

Research Journal of Pharmaceutical, Biological and Chemical Sciences

The Effect of Bluetooth of Smartphone against Radiation Teratogenicity in Mice Fetuses.

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ABSTRACT

The effect of bluetooth of smartphone against radiation teratogenicity in mice fetuses has been done. The aims of this research are to look the effect of exposure from mobile phone bluetooth radiation teratogenicity in mice fetuses. The research are an experimental studies used white female mice, which age about 2-3 months. These animals were divided into four groups where each group consists of four experimental animals. The first group is a control group which has been exposed by the bluetooth radiation. The second group has been exposed by the bluetooth radiation bluetooth radiation for 15 minutes. The third group has been exposed by the bluetooth radiation bluetooth for 30 minutes and the fourth group received a bluetooth radiation for 60 minutes. After the 18th day of pregnancy, the mice were killed by cervical dislocation and then conducting laparotomy. Embryo toxicity seen by counting the number of fetuses, number of fetuses were alive, and the number of defective fetus. Based on the descriptive analysis of the effect of radiation from the smartphone to the fetus bluetooth mice potential teratogenicity. On the results showed that administration of a smartphone bluetooth radiation causing slow growth and death of the fetus. On administration of bluetooth radiation for 30 minutes causing slow growth and fetal mortality. On administration of bluetooth radiation for 60 minutes causing slow growth. However, based on analysis ANOVA test showed that administration of a smartphone bluetooth radiation affects the main body weight significantly which raise the rate of progression of pregnancy. While the total number of fetuses and fetal body weight was not significantly affected. On administration of bluetooth radiation for 15 minutes, 30 minutes, and 60 minutes have not shown teratogenic effect clearly.

Keywords: Radiation, teratogen, fetuses, Smartphone, Bluetooth

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INTRODUCTION

Teratogen is a part of the environmental factors which cause permanent abnormalities about structure and the function of the organ, inhibit of fetal development and cause embryos and fetuses death [1] [2]. Birth defects, congenital disorders and anomalies are similar terms which are used to define structural, behavioral, functional and metabolic congenital disorders. The study is also known as Teratology. Congenital defects can be due to hereditary and environmental factors [3]. Potential problems can be a risk for system in the body that is blood system, reproductive system, nervous system, cardiovascular system, endocrine system, pshycological system and hypersensitivity.

Radiation can be a risk to the fetal visceral defects [2]. Exposure to electromagnetic mobile phones have destructive effects or cause abnormalities or cranial malformations of the fetuses (*Mus musculus* L.). Exposure to electromagnetic from mobile phones for an hour in adult rats would lead to an increase metabolic processes in the head [4]. The other studies, exposure from mobile phone call radiation during 15 min cause of growth disorders and death fetuses, exposure during 30 min and 60 min cause slow growth of the fetuses[2].

Bluetooth has frequency 2400MHz available to connect until 100 meters, speed of until 3 Mbps depending on the Bluetooth device type[5]. Bluetooth devices can increase the exposure in different organ of the body, including the testes and ovaries when the phone is placed in the pocket [6].

MATERIALS AND METHODS

This research are an experimental studies. Materials use in this study is wipes, alizarin solution, bouins solution. The animals used in these experiment are female white mice (*Mus musculus*) which age about 2-3 months. The data consisted of twenty adult female mice (*Mus musculus*), healthy, nullipara, having normal estrous cycle 4-5 daysand weighing about 20-30 grams, animals divided into 4 groups.The animal experiments must be adapted to the environment, acclimatization conducted for 10 days for adaptation. The mice were kept under hygienic conditions, placed in metal cages and bedded with wood shavings, fed libitum and all had free access to water. During the acclimatization, observation of the estrous cycle by visual observation vagina of mice, estrus period marked by vaginal plug[7].

Group	Treatment of radiaton bluetooth from smartphone
I	Animals are not given radiation by mobile phone bluetooth
II	Animals are given radiation by mobile phone bluetooth for 15 min/day
III	Animals are given radiation by mobile phone bluetooth for 30 min/day
IV	Animals are given radiation by mobile phone bluetooth for 60 min/day

Table 1: Group of treatment animals

Four adult female mice were mated with one male in one night. On the morning examination of vaginal plugs has been done. The female mice were examined for sperms in the vaginal smear in the morning, and sperm positive ones were considered as 0 day pregnant [7].Mice were randomized. The provision of treatment in each group on sixth day to the fifteenth day of pregnancy. The treatment was conducted for ten days.

This study uses bluetooth radiation exposure of smartphone as a treatment of the research object. Pregnant mice were placed in a circular cage and smartphone placed at 1.5 cm from the mice. Twenty pregnant mice were divided into four groups each consisting of five male. The treatment is given by using smartphones frequency 900-1800 MHz with SAR 2.0 mW / kg and bluetooth with a frequency of 2400 Hz is placed at 1.5 cm from the mice. Smartphone bluetooth device is turned on during file transfer mode.



Fig 1: Treatment cages

The weight has been record every day and analysed. If the weight is loss and there is a bleeding around the vagina, the possibility of this mice had a miscarriage, so the mice must be sacrificed and examined. The temperature of mices has also been noticed, because the bluetooth exposure can causing a disease to the mice, and it can't be used anymore [8].

Laparotomy performed on the 18th day of pregnancy. Mice were killed by cervical dislocation, then conducted laparotomy to remove the fetuses. Fetus was removed by cutting the uterus and placenta. Furthermore, observe the resorption that is marked by a red agglomeration. The total number of fetuses is calculated on each part of the uterus, fetuses and fetuses that has been dead. Then the fetus is dried with a tissue, the weight of each fetus weighed to determine the mean weight of births. Then observed visual abnormalities, such as the tail, ears, eyelids, the number of legs [7].

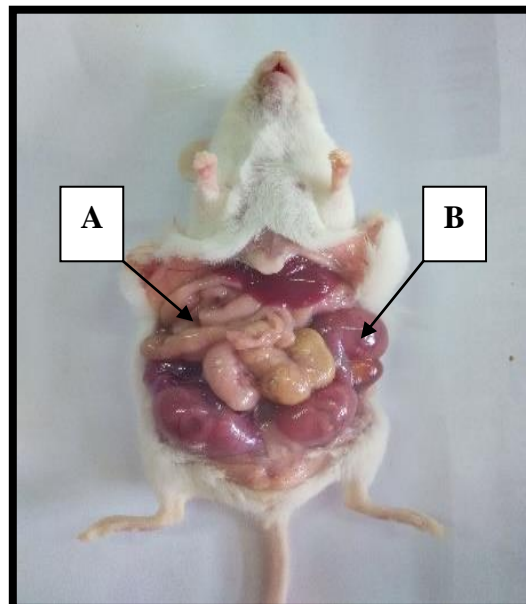


Fig 2: Laparatomy A. Intestine B. Uterus

After visual observing, a third part of the fetus was fixation with Bouin's solution for 14 days. Then dried, observed fetal ears, eyes, feet and tail. Furthermore, the observed presence or absence of cleft palate, slice his head under the middle ear [9].

The remain part of the mice was soaked with Alizarin red solution while three days. Observe bone disorders and count them. Observations were made on the sternum, feet, and toes [9].

Main body weight of mice, the total number of fetuses, fetal body weight, were analyzed using analysis of variance (ANOVA) one-way. If the level of significance ($p < 0.05$), continue with the analysis in multiple regions DMRT test (Duncan's Multiple Range Test). While the observation of the types of defects and results fixation is done with descriptive method.

RESULT

Radiation exposure Bluetooth of smartphones in pregnant mice has been not affected the body weight during pregnancy mice was significantly ($p > 0.05$). The average body weight during pregnancy mice in the control group, treatment for 15 minutes, 30 minutes, 60 minutes respectively was 34.8 ± 4.35 grams; 35.7 ± 5.70 g; 4.26 ± 38.5 g; 5.03 ± 37.2 grams.

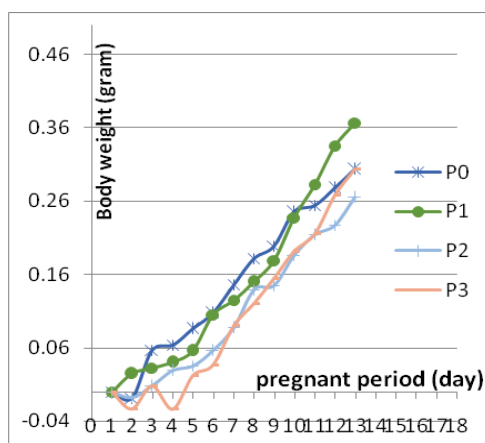


Fig 3: Comparison of mean body weight pregnant mice in the critical period of pregnancy during the treatment.

Radiation exposure bluetooth of smartphones in pregnant mice has been not affected the number of fetuses were significantly ($p > 0.05$). Mean of fetuses to the control group, the treatment for 15 minutes, 30 minutes, 60 minutes respectively was 9.5 ± 2.38 tail; 11.3 ± 0.96 tail; 8.0 ± 2.71 tail; 9.3 ± 5.91 tail.

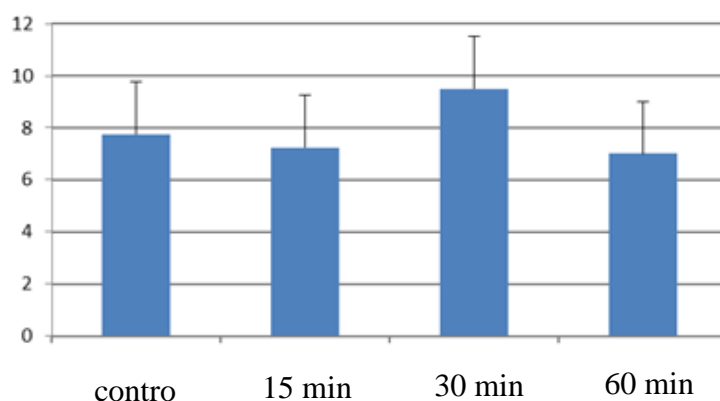


Fig 4: Comparison of mean total number of fetuses in each treatment

Radiation exposure Bluetooth of smartphones in pregnant mice has been not affected the mean body weight of fetuses were significantly ($p > 0.05$). The mean body weight of the fetus to the control group, the treatment for 15 minutes, 30 minutes, 60 minutes respectively was 0.6 ± 0.13 grams; 0.8 ± 0.33 grams; 1.3 ± 0.34 grams; 1.1 ± 0.62 grams.

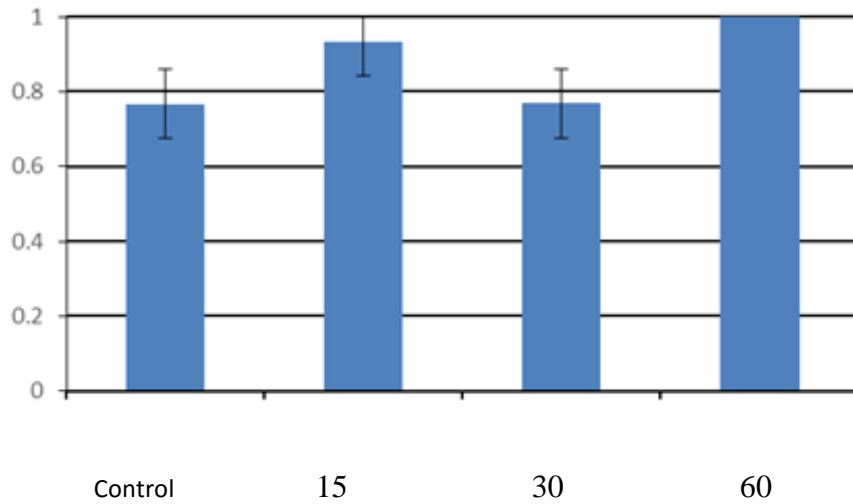


Fig 5: Comparison of mean body weight the fetuses after laparotomy

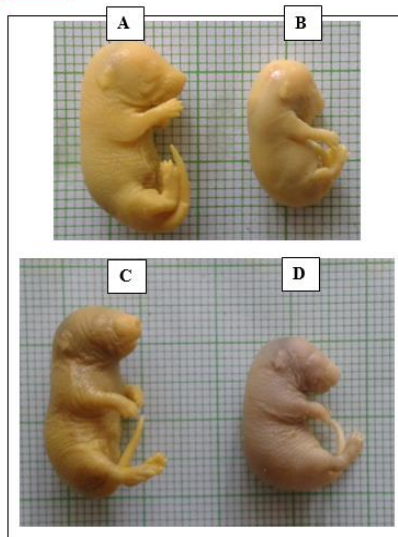


Fig 6: Fixation using Bouin's solution A. Normal (group 3), B. Slow growth (group 3), C. Normal (group 4), D. Slow growth (group 4)

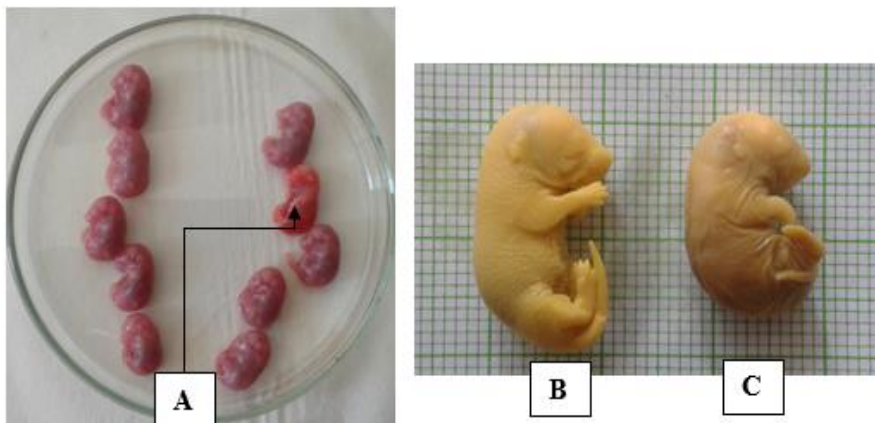


Fig 7: Fixation using Bouin's solution (group 3) A. Abnormalities, B. Normal, C. Fetus was soaked with Bouin's solution

CONCLUSION

Study the effect of radiation exposure from Bluetooth smartphones in the mice fetuses, conducted in vivo may cause fetal death. Based on the test Anova analysis showed that radiation exposure bluetooth of smartphone does not affect the total number of fetuses and fetal body weight significantly. Effect of radiation exposure from bluetooth of smartphone pregnancy affects the development by raising the rate of progression of pregnancy.

ACKNOWLEDGEMENTS

We acknowledge the Faculty of Pharmacy Andalas University for the financial support of this research.

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