

Studying the Effect of the Electromagnetic Mobile Radiation on the Embryonic Formation in Chicken

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Abstract: This study is concerned with the effect of electromagnetic radiation (ERM) emitted from the mobile phone due to its frequent use on a daily basis and for long hours and understanding the damage it may cause. other live when exposed to these rays for long periods.

In this research, the effect of (ERM) emitted from mobile phones at a frequency of 900-1800MHz on the embryonic formation of local chickens was studied, where 90 samples were collected to compare eggs exposed to electromagnetic radiation and those not exposed to electromagnetic radiation.

This study concluded that there are effects of (ERM) emitted from mobile phones at a frequency of 900-1800 MHz on fetuses exposed to electromagnetic radiation compared to healthy fetuses (not exposed to radiation) represented in the small size of the head, bleeding under the skin and in the nose, the appearance of a hernia in the abdomen, and a transparent layer on the eyes as well as the wings and legs with a weak structure, the backbone does not protrude compared to the healthy group.

This study also concluded that electromagnetic radiation affects living tissues in the body, and the brain and skin were the organs most affected by radiation due to the large number of blood vessels in it, as the radiation has toxic effects on brain cells by increasing the number of programmed cells and fragmentation of exposed brain tissue and causing bleeding under the skin Where radiation works on changing living cells of tissues, starting from the plasma membrane and its various receptors, and living molecules inside the cell that may cause genotoxicity. This change may have an effect on cell proliferation in terms of increase, and this causes damage to the internal organs in local chicken embryos.

Keywords: electromagnetic radiation, mobile phone, fetus, chicken, development.

Introduction:

Electromagnetic radiation is a form of energy consisting of oscillating, traveling, self-propagating electrical waves. These waves transmit energy and information. Radiation waves consist of indivisible packets called photons.

Electromagnetic radiations exist in different types, arranged according to frequencies, from low frequency to medium frequency to high frequency (Baird, 2019).

The first type of (ERM) refers to electromagnetic radiation with very low frequencies (Low Frequency), which are electromagnetic waves less than 300 Hz, and are produced by military and railway equipment, and the second type is known as medium frequency, which has frequencies ranging from From 300 Hz to 10 MHz and is produced by industrial cables and electrical equipment in homes such as televisions and computer monitors. The third type is high frequency (High Frequency), which has frequencies in the range of 10 MHz to 3000 MHz and is produced by mobile phones and radio broadcasts. Radio frequencies are also part of This category, which has frequencies up to 100 MHz (Gye and Park, 2012).

It has been proven that there are congenital deformities in chicken embryos if exposed to electromagnetic radiation, and there are studies confirming deformation of embryos and a change in the shape of cells if exposed to radiation for long periods. The use of various mobile phones must be

reduced to reduce the emission of electromagnetic radiation from them. Scientists warn that the means used to reduce the damage of radiation are of no value. It has the protection of the body from electromagnetic radiation, as the measurements made at Cairo University proved that the electromagnetic radiation emanating from a closed device reaches 5 gauss, which is the unit of measurement for electromagnetic waves.(فتحي، 2002)

Electromagnetic radiation emitted from the natural environment as well as from the use of industrial and daily devices constantly affects the human body. Electromagnetic radiation may produce a group of harmful effects on the human body represented in chronic fatigue, headaches, cataracts, heart problems, tension, nausea, chest pain, and affects learning and memory and the heart system. It affects the reproductive ability, the central nervous system, the endocrine glands, and the immune system. Exposure to electromagnetic radiation for long periods of time stimulates the emergence of cancerous diseases in the body represented in brain and lung cancer, and breast tumors, as well as several diseases such as leukemia and neurodegenerative diseases, causing infertility, increasing the risk of miscarriage of fetuses, and the appearance of birth defects in the fetus. embryos (Ebrahim *et al*, 2016).

Effect of electromagnetic radiation on fetuses:

Exposure of fetuses to electromagnetic radiation emitted from a mobile phone lead to damage to the

fetus and the occurrence of congenital deformities, and the deformation may not be evident at birth. It naturally divides when exposed to electromagnetic radiation (Fathy, 2002).

The most important artificial sources of electromagnetic radiation emission:

1- Telecommunications equipment equipped with transmitting and receiving antennas, such as television screens, power surge units, electrical transformers, and others.

2- Microwave ovens in homes. They have spread throughout Europe since the 1960s, and they are a huge source of electromagnetic waves similar to a mobile phone, but with much higher energy, as they are used to raise the temperature of food (Fathi, 2002).

How to protect yourself from the use of electromagnetic radiation from a mobile phone:

1- Reducing the time, you spend each day on the mobile phone.

2- Refrain from using a mobile phone when the signal coverage is weak.

3- Avoid using the mobile phone near our bodies, using the earphone

(Batoul *et al*, 2019).

Classification of chickens:

Chickens are classified in the animal kingdom as follows:

Kingdom: Animalia

Phylum: Chordata

Subphylum: Vertebrata

Class: Aves

Order: Galliformes

Family: phasianidae

Genus: Gallus

Species: *Gallus gallus* (Al-Nasser *et al*, 2007)

The number of mobile phone users worldwide is increasing exponentially and this has led to increased concerns about the potential health risks to the body associated with the use of mobile phones.

Larsen *et al*, 1991) The researchers studied the damages of exposure to high-frequency electromagnetic radiation among medical treatment specialists, and its effect on their reproductive capacity, as it led to the emergence of congenital malformations in the fetuses, represented in the birth of premature fetuses, an increase in the incidence of miscarriage of fetuses, and the birth of small fetuses, (Tabrah *et al*, 1998) The study aimed to identify the effect of electromagnetic radiation (with a frequency of 72 Hz) on bone density in women after menopause. Emitted from television screens, video and cell phones on chicken and mouse embryos, and they reached a significant loss of embryos and a decrease in the levels of antibodies, corticosterone and melatonin in the body (Robert, 2004) The researcher aimed to study the association between exposure of newborn human fetuses to electromagnetic radiation to radio waves and an increase in the incidence of disease disorders Autism in children (Nittby *et al*, 2008)) The researchers studied the effect of electromagnetic

radiation emitted from the mobile phone on mice, and one of the most prominent results was the weakening of the blood-brain barrier that works to protect the brain, (Beyza *et al*, 2009) The researchers studied the toxicity of electromagnetic radiation emitted from TV, video, and mobile phone screens on chicken and rat embryos. Continuous exposure to electromagnetic radiation was associated with increased embryo loss by (47-68%) and increased stress and depression in healthy embryos. (Del vecchio *et al*, 2009) The researchers conducted a study in which rats were exposed to radiation. Radioelectromagnetic radiation at a frequency of 900MHz led to oxidative damage to neurons in the brain of laboratory rats, (Lahijani *et al*, 2011) The researchers studied the effect of electromagnetic radiation at a frequency of 50-60 Hz in the early stages of embryonic development of chickens on the tissues and structures of the brains of white chicken eggs, which It was previously incubated and one of their most prominent results was that electromagnetic radiation has toxic effects on brain cells by increasing the number of programmed cells and degeneration of brain tissue of exposed chicken embryos.

(Gye and park, 2012) The two researchers conducted a study of the effect of exposure to electromagnetic radiation on the human reproductive system. Their studies, conducted in vivo and in vitro, revealed that exposure to electromagnetic radiation can alter cellular homeostasis, endocrine function, and reproductive function represented by cell death. male germs, gonadal hormones, genital organ weights, and abnormalities in sperm movement (القدسي، عزوز، 2012). The two researchers studied the effect of electromagnetic radiation emitted from mobile phones on the growth of chicken embryos, and they concluded that congenital malformations appeared in the treated embryos, smaller embryos, subcutaneous bleeding, and brain deformities compared to In the control group, (Jing *et al*, 2012), the researchers exposed pregnant mice to radiation emitted from mobile phones, and one of their most important results was a decrease in the proportion of neurotransmitters in the brains of rat fetuses (Qinxia *et al*, 2015). The researchers studied the effect of electromagnetic radiation at a frequency of 1800MHz on mice and found that oxidative changes, programmed cell death, and DNA damage occurred in mice cells (Siddiqi *et al*, 2015). Liver, (Wanq *et al*, 2016) The researchers studied the effect of electromagnetic radiation emitted from a mobile phone at a frequency of 900 MHz on chicken embryos and found that it causes heart malformation, delayed cardiovascular development, DNA damage, and increased embryonic mortality (Ebrahim *et al*, 2016). By conducting experiments on mice exposed to electromagnetic radiation, they found an increase in red and white blood cells, platelets, and lymphocytes, which leads to an imbalance in metabolic activity and deterioration of the cellular membrane of the liver, as well as insulin deficiency

with a small part of the pancreas (Woelder *et al*, 2017). The effect of electromagnetic radiation of radio frequencies on chicken embryos, one of the most prominent results of which was the death of embryos in incubation and the emergence of many deformities on the embryos, Pawlak *et al*, 2018)) The researchers conducted experiments on chicken embryos, the aim of the study is to determine the effect of the electromagnetic field at a frequency of 1800 MHz during development embryonic chickens, and they found an increase in the percentage of corticosterone in blood plasma and a decrease in the percentage of fat and glycogen in the liver of newborns, and it also caused a decrease in the relative weight of the heart and the thickness of the wall of the right ventricle, The researchers studied the effect (Aderemi *et al*, 2019).

The electromagnetic radiation transmitted from the laptop on male white rats, and the most prominent results were a significant decrease in the movement and number of sperm, a decrease in the level of testosterone and the level of follicle-stimulating hormone, (Zhi-qiang *et al*, 2020) The researchers conducted experiments on mice by exposing them to electromagnetic radiation (at a frequency of 1800-2400MHz) before birth, they found a delay in the behavioral and cognitive development of newborn mice.

The aim of the study:

This study aims to know the effect of exposure to electromagnetic radiation emitted from a mobile phone on embryonic formation in local chickens, to note fetal deformities that appear in local chicken embryos when exposed to electromagnetic radiation (for a period of 15 minutes) at a frequency of (900-1800) MHz, over a period of time. It was (60 minutes) distributed over four periods per day at a temperature of (37.5 °C), and the embryos were extracted after the age of 7 days, 14 days, and 21 days, and compared with the control samples.

Materials and method of work:

Materials used

Samples used: 90 fertilized chicken eggs were used.

Experimental Design:

take the fertilized eggs and place them in an egg incubator at a temperature of 37°C.

Method of laying eggs with mobile phone incubator center:

1- We were placed a mobile phone with a frequency of 900 - 1800 MHz with fertilized eggs in the center of an incubator.

2- We were called the mobile phone daily for a period of (60 minutes) divided into four periods (15 minutes) for each period from the first day the eggs were laid to 21 days (2012، عزوز، القدسي).

3- Fertilized eggs were placed in an incubator without a mobile phone (electromagnetic radiation) and the embryos were then compared (2012، عزوز، القدسي).

During this study, 90 eggs were collected from fertilized chickens from chicken coops in the city of

Misurata, and the collection continued for 7 consecutive days (January), then 90 eggs were divided into two groups. The second contains 45 eggs that were not exposed to electromagnetic radiation in the incubator during the study period. The samples were monitored daily to compare between eggs exposed to electromagnetic radiation and eggs not exposed to electromagnetic radiation, where 30 eggs were examined at the age of 7 days for embryos, and then another 30 eggs were examined at the age of 14 days. Then another 30 eggs were examined at the age of 21 days, where 15 eggs were taken from each group and compared to the healthy group with the group exposed to electromagnetic radiation. The age of 7 days to the 14th day, then the 21st day, which is the period of embryonic formation of fertilized chickens) (عزوز، القدسي، 2012).

Sampling tissue:

Samples were taken from fetuses exposed to electromagnetic radiation, and those not exposed to electromagnetic radiation, at the age of 16 days, and placed them in a formalin solution to preserve them from decomposition. Subcutaneous tissue sections and brain tissue sections are prepared.

How to prepare a subcutaneous section and a section of a brain:

The histological sections were prepared in the Misrata Oncology Center, and the method of preparation was as follows:

The sample was placed in 10% formalin, then placed in alcohol, then zylol, then the process of burial in paraffin wax, then the wax is placed in a dish, then the sample is placed, then wax is placed on it, then it is removed from the wax mold, then it is placed in a water bath at 39 degrees Celsius to spread the sample on the slide and write The data is on the slide, then we put it in the incubator so that the wax melts for a period of 10 minutes, followed by the dyeing process by passing the sample on the zylol and then getting rid of the zylol, then we put the sample in ethyl alcohol with gradually decreasing concentrations of alcohol solutions until it reaches the water (3 minutes each stage) and then put Hematoxylin stain to stain the nuclei and then eosin to stain the cytoplasm. After the completion of the staining process, the preparation of the microscopic slide begins using a plastic preservative such as Canada balsam, then we place the slide under the optical microscope with a power of magnification x 40 (10) located in the Research Center of the Faculty of Science Misurata. This study method lasted about two months From (15-1-2022) to (15-3-2022) (1998، جنيد).

Statistical analysis:

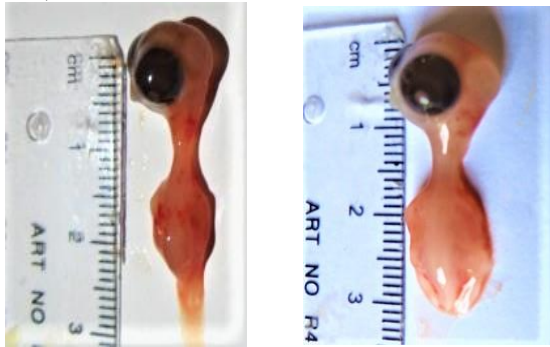
Use the Spss 19 program to perform the statistical analysis to study the difference between eggs exposed to electromagnetic radiation and those not exposed to electromagnetic radiation using the ANOVA test.

Results and Discussion:

Sampling results:

90 samples of fertilized eggs were examined through different stages of this study at the age of 7 days, 14 days, and 21 days, and to identify the difference between the embryos that were exposed to electromagnetic radiation and those that were not exposed to electromagnetic radiation, and to record observations and observations in the following time periods:

7-day-old embryos: It was observed in the embryos not exposed to electromagnetic radiation that the size of the embryo, blood vessels, clear formation, the appearance of the limbs, and the clarity of the vertebral series, as in (Fig. It was small as it is normal and there is bleeding under the skin and the appearance of a transparent layer on the eyes. We also find that the limbs are not clearly developed and the spine does not develop normally. There are differences in the size of the head as it was more curved compared to the control group, as in (Figure 1_b).



1(a)

1(b)

Figure (1): shows a 7-day-old fetus (A_ a fetus not exposed to electromagnetic radiation, B_ a fetus exposed to electromagnetic radiation)

It was observed in the embryos not exposed to electromagnetic radiation that the embryos preserved the vitelline membrane surrounding them, as well as the blood vessels were regular and there was no bleeding and the beginning of embryonic formation was clear as in (Fig. The formation of the embryos for the organs is very weak, as in (Fig. 2_b).

Through Figure (3) there is a decrease in the number of eggs exposed to deformed electromagnetic radiation when compared with eggs not exposed to electromagnetic radiation at the age of 7 days, there is a rise in the number of eggs exposed to electromagnetic radiation not deformed when compared to the number of eggs not exposed to electromagnetic radiation, when the comparison between Unexposed eggs (control samples) and eggs exposed to radiation, the value ($478.0 = p\text{-v}$) was greater than the value of alpha, and this indicates that there are no significant differences. When comparing eggs not exposed to electromagnetic radiation (control samples) and eggs exposed to electromagnetic

radiation, the value was ($.001 = 0$) (The p-value is smaller than the alpha value, which indicates the existence of significant differences.

2 (a)



2 (b)

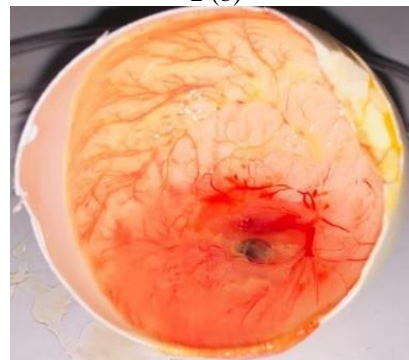


Figure (2): shows a 7-day-old fetus (a fetus not exposed to electromagnetic radiation, A fetus exposed to electromagnetic radiation).

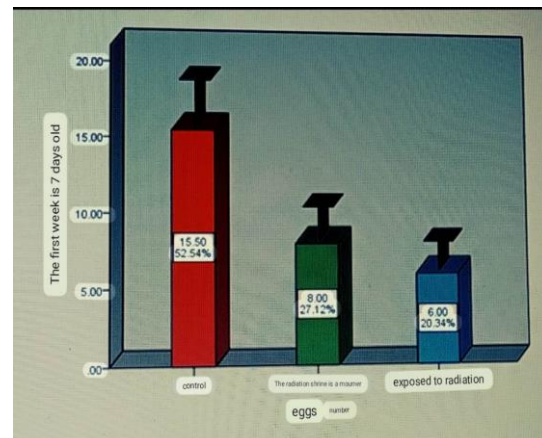


Figure (3) : shows the number of eggs exposed to electromagnetic radiation and not exposed to electromagnetic radiation at the age of 7 days.

14-day-old embryos: It was observed in embryos not exposed to electromagnetic radiation that there was no lethality in the direction of the stomach, as well as well-formed wings and growth of fluff throughout the body, and the structure of the legs was long, and also the claws were clear in shape, and the fetus preserved the yolk sac, as well as the retina of the eye, which had no damage, and the length was Normal fertilized chicken embryo 9 cm long as in (Figure 4a-) (Figure5).

It was noted in the embryos exposed to electromagnetic radiation that there was lethality in the abdominal area, a delay in the growth of the front and back limbs, a delay in the growth of fluff on the body, weakness of the neck vertebrae, and the protrusion of the eyes. In (Fig. 4-b), (Fig.5).



4(a)



4(b)

Figure (4): shows a 14-day-old fetus (a- a fetus not exposed to electromagnetic radiation, b- a fetus exposed to electromagnetic radiation).

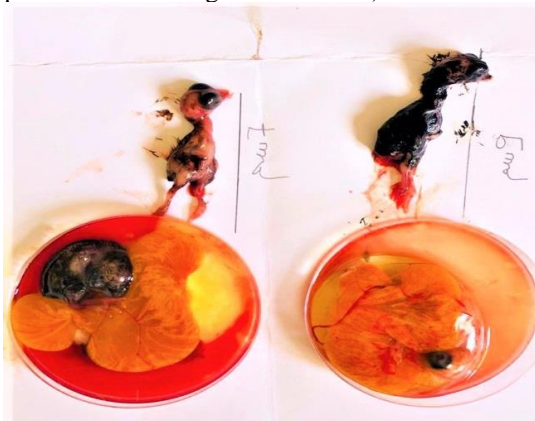


Figure (5): Comparison of length measurement to illustrate local chicken embryos at the age of 14 days (not exposed to electromagnetic radiation, normal length 9 cm) as well as local chicken embryos at the age of 14 days (exposed to electromagnetic radiation, abnormal length 7 cm).

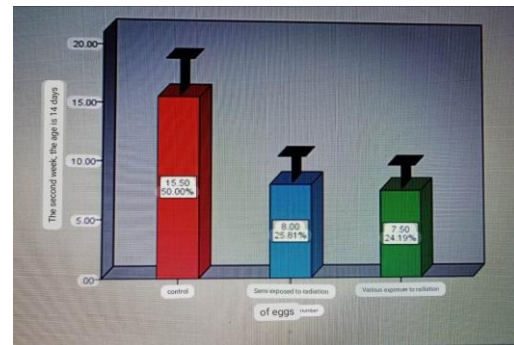
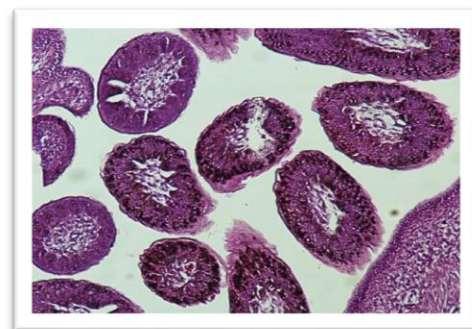


Figure (6): shows the number of eggs exposed to electromagnetic radiation and not exposed to electromagnetic radiation at the age of 14 days.

Through Figure (6) we note that there is a slight increase in the number of eggs exposed to distorted electromagnetic radiation when compared to eggs not exposed to electromagnetic radiation, there is a slight decrease in the number of eggs exposed to distorted electromagnetic radiation when compared to eggs not exposed to electromagnetic radiation and when the comparison was between eggs not exposed For electromagnetic radiation (control samples) and eggs exposed to electromagnetic radiation, the value (001.0 = p-vale) was smaller than the value of alpha. -p) is smaller than the alpha value. This indicates the presence of significant differences. When the comparison was between eggs not exposed to electromagnetic radiation (control samples) and eggs exposed to electromagnetic radiation (healthy), the value (8550 = p-vale) was greater than the alpha value. This indicates No significant differences.

16-day-old embryos: The embryonic cells in embryos that were not exposed to electromagnetic radiation were not diffused, close to each other, and clear in shape, as in (Figure 7-a). We also notice that in embryos that were exposed to electromagnetic radiation, the spread of embryonic cells and the occurrence of bleeding of cells when using mobile phones, we find that these radiations Electromagnetic radiation may alter the living cells of the cell, starting with the plasma membrane and its various receptors and the living molecules present inside the cell, which may cause genotoxicity as in (Fig. 7)



Figure(7) A- Cells under the skin (Not exposed to electromagnetic radiation) With the power of a lens magnification (40 x 10)

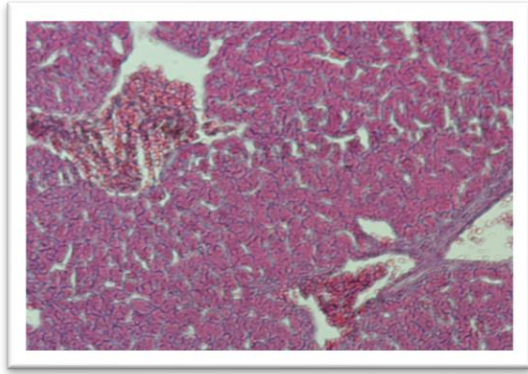


Figure (7) B_ Cells under the skin (Exposed to electromagnetic radiation) with the power of a lens zoom (40 x 10)

16-day-old embryos: It was observed in the embryos under the microscope that were not exposed to electromagnetic radiation, clear brain cells, and there was no bleeding in them, as in (Fig. The tissues of the brains of the local and exposed chicken embryos were fragmented and hemorrhage occurred in (Fig. 8_B).

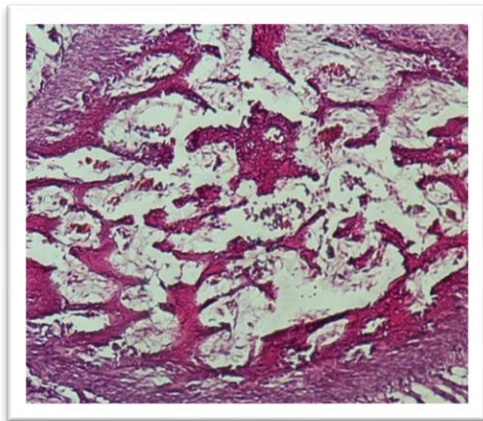


Figure (8) A- shows brain cells. (Not exposed to electromagnetic radiation) With the power of a lens magnification (40 x 10)

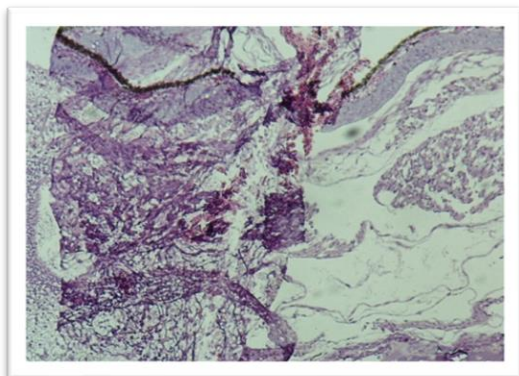


Figure (8) B- shows brain cells (Exposed to electromagnetic radiation) with the power of a lens zoom (40 x 10)

21-day-old embryos: It was observed in the embryos that were not exposed to electromagnetic

radiation that they came to life and were hatched from the egg as in (Fig. 9_a) and that the embryos that were exposed to electromagnetic radiation have a very large lethality in the abdominal area, the prominence of the eyes, the appearance of a white layer on them, and the occurrence of a deficiency in the growth of the wings Feet, claws, and body size are small compared to normal growth, as shown in (Fig. 9_b).



Figure (9): shows 21-day-old embryos (a_ embryos not exposed to electromagnetic radiation, b_ embryos exposed to electromagnetic radiation)

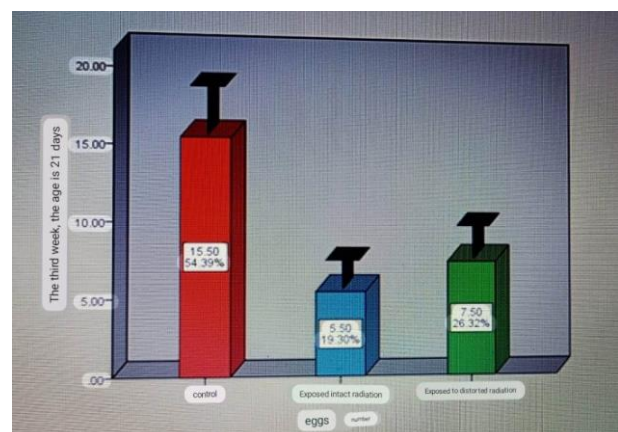


Figure (10): shows the number of eggs exposed to electromagnetic radiation and not exposed to electromagnetic radiation at the age of 21 days.

Through Figure (10) we notice that there is an increase in the number of eggs exposed to

electromagnetic radiation (distorted) and there is a decrease in the number of eggs exposed to electromagnetic radiation (healthy) when compared with the number of eggs not exposed to electromagnetic radiation.

When the comparison was between (control samples) and (healthy) eggs exposed to electromagnetic radiation, the p -value = (0.498) was greater than the alpha value. This indicates that there are no significant differences.

The results of this study agreed with (Al-Qudsi, Azouz, 2012). In that when the fertilized chicken embryo was exposed to electromagnetic radiation at a frequency of 900 - 1800 MHz during the incubation period, various congenital deformities appeared in the embryos such as subcutaneous bleeding, nosebleeds, head deformities, and abdominal hernia and also agreed with (2011) (LAHIJANI et al) that electromagnetic radiation has toxic effects on brain cells by increasing the number of programmed cells and fragmentation of the brain tissue of exposed chicken embryos and also agreed with Larsen et al, 1991)) that exposure of physical medicine specialists to electromagnetic radiation appears congenital deformities in fetuses and increases abortions and our study agreed with WOELDERS et al, 2018)) When exposing chicken embryos to electromagnetic radiation, it leads to the death of embryos in incubation and the emergence of many deformities on the embryos.

Our study agreed with PAWLAK et al, 2018)) when exposure of chicken fetuses to electromagnetic radiation (1800MHz) led to an increase in the proportion of corticosterone in the blood plasma and a decrease in the proportion of fat and glycogen in the liver of newborns, and also caused a decrease in the relative weight of the heart and the thickness of the wall of the right ventricle.

And there is no study that did not agree with our study, as all the studies that we reviewed concluded that congenital deformities appeared in the fetuses

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norvegicus). *Ecological Safety and Balanced Use of Resources*, 1 (19): 43-52.

Conclusion:

We conclude from this study:

1- An increase in electromagnetic radiation from 900-1800 MHz causes fetal deformities in chicken embryos.

2- There is an effect of electromagnetic radiation emitted from a mobile phone on the embryonic formation of chicken embryos in the early stages, and it is necessary to stay away as much as possible from using a mobile phone.

3- There is a direct relationship between the strength of electromagnetic radiation and fetal deformities, meaning that the more electromagnetic radiation increases, the greater the health problems and fetal deformities.

4- The effect of electromagnetic radiation transmitted from the mobile phone leads to the non-hatching of local chicken embryos, their non-exit from the eggs, the non-formation of normal embryos, and their death inside the eggs.

Recommendations:

Through this study, we recommend conducting such a study on the fetuses of other animals to see the extent of the effect of electromagnetic radiation emitted from mobile phones on the embryonic formation of fetuses of many animals and the use of electromagnetic radiation of different frequencies in order to clarify the use of mobile phones and their harm to human fetuses, and the use of microwaves that emit radiation High electromagnetic radiation and the extent of its danger to fetuses We also recommend the use of electromagnetic radiation of different ranges (high and low) in order to know its effect more clearly on fetal deformities. Fetal cumulative dose of radiation exposure and gestational age at which exposure occurs to provide appropriate advice to pregnant women.

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