumes of using an EMR in everyday at home and work, and this one of the environmental inducements affects cells and organs in the body. The causes of EMR in the environment, comprising wireless communications, radars, satellites, TV, and radio antennas. It is too commonly used in medical devices and the hospitals [10] because it is a cheap [11]. Wi-Fi is use Radiofrequency energy to send and receive information which is a type of electromagnetic radiation. Radiation have energy which is formed by excited atoms, the radiation is spread as a waves, particles, or rays form in space. The classification of radiations to two categories non-ionizing radiation and ionizing radiation. Ionizing radiations (high-energy electromagnetic waves) which can easily eliminate electrons from atoms and molecules, and its reason harm to living cells because of free radicals forming [12]. Though non-ionizing radiations conveys electromagnetic energy, sound energy, or thermal energy lacking breaking the chemical bond (Diagram 1) [13], [14]. But, the common community there are exposed many years to Wi-Fi, which is consider one a common type of sources that emit non-ionizing radiation [15].

3-The exposure doses to Wi-Fi

Wi-Fi radiation is subject to international exposure principles permitted through the World Health Organization (WHO), the principles are science-based, developed to keep the public and comprise an important edge of safety built into the limits. The WHO confirms that the safety edge takes into account all members of the populace, as well as the ill, elderly, pregnant and children [16]. The exposure for slight doses to non-ionizing radiations which not have great harm, but great and large doses of that radiations which cause cancers and radiological illnesses

according to medical laboratory tests,. The is sensitive to

the non- ionizing radiations can effect on the DNA may cause change or become sensitive when exposed to these radiations [17]. A number of of the people considers themselves sensitive for radiation from wireless [18], [19]. The human research on animal observed that increasing time of exposure to Wi-Fi causes significantly increased in effects. The effects produced alterations in the brain and neurons structure and after exposures stopped, all these structural alterations changes were mostly gone and consider reversible. But, longer exposure wireless radiation (more months) from Wi-Fi considerable extra severe effects on structure brain and neuronal, these effects were irreversible [20]. The current research showed long Wi-Fi period on nervous will lead to: headaches, dizziness, faintness, exhaustion, pains, nausea, memory concentration difficulties, depression, muscle and joint pains [21]. The harmful effects of Wi-Fi may be detected in many tissues of body initiating many irregularities for example: falls, discomfort, worsening vision, ear buzzing, uneasiness, and ear audible range damage [22].

4-The effect of Wi-Fi radiation

The research noted the exposure to EMR of Wi-Fi induces in the brain an difference in the oxidant/antioxidant (defense system), means that the inner environment of all brain cell was getting disturbed by the EMR. Wi-Fi which may disturb function's cell, and the reactive oxygen species which forming when increase exposure [23]. Current studies shown that contact to Wi-Fi has also risk of cancer. Most studies showed that EMR is linked to the absorption of energy through living organisms [24]. In some current studies reveals in aggressive behavior and attention focus are related to internet addiction in young, significantly impacting their behavior and attention span [25].

4-1 The effect of Wi-Fi radiation on animals

the investigation noted the radiation of Wi-Fi have effects on animals by causes the congenital abnormalities, change hormonal responses and reduction of locomotors activity [26]. Some studies on animals (mice and rat) recovered that higher levels of heat shock protein 70 and reduced cognitive function, increased oxidative/nitrosative stress and DNA damage in following exposure to Wi-Fi, these finding different according to the duration exposure [27]. However, according to some research, both animal and human, indicates that exposure of the testes to EMR for Wi-Fi could affect sperm count, motility, concentration, and morphology [28], [29]. The revisions recorded that the Wi-Fi have high potential effects on cognitive behaviors happening together humans and animals [30].

4-2 The effect of Wi-Fi radiation on children

Wi-Fi can be greatly additional damaging for young children [31] by have effects on cells (embryonic stem cells) [32], as these cells happen in children on abundant higher cell masses than in adults through the masses of stem cell that reducing by increasing age and highest in the fetus. The increased DNA damage because of the reduced DNA repair. When exposure Wi-Fi strongly propose that young children might be gradually susceptible to cancer and sensitive to disruption of brain development after these exposures [33], [34], rather that may be related to caused autism. So after these different results noted the Wi-Fi position in the schools around the country can well stay a high level hazard to the children health and teachers [35].

4-3 The effect of Wi-Fi radiation on reproductive health

wireless exposure increased the potential effect on fertility. Some human studies noted create a significant reduction in the development of ovarian and size due previous cell death and follicles in ovaries [36]. Recent research shows the Wi-Fi have effect of on the reproductive health of individuals by depressing of counts and quality sperm in human and in animal may be lead to human death in various countries everywhere the world , the major effect of exposures to Wi-Fi on testis showed sperm immobile, apoptosis, damage DNA cellular, hormonal changes, lowered

male fertility and oxidative stress [37], [38].

4-4 The effect of Wi-Fi radiation on Oxidative stress and cellular DNA

The most chronic human diseases happened to oxidative stress; damage DNA cellular can reason of cancer, therefore generating a partial clarification for Wi-Fi effect that lead to cancer relationship; because the DNA damage happen in sperm cells [39] this damage is very ready create mutations which effect generations in future; apoptosis has central roles in neurodegenerative diseases; these neuropsychiatric effects are practically surely affected by Wi-Fi effects on brain structure [20], [40]. Also Wi-Fi radiation have attacking the DNA cells, placing our biological inheritance at excessive risk. As living organisms, Wi-Fi attack each of the greatest important roles that go to the core of our human complexities [35]. Wireless exposure increased DNA abnormalities, Some human studies noted rise in the apoptosis (cell death) [36].

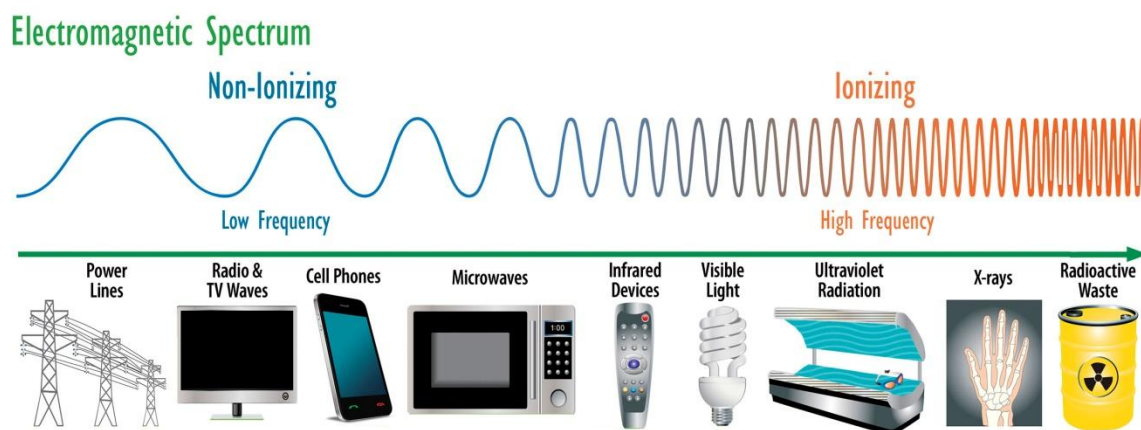
Some research recommend that continued or high dose EMF exposure may induce oxidative stress, mitochondrial dysfunction and cellular changes comprising changed sperm parameters in rodents and increased reactive oxygen species (ROS) [41].

5-The position of Wi-Fi router

These effects that recorded above happened when exposure for longer time periods. But, how about the detail which Wi-Fi has been located in homes, most schools, hotels, restaurants, coffee shops, commercial aircraft and airports and the Wi-Fi hot spots will becoming increasingly common in places around the world, we must imagine great increasing Wi-Fi influence on many people [42]. Wireless computing devices can be employed for longer durations, and are more likely used by young people [15]. So after these different results the position of Wi-Fi in schools everywhere of the country can well be a high level hazard for healthing of children and teachers [35]. Continuous Wi-Fi exposure can cause problems for cardiac as following: cardiac arrhythmias, Irregular heartbeat, Squatness of snort, shortness of breath and hypertension. Failure of any associated organs can lead to serious consequences or death [43]. Other endpoints were investigated in their experiments available over the last years, changes in microRNA expression [24], functional cardiovascular changes [44], development of teeth [45], female hormonal status [46], diabetes like changes [47], changes of cornea and lens [48], and adverse effects in the liver, kidneys, thyroid gland and thymus [36]

6- The ways to reduce the effect of Wi-Fi radiation

Wi-Fi radiation are low-energy, non-ionizing electromagnetic radiation, and current studies have not yet proven that they pose a definite health risk when used within permissible limits. However, precautionary measures are recommended, especially for children and pregnant women. There are a number of the ways to alleviate the effect of Wi-Fi radiation include: Decreasing overview time, protective a distance from all Wi-Fi sources, Special care wanted for protecting children that under 10 years old from exposure, Construction a Faraday Birdcage (earth in metallic shield cover a part of machine without Influences EMR) [21], [37]



(Diagram 1) A diagram of the electromagnetic spectrum [2].

Conclusion:

In spite of these investigational findings, the effect of Wi-Fi radiation is staying inconsistent and not reproducible in human populations. Major reviews achieve that experimental effects are mainly thermal (tissue heating) at high exposure levels, not demonstrative in low level Wi-Fi exposure. Some studies noted that the structural changes disappeared when Wi-Fi exposure stopped.

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