بحث علمي حول تأثير المجالات الكهرومغناطيسية على صحة الإنسان ومدى علاقتها في الاصابه بالسرطان وأيضا التداخل الناتج من هذه المجالات على مختلف الأجهزة الكهربائية في المملكة العربية السعودية

Effects of Electromagnetic The

Devices & on Human Fields

Abstract

In this study, the effect of electromagnetic fields on human health will be discussed. These fields radiated from power lines. This study aimed to investigate Electromagnetic interference (EMI) characteristics of power lines. These effects may cause cancers. Residential and occupation exposure to EMF will be discussed. Also, describe the evidence on childhood cancer and on the adult cancer. These two kinds of cancers related to residential exposure of EMF. Leukemia and brain cancer related to the occupation exposure of EMF. There is an increase in childhood cancer with increasing residential magnetic fields. Also, the brain tumors have been increasing with the increasing to the exposure to EMFs. There is increasing amount of public concerns in health risk of EMF created by mobile phones.

1. Introduction

The first mention of a possible relation between Electromagnetic Fields (EMF) exposure and cancer was published in 1979 [1]. Dr.Wertheimer and Dr.Leeper were the first two people to talk about the association between the exposure of EMF and the infection by cancer. The studies of residential exposures to power lines are focused on magnetic fields exclusively, whereas other exposure sources of interest, such as blankets or energized equipment in the workplace focused on both electric and magnetic fields. The residential studies interest about childhood cancer, and in occupational studies, adult leukemia and brain cancer will be in focus [1]. The concern is not only on the EMF radiated from power lines, but also the EMF radiated from mobile phones. Mobile phones transmit and received microwave radiation, and health risk is connected with the EMF [3].

There are large differences among countries in risk of particular cancers. Some of the hormone related cancers such as that of the breast in females and of prostate in males appear to be much more common in industrialized than in non –industrialized countries [1].

Various studies investigated power lines and cancers to see if there is causal link. The researchers agree that EMF from high voltage lines can cause significant changes in biological system via electric field induced in the body [1,2]. Scientific standards have been developed to limit public exposure to power – frequency EMF. People are exposed to these fields almost everywhere (e.g. near power lines, electrical wiring and appliances, etc.) [2].

2.Cancer Risk

In this section, the relation between the electromagnetic fields and the possibility of infection by any kind of cancers will be discussed.

2.1 Cancer in Relation to Residential Exposure to EMF

The first study suggesting a link between exposure to electromagnetic fields and cancer was published in 1979 as mentioned before. The original motivation for the study was published by a psychologist (Dr. Wertheimer) who was visiting families of children with cancer. She notes that these homes often had a transformer, a major distribution line, or some other electrical devices. To estimate the exposure to EMF, they created a "wire code" that estimated exposure to magnetic fields on the basis of distance between the home and the electrical installation. There are some studies based on other specific sources of EMF that occur in homes, such as electric blanket or water bed use or exposures resulting from amateur radio operation [1].

Three years after the publication of their childhood cancer study, Wertheimer and Leeper (1982) published a similar study on adults. No excess risk for leukemia was seen in this study, but a variety of other cancers were found to be responsible for the elevation in total cancer risk. Currently, there are five published studies on leukemia in adult and residential magnetic field exposure. Also there are now studies of adult cancers addressing electric blankets and other specific EMF sources [2]. The most interest in studies on residential EMF exposure and adult cancer was leukemia.

2.2 Cancer in Relation to Occupational Exposure to EMF

The initial interest in cancer among electrical workers is also attributable to Wetheimer and Leeper (1979). They found that an aggregation of occupation thought to have elevated EMF exposure experienced a standardized mortality ratio for cancer of 1.15 versus a standardized mortality ratio for other natural causes of 1.02 [1].

A wild series of analyses concerned with the patterns of leukemia among electrical workers was represented by Milham letter. Milham compiled a list of potential exposed workers, largely on the basis of jobs requiring work with electrical equipment, and studied the proportion of deaths among such men that were due to leukemia compared to the proportion of leukemia deaths among non-electrical workers. He found an over all increased proportionate mortality ratio for leukemia of 1.37 among all electrical workers, with a proportionate mortality ratio of 1.63 for acute leukemia. Stronger associations were found for specific groups of electrical workers, including television and radio repairmen, power station operators, and aluminum workers. Little or no increased risk was noted for welders, flame cutters, and electrical engineers [1]. All studies that have been published that provide a basis

estimating leukemia risk in relation to occupational exposure were sought. A number of studies have reported results relating electrical occupations to cancers of the brain and central nervous system [2].

There is some evidence implicating other types of cancer as being associated with occupational EMF exposure. Several studies report elevated risks of melanoma, potentially confounded by sunlight exposure in outdoor jobs. Male breast cancer has recently come to attention, largely because there is a postulated biological pathway that might link EMF to cancer risk [1].

3.Effect of EMF from Mobile Phones

The wide spread use of the mobile phones rises a high concern regarding the problem of the health risk as a potential biological effects. Mobile telephones transmit and receive microwave radiation and health risk is connected with the high-frequency EMF. Mobile telephones operate with radio frequency mainly between 900 and 1800 MHz [4]. The exposure of users of mobile phones can be defined as the amount of energy absorbed by a unit mass of the object. This is expressed as the specific absorption rate (SAR) with units of W / kg [6].

Basic limits for general public exposure are calculated as mean of total body SAR. Radio waves transmitted by mobile phone are not above the SAR limits, because all modern GSM (Global System for Mobile communication) mobile phones emit a level of radio waves that produce less than 1 W / kg in the head. There is no worldwide common standard of SAR limits. Individual countries set SAR guidelines, which indicate to the public what level of EM waves emitted by electrical appliances is safe. Guidelines for risk limits are based on thermal effects of EMF [3].

The ear of the users is in the near field of the EMF source during call, because the distance from the antenna to the inner ear is only several centimeters. Although, there is no published study for long airtime the effect of EMF created by mobile phones to the heating of their users [4]. This exposure rate is not actually determined on the basis of individual exposure, but is experimentally determined in the

laboratory using phantom models having the shape and dielectric properties as close as possible to the human [3].

Estimates for SAR to the head from a 900 MHz mobile telephone vary from 0.16 to 0.69 W / kg. Radio frequency signals are radiated and received by an antenna during a call. This may lead to relatively high SAR deposition in the ear compared to other parts of the body. Although the effect of mobile phones on hearing aids was studied [3,6]. The technical feature of the GSM telephones may also have a role for not causing any detrimental effect on hearing [6].

4.Impacts of The Electromagnetic Interference Levels In KSA

Electromagnetic interference (EMI) levels are measured for transmission and distribution lines in order to assess the negative impact which such lines can have on the performance of radio, TV and other communication and control facilities which may have to operate in the vicinity of such lines. In this section, the impact of EMI generated by power lines, which are located in the central region of Saudi Arabia will be in focus [5].

In this section, electromagnetic interference (EMI) levels were measured for power lines of all voltage levels that currently exist in the central region of Saudi Arabia (380, 230, 132 and 13.8kv). The measurements were carried out for almost all of the transmission and most of distribution line located in Riyadh area. In total, about 500 sets of measurements were carried out over a period of one year in different environmental conditions including the rain. Consequently, the results were analyzed to determine the following EMI characteristics for each class of the power lines [5]:

1. **EMI frequency spectrum, thereby determining the variation of EMI level with frequency. These were measured under the power lines [5].**

2. **EMI lateral profile, thereby determining the variation of EMI level with lateral distance corresponding to a few fixed frequencies [5].**

3. **Statistical spread of EMI levels for lines of each voltage class. In general, it was observed that power lines generating EMI decreased with increasing frequency [5].**

Also, the EMF radiated from mobile phones may damage the medical devices, which the patients live depends on [3].

5.Different Look to Electromagnetic Fields

Electric and magnetic fields have several important roles. They are tools useful in research geared at developing an understanding of how biological system operate. They are clinically useful diagnostic tools in medical resonance imaging and magnetic brain stimulation [2]. They are also sources of environmental exposure for essentially everybody in the modern world, and an evaluation of the degree to which this exposure poses a health hazard remains one of the most important unsolved issues [1]. It is an understatement to say that everyone is exposed to electric and magnetic fields all of the time; since not only do EMF of a variety of frequencies permeate our environment from electricity and communications sources, but also our bodies generate endogenous fields [1,2]. The electroencephalogram (EEG) and electrocardiogram (ECG) are examples of fields generated by a population consisting of many nerve or cardiac muscle cells. Many other types of the cells in the body generate steady dc electric fields that are thought to be of considerable importance in development [1].

6.Conclusions

From the previous sections, the dangerous of more exposure to electromagnetic fields should be observed. It is clear that the exposure comes from different sources, not only from power lines but also from many different devices such as mobile telephones. Childhood cancer is a major public health problem. From the result that we get, increasing in childhood cancer associated to the increasing exposure to EMF. In this study, the two kinds of childhood cancer, leukemia and brain cancer was investigated. Electric fields close to transmission lines are much stronger than the fields found near electrical appliances. However, remember that electric fields are greatly reduced in strength by objects like buildings, trees, and vehicles. Most materials do not block magnetic fields. Magnetic fields very close to electrical appliances are often stronger than the fields directly beneath power lines. However, appliance fields decrease in strength with distance more quickly than do power line fields.

There are a number of ways to reduce exposures to EMF. Some are as easy as standing back from an appliance when it is in use. Remember that magnetic fields from appliances drop off dramatically in strength with increased distance from the source. Other EMF reduction steps, such as correcting a household-wiring problem, are worth doing anyway for safety reasons. Some EMF reduction measures may create other problems. For instance, compacting power lines to reduce EMF can increase the danger of accidental electrocution for line workers.

Finding on the thermal effect of acute exposure to the EMF were consistent, resulting in an increase of cellular, tissue or body temperature by one °C or more. Guidelines for risk limits are based on this thermal effect. In deep tissue, like the brain, maximum temperature rise due to mobile telephone EMF exposure was calculated to be no more than about 0.1 °C. this is similar to the normal daily fluctuations in body temperature and is considered to be too low to cause adverse effects. But, there are many benefits to humans from EMF. Electric and magnetic fields are wonderful research tools and have major applications to clinical medicine where they are invaluable in the diagnosis and treatment of disease.

The most important thing is to remember that the high voltage lines are dangerous. Always be sure to keep a safe distance from them. Don't talk too long on mobile phones, because this may lead to healthy troubles.

7.References

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