

A Report on the Effect of Electromagnetic Radiation on the Growth of Silkworm in Mobile Phone

Zongyu Li, Suping Liu, Yanzhong Gu

College of Bioengineering, Wuxi Agricultural University, Jiangsu, China

ABSTRACT

This study was conducted to study the growth process of silkworm eggs in a silkworm research center under the condition of no electromagnetic radiation and strong electromagnetic radiation. In the course of the study, the silkworm seeds were randomly divided into two groups. All the mulberry leaves were used to observe and record the time of molting dormancy growth and the related physiological parameters were recorded and recorded. The effect of mobile phone radiation on the growth process of silkworm larvae was analyzed. Based on the experimental results, the microcosmic mechanism of the effects of mobile radiation on organisms and adolescents was analyzed and the preventive measures were put forward. First, for young people as much as possible to reduce the frequency of mobile phone use, thereby reducing the adverse effects of electromagnetic radiation on the growth and development of young people, to develop good habits. Second, the social and electromagnetic wave management departments attach importance to strengthen the rational use of electromagnetic waves.

KEYWORDS: electromagnetic radiation; growth; silkworm; mobile phone

1. Introduction

1.1. Questions

With the socio-economic development, the rapid increase in communication technology, mobile phones have become an indispensable tool for our daily life. However, the electromagnetic radiation in mobile phones [1-3] has become a hot topic of our discussion. In recent years, mobile phone electromagnetic radiation [4-6] on the impact of biological reports more and more, there are negative discussions, there are positive discussions. In this study, we study the effect of electromagnetic radiation on the growth of silkworms in our mobile phone, and get the influence of the electromagnetic radiation on the growth of silkworms.

1.2. Purpose of the study

Research purpose: I decided to use two months to experiment from the perspective, to explore the mobile phone electromagnetic radiation on the growth of silkworm process.

The experimental object and experimental conditions of the study were easier to select and construct.

Silkworms and their larvae stage were selected as the experimental subjects for the following reasons:

1. Biological textbooks to understand the silkworm is a metamorphosis of insects, life through the eggs, larvae, pupae, adults, four morphological and physiological functions on a completely different development stage, especially during the development of silkworm larvae during the rapid development of cell division, metabolism, The external environment and electromagnetic signals are very sensitive.

2. The study time is appropriate. Because silkworm easy feeding, the growth cycle is short, from eggs to hatch to four molt to complete the larvae stage for about a month.

3. Near the hill there are a few mulberries, silkworm baby food source is guaranteed.

4. To build no electromagnetic radiation, strong electromagnetic radiation environment easier. Under the guidance of the teacher, I use the metal iron box, the use of wires connected to the iron heating film, build electrostatic shielding environment, to the silkworm baby to establish a mobile phone radiation growth environment; home available waste mobile phone, Networking, can build a relatively strong mobile phone electromagnetic radiation environment.

1.3. Summary of Research Status

Silkworm on the external environment and electromagnetic signals should be very sensitive, at home and abroad on the growth and development of silkworm human intervention in the field of research results are more. For example, ^{60}Co - γ to silkworm gene-induced variation [7] and strong magnetic field (2000 ~ 8000 Gauss) silkworm biological effects [8]. In this study, the silkworm seed in the absence of electromagnetic radiation conditions and strong electromagnetic radiation under the conditions of incubation, growth process, through access to relevant literature, know that no research institutions have done personal mobile radiation field of electromagnetic field on the growth of silkworm larvae stage the impact of experimental studies. Therefore, this subject has a certain innovation, originality.

1.4. The significance of the study

In this study, the difference between the two groups of silkworms in the absence of mobile radiation environment and the strong growth environment of the mobile phone radiation was analyzed by experiment and observation. The difference of the biological characteristics of the two groups was compared with the experimental data. At the same time the control of access to information on the initial understanding of the mechanism of mobile phone radiation and the micro-mechanism of the role of organisms, we have young people in the body growth and development process useful advice.

2. Research content

2.1. Experimental subjects

This experiment uses silkworm eggs is a silkworm research center to provide silkworm eggs, first into the refrigerator 5.0 degrees Celsius environment refrigerated, then put room temperature 20.0 degrees Celsius hatching, age mulberry feeding.

2.2. Experimental apparatus

Specifications for the long, wide, high, respectively, 16.0cm, 11.5cm, 9.5cm of a conventional carton, a diameter of 19.5cm round metal box and iron cover a small, alligator clip, wire, iron feet, vernier caliper

2.3. Experimental environment

2.3.1 Build a strong electromagnetic radiation environment

In order to enhance the radiation intensity of mobile phones and increase the contrast of experimental results, this experiment uses four mobile phones, namely Lenovo, Samsung, millet, Motorola mobile phone, built-in Unicom 2G, mobile 2G, Unicom 4G network, in the open state, 1, were placed in the experimental silkworm rearing around the box, to maintain a twenty-four hours open state, the power exhausted timely charge.



Figure 1. mobile phone radiation environment of the silkworm room

2.3.2 Construction of non-electromagnetic radiation environment

By consulting the father and colleagues, the use of the basic knowledge of electromagnetic physics, the use of conductive metal shielding electromagnetic radiation principle, as shown in Figure 2, round metal box covered with wire alligator clip connected to the iron heating film, theoretically Shielding out most of the electromagnetic radiation.





Figure 2. shielded mobile phone radiation environment of the silkworm room

2.4. Research steps and related data records

2.4.1 Hatchability survey



The eggs in the refrigerator room to pick out the eggs of 50 metaphor rounded full and no obvious necrotic silkworm eggs, divided into two groups, were placed at room temperature in the ordinary carton radiation environment, and shielding mobile phone radiation in the tin box, recorded the following The data are shown in Table 1.

Table 1		Radiation-free silkworm group I (25 tablets)	Cell phone radiation silkworm group II (25 tablets)
Silk eggs out of time		2015.4.15.18:00 from 5.0 degrees Celsius refrigerated room removed	
Hatch Time	Earliest Date	4.24.20:00	4.20.7:20
	The Latest Date	4.26.12:00	4.21.18:00
	The average time	10.0 Days	5.5 Days
	Anthers Incubation rate	23/25= 92%	12/25= 48%
Control the picture			

2.4.2 Investigation on Growth Parameters of First - aged Silk



The two groups of silkworms feed the same amount and fresh mulberry leaves, and wait for the first molting of the silkworms, record the corresponding date, count the number of dead silkworms, record the remaining number; keep the dormant state, Signs, sampling selection of the corresponding group of five different sizes of silkworm, with the vernier caliper measurement length and diameter after the average, the recorded data as shown in Table 2:

Table 2	No Radiation Silkworm Group I (22)	Cellular Radiation Silkworm Group II (10)
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The first time molting time	The Earliest Date		4.28	4.23
	The Latest Date		5.1	4.26
	The Average Time		3.0 Days	2.5 Days
	Measurement of the First Age Silkworm	The Average Length	5.20mm	4.80mm
Average Diameter		1.00mm	0.80mm	
Control the picture				

2.4.3 Investigation on Growth Parameters of Second Age Silk

Wait for the second molting of the silkworm, record the date, keep the dormant state, measure the second age silkworm signs, statistics the number of remaining silk, recorded data as shown in Table 3:

Table 3		Radiation Silkworm Group I (21)	Cell Phone Radiation Silkworm Group II (8)	
The Second time molting time	The Earliest Date		5.1	4.25
	The Latest Date		5.3	4.28
	The Average Time		3.0 Days	2.5 Days
	Measurement of the Second Age Silkworm	The Average Length	8.42mm	7.00mm
		Average Diameter	1.60mm	1.20mm
Control the picture				

2.4.4 Investigation on the parameters of third instar



Wait until the third silk molting record date; record the relevant data as shown in Table 4:

Table 4		No Radiation Silkworm Group I (21)	Cell Phone Radiation Silkworm Group II (5)	
The Third time molting time	The Earliest Date		5.7	5.1
	The Latest Date		5.9	5.2
	The Average Time		6.0	5.0
	Measurement of the Third Age Silkworm	The Average Length	19.50mm	15.60mm
		Average Diameter	2.20mm	1.90mm
Control the picture				

2.4.5 Investigation on the parameters of fourth - grade silkworm

Wait for the fourth molting of silkworm, the recorded data as shown in Table 5:

Table 5	No Radiation Silkworm Group I (20)	Cell Phone Radiation Silkworm Group II (4)
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The Fourth time molting time	The Earliest Date		5.13	5.6
	The Latest Date		5.14	5.7
	The Average Time		5.5 Days	5.0 Days
	Measurement of the Third Age Silkworm	The Average Length	42.0mm	33.00mm
Average Diameter		6.20mm	5.00mm	
Control the picture				

3. Results and Analysis

3.1. Results

In this study, the above data, no radiation silkworm group I 25 eggs hatch out of 23, there are radiation silkworm group II hatched out of 12, hatching rate as shown in Figure 3:

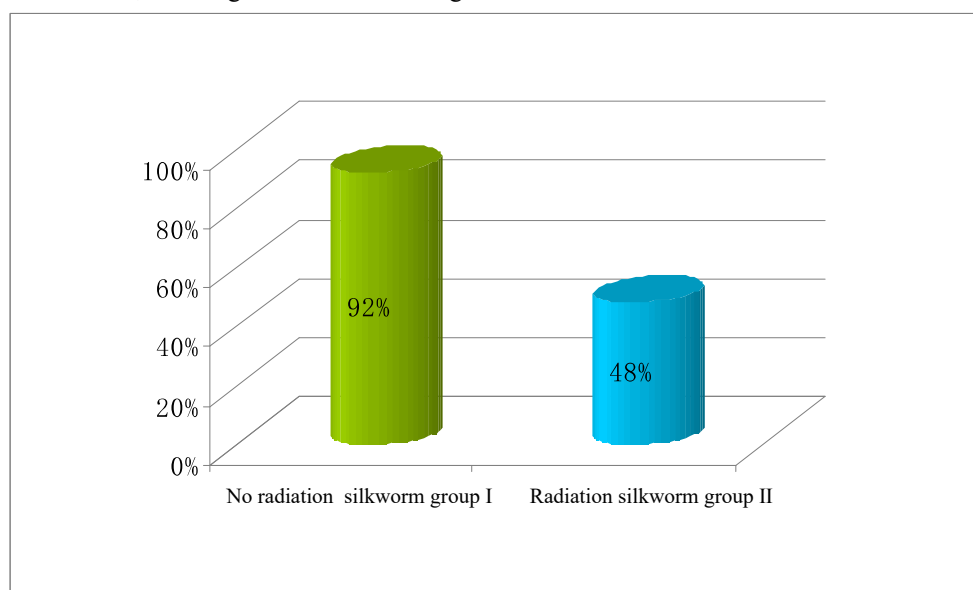


Figure 3. Comparison of hatching rates of two groups of silkworm eggs

The whole study in April 15, 2015 silkworm eggs hatching until May 15, 2015, two groups of silkworm eggs were 25, halfway dead a lot of silkworm, no radiation group 25 eggs successfully grow up 20, There are only four radiation group, the mortality rate as shown in Figure 4:

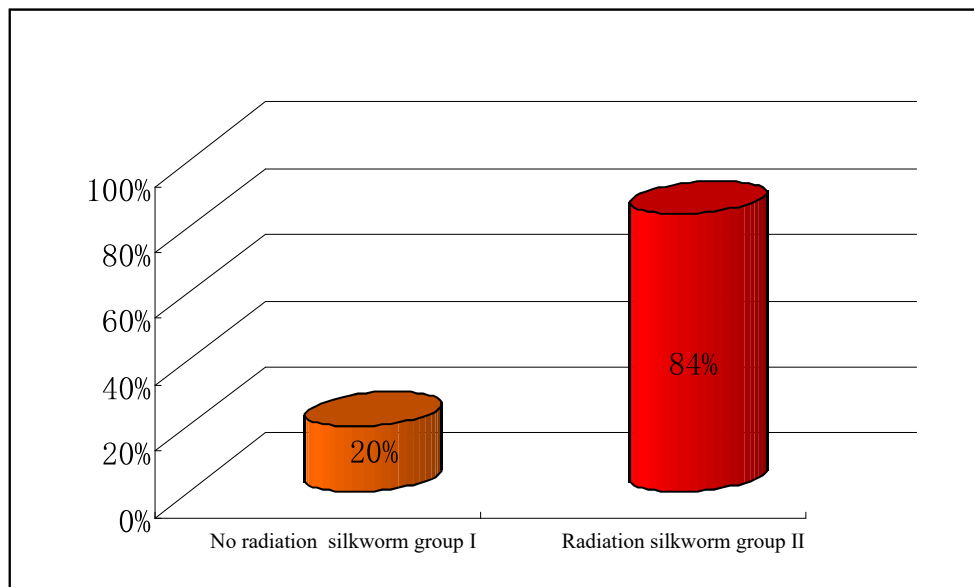


Figure 4. Comparison of two groups of silkworm mortality

In the study, the body length of the two groups of silkworms changed with time, and the abscissa was the five stages of the silkworm development process, as shown in Figure 5:

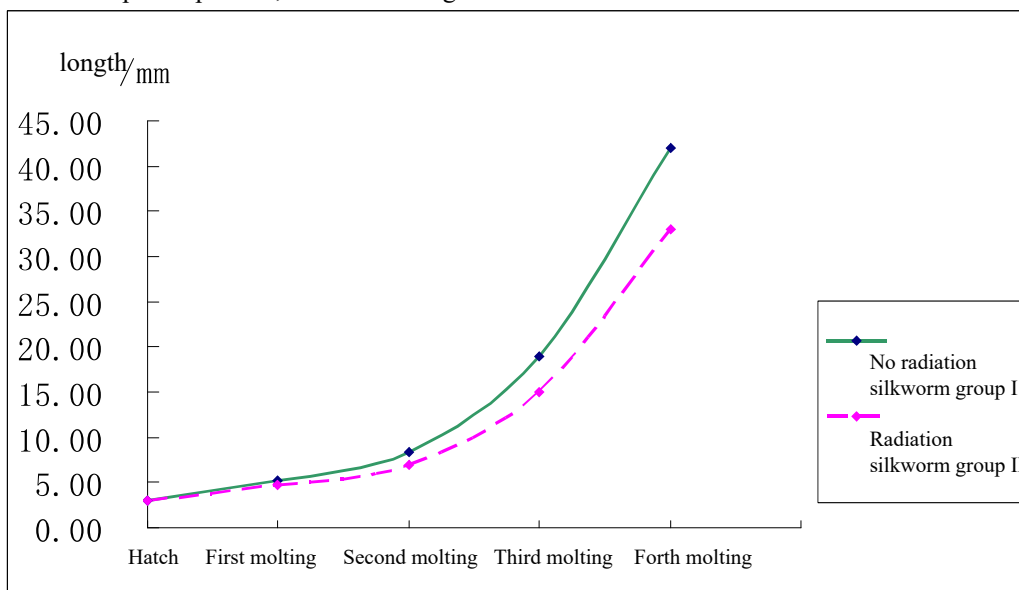


Figure 5. Comparison of body length growth curves of two groups of silkworms

The average diameter of the two groups of silkworms varies with the growth stage, as shown in Figure 6:

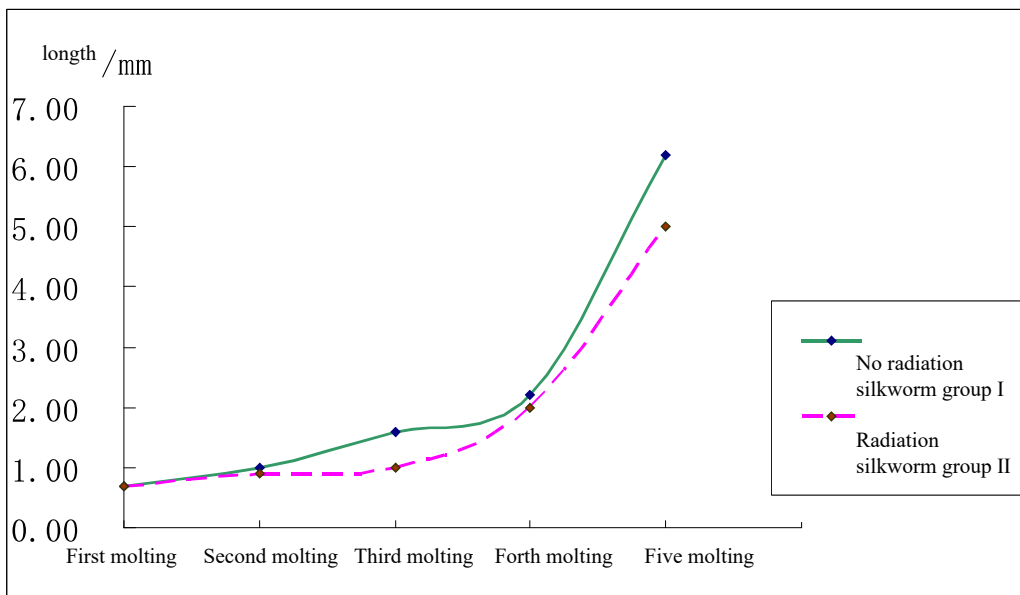


Figure 6. Comparison of two groups of silkworm diameter growth curve

As the silkworm individual is very small, especially the first age of the second age of silkworm, as a biological experimental biological individual important parameter ---- average quality, the experiment did not find enough accurate equipment to measure, by consulting the teacher, I learned A method of estimating the quality of the approximate silkworm baby, the silkworm's body is 98% of the body's water, so it can be roughly considered that the density of the silkworm is roughly equal to that of the water. For the average length of the silkworm and the average diameter of the silkworm, The volume of the cylinder, so you can estimate the quality of silkworm baby, has always been two groups of silk body mass curve of the comparison curve, as shown in Figure 7:

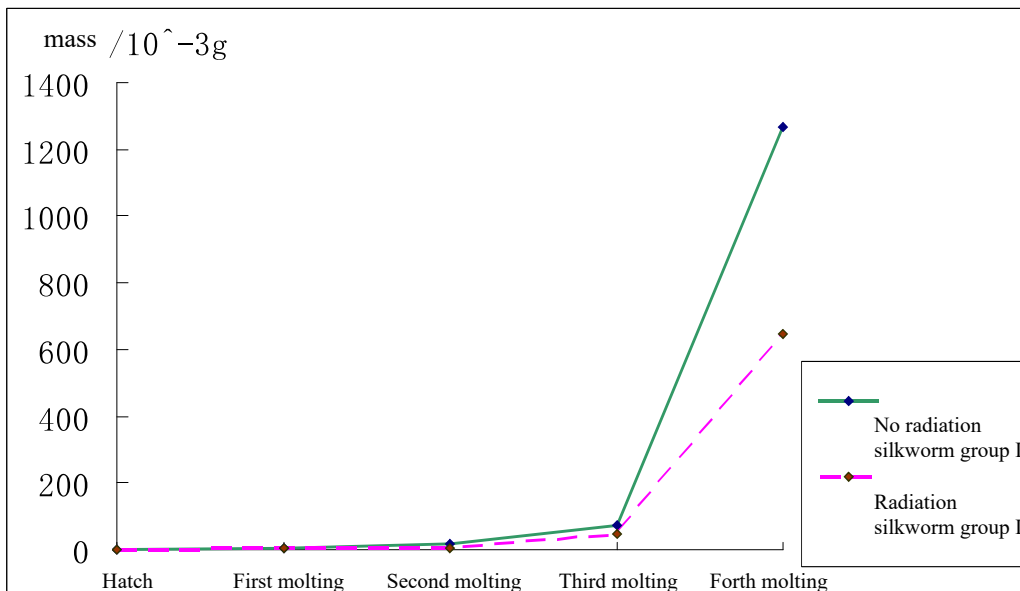


Figure 7. Comparison of average quality curves for two groups of silkworms

3.2. Analysis of the results of the study

From the experimental data analysis, it can be concluded that the electromagnetic radiation of mobile phone has a significant negative effect on the hatching and growth process of silkworm.

First, the relative non-radiation silkworm group, there are radiation silkworm group hatching time is very short, hatching rate is only about half of the radiation group around, many eggs are dead; the whole feeding process, the two groups feeding mode, feeding frequency feeding Food was the same, but the final smooth growth of non-radiation silkworm group has 21, while the radiation group survived only 4, the mortality rate is no radiation silkworm group 4 times; this can be clearly seen, the phone Electromagnetic radiation on the survival of silkworm survival of the adverse effects of great.

Second, the 25 eggs of the non-irradiated silkworm group I were incubated for 10.0 days on average, and the radiation silkworm group II was hatched for only 5.5 days, and almost half of the time was used. The larvae stage of the non-irradiated silkworm group Growth cycle from hatching to complete all molting an average of a total of 30 days, a total of about 23 days of radiation silkworm group, shorter than the non-radiation group of 7.0 days, we can see that the mobile phone radiation environment, whether it is silkworm hatchery or larvae Of the growth process significantly increased the speed of development, the metabolism increased.

Thirdly, the final body length of the non-irradiated silkworm larvae was 42.00mm in diameter and 6.20mm in diameter. The average approximate mass was 1.268g. The final average body length was 33.00mm diameter of 5.00mm and the average approximate mass was 0.647g, Which was 21%, 19% and 49% respectively. It can be seen that the growth rate of silkworm larvae in mobile phone radiation environment is faster, but the quality of growth and development is lower, body length, diameter and average body weight are significantly worse than those without radiation To be worse.

3.3. Microscopic mechanism of mobile phone radiation on silkworm radiation

According to the reference, I learned that the phone can call at any time, because the phone through the antenna to send and receive electromagnetic waves, the frequency of 800 ~ 1800 MHz.

When the electromagnetic radiation exposure biological activity, a part of the electromagnetic wave is reflected, the other part is absorbed. And the amount of water absorbed in the body of the organization: the high water content of tissues, such as blood, absorb more energy than electromagnetic radiation; low water content, such as fat, bone, less energy absorption.

In my experiment, the mobile phone radiation group, the mobile phone electromagnetic waves on the whole body of silkworm, silkworm no bones inside, about 98% of the water, so the absorption of electromagnetic radiation is very strong, these electromagnetic radiation is mainly produced Is the thermal effect, is the internal temperature of the silkworm, the rate of cell metabolism will increase faster, so the experimental findings found in the radiation environment, silkworm eggs hatching accelerated, growth molting can accelerate the phenomenon can be a preliminary explanation; the same time, in the process , Electromagnetic waves will certainly be more complex and unpredictable way on the inner brain of silkworms, ganglia, esophagus, muscle have a lot of impact, so that this experiment in the experimental growth of the two groups of silkworm elements of the parameters are Great difference, and it is bad.

So, I think, the same as the living body of us, in the growth and development, although the individual and the quality is far more than the silkworm baby, but the mobile phone radiation in the course of the use of very concentrated brain tissue absorption, local will form a thermal effect damage brain tissue, Will interfere with the body's physiological system. So we young people to be careful to use the phone, do a good job of protection work.

4. Discussion

The research method of this subject is to adopt the contrast method. The non-electromagnetic radiation environment is constructed by using the theory of electrostatic shielding. The strong electromagnetic radiation environment is constructed, and the conventional 3G and 4G wireless communication network signals are used. Scientific;

The results of this study are through the cultivation of silkworm, through the specific practice to achieve, the results have a strong reliability;

The value of this research:

First, for young people must learn to use the phone science, as far as possible to reduce the frequency of mobile phone use, must be a long time to talk, left and right ears alternately; in the call, it is best to first move the phone away from the head, Radiation of the head at high power.

Secondly, the attention of social and electromagnetic wave management departments is to strengthen the rational use of electromagnetic waves. Electromagnetic radiation pollution cannot touch, not easy to be perceived, we should be treated with care. Electromagnetic wave management department in the technical level is to do the power size control, scientific management.

Third, young people must pay attention to scientific diet, usually eat some fruits and vegetables, especially vitamin B-rich foods such as carrots, kelp, rape, cabbage and animal liver, etc., to increase the body's ability to resist electromagnetic radiation pollution.

Of course, the subject of the current study has its limitations, first of all, the number of experimental silkworm is not large enough, biostatistical significance will be reduced, in addition, with a round metal box covered with wire alligator clip connected to the iron heating On-chip, theoretically can shield out most of the electromagnetic radiation, in the actual environment which there is still a weak electromagnetic radiation. For the construction of the mobile phone to build a strong electromagnetic radiation environment is simple, and there is no precise measurement of the amount of radiation on the phone, and the electromagnetic radiation provided by it is not strong enough.

Further research recommendations, it is best to combine the relevant scientific research institutions to provide more weak electromagnetic radiation environment for electromagnetic radiation experiments; to provide a strong magnetic field of scientific research institutions, the strong electromagnetic radiation experiments, resulting in more obvious experimental conclusions.

5. Conclusions

This study has solved the problem that has been troubling our influence of electromagnetic radiation on the organism. From the growth of silkworms, it can be seen that electromagnetic radiation has a certain impact on its development. Young people in the growth and development process, or as far as possible away from the electromagnetic radiation, do more prevention, that is, to reduce the frequency of mobile phone use, thereby reducing the adverse effects of electromagnetic radiation on the growth and development of young people to develop good habits.

Too strong electromagnetic radiation should not be ignored, should cause the attention of electromagnetic management department, to strengthen the rational use of electromagnetic, to minimize the excessive electromagnetic radiation on our life cannot see the adverse effects.

References

1. National Environmental Protection Administration of electromagnetic radiation impact assessment expert committee members, Zhao Yufeng. Electromagnetic radiation hazards health [N]. Chinese Journal of Traditional Chinese Medicine, 2009-03-12006.
2. Zong. Electromagnetic radiation on the human body in the end there is no harm? [N]. Science and Technology Daily, 2004-10-09.
3. Luo Muxia, Zhang Pu election, Ma Xiaowei, et al. Electromagnetic radiation and electromagnetic protection [J]. China's individual protective equipment, 2009,05: 26-30.
4. Liu Tingting. Electromagnetic radiation and electromagnetic pollution [J]. Modern Physics Knowledge, 2006,01: 30-31.
5. Wu Peiru, Zhao Shouguang. Biological effects of electromagnetic radiation and its protection [J]. Television Technology, 2001,04: 98-99.
6. Cao Yi, Tong Jian. Biological effects of electromagnetic radiation research summary [J]. Environmental and Occupational Medicine, 2007,02: 222-226.
7. Sun Hui, Liu Zhaoliang, Mu Li, et al. ^{60}Co - γ radiation on the growth and development of silkworm [J]. Laser Biology, 2008,03: 327-332.
8. Lu Shenghai, Song Yaying. Study on the magnetic biology of silkworm [J]. Biol., 2002,11: 28-29.