

The Effects of Mobile Phone Radiation on Serum Levels of Creatinine in Male Rats

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Abstract—Cell phone radiation may impose damaging health effects on human physiology. The main aim of this study was to determine the effects of mobile phone radiation on serum levels of creatinine in male rats. In our study male Wistar rats were randomly divided into control and mobile phone radiation receiving groups for 1, 3 and 6h/day of 5 rats in each group. After 8 weeks, blood samples were obtained and serum level of creatinine was measured. Data were statistically analyzed and compared between groups using ANOVA. The results indicated that serum level of creatinine significantly increased in rats exposed to mobile phone radiation for 3h/day compared to control rats ($P<0.01$). Our findings show that long term exposure to mobile phone radiation can increase serum creatinine level, according to which, may impose damaging health effects on body function.

Index Terms— Mobile Phone Radiation, Creatinine, Male Rat.

I. INTRODUCTION

Creatinine is a chemical waste molecule that is generated from muscle metabolism. Creatinine is produced from creatine, a molecule of major importance for energy production in muscles. Approximately 2% of the body's creatine is converted to creatinine every day. Creatinine is transported through the bloodstream to the kidneys. The kidneys filter out most of the creatinine and dispose of it in the urine. Although it is a waste, creatinine serves a vital diagnostic function. Creatinine has been found to be a fairly reliable indicator of kidney function. As the kidneys become impaired the creatinine will rise. Abnormally high levels of creatinine thus warn of possible malfunction or failure of the kidneys [1], [2].

Mobile phones use electromagnetic radiation in the microwave range. As we know some waves have harmful effect on health. For instance effect of UV on skin [18]. The mobile phones emitting 900-MHz electromagnetic radiation (EMR) may be mainly absorbed by kidneys because they are often carried in belts [4]. Electromagnetic radiation also cause to disturbance and irregularity in some enzyme. Studies, though with limitations in study design, suggest a possible link between cell phone use and infertility. A recent study found that use of cell phones adversely affects the quality of semen by decreasing the sperm counts, motility, viability and morphology [5],[6].

Exposure to the electromagnetic radiation (EMR) emitted from mobile phones is able to induce hepatic, renal and

splenic tissue damage. The degree of damage increased with time of exposure to EMR [7]. However, in contrast some research show that no significant differences were seen in the diameter of hepatocytes and their nuclei between control and electromagnetic radiation exposure group and The electromagnetic radiations of MRI device may influence the level of liver enzymes and liver function without any histomorphologically changes [8].

According to possible effects of mobile phone radiation on body system, the present study was exerted to determine the effects of mobile phone radiation on serum levels of creatinine in male rats.

II. MATERIAL AND METHODS

A. Animals

Adult Wistar rats weighting 200 ± 30 g were purchased and raised in our colony from an original stock of Pasteur institute (Tehran, Iran). The temperature was at 23 ± 2 °C and animals kept under a schedule of 12h light:12h darkness (light on at: 08: 00 a.m.) with free access to water and standard laboratory chow.

B. Protocol of Study

Male Wistar rats were randomly divided into control and mobile phone radiation receiving groups for 1, 3 and 6h/day of 5 rats in each group. After 8 weeks, blood samples were obtained and serum level of creatinine was measured using spectrophotometry method.

D. Statistical Analysis

All values are presented as mean \pm S.D. Statistical significance was evaluated by one-way analysis of variance (ANOVA) using SPSS 19. Differences with $P<0.05$ were considered significant.

III. RESULTS

Table I and Figure I show the serum levels of creatinine in male rats. The results indicated that serum level of creatinine increased significantly in rats exposed to mobile phone radiation for 3h/day compared to control rats ($P<0.01$).

TABLE I
SERUM LEVEL OF CREAETININE IN CONTROL ANIMALS AND RATS EXPOSED TO MOBILE PHONE RADIATION FOR 1, 3 AND 6H/DAY. P VALUES ARE VERSUS CONTROL GROUP. NS INDICATES NON-SIGNIFICANT DIFFERENCE COMPARED TO CONTROL GROUP.

Group	Creatinine (mg/dl)	P
Control	0.71 \pm 0.01	-
1h/day	0.71 \pm 0.02	NS
3h/day	0.69 \pm 0.03	NS
6h/day	0.79 \pm 0.02	<0.01

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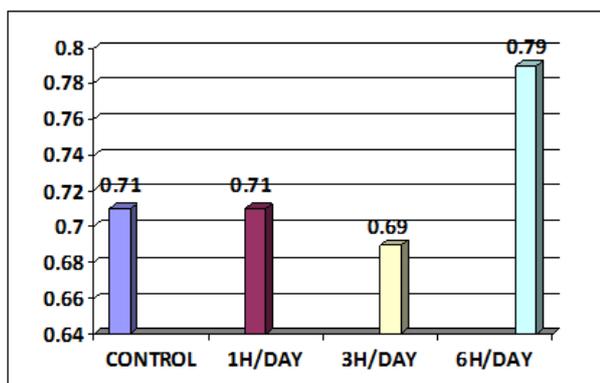


Fig. 1 Serum level of creatinine (mg/dl) in control animals and rats exposed to mobile phone radiation for 1, 3 and 6h/day.

IV. DISCUSSION

The results of our study indicated that long term exposure to mobile phone radiation increases serum creatinine level in male rats. In line with our finding there are other studies showing that exposure to cell phone radiation many aspects of human health [9]. Radio frequency electromagnetic radiation from mobile phones induces oxidative stress in rats [6],[10]. The studies show that urea and creatinine significantly increase following increase in the duration of microwave exposure [11]. The adverse effects of waves have been shown on many tissues [3]. The mobile phones emitting 900-MHz electromagnetic radiation may be mainly absorbed by kidneys because they are often carried in belts [4], according to which, may influence serum creatinine level. Exposure to the electromagnetic radiation emitted from mobile phones is able to induce hepatic, renal and splenic tissue damage [7]. The damage to such tissues may have a part in increasing of serum levels of creatinine. There is association between cell phone radiation and cellular damage [12], which in turn, may result in increased serum levels of creatinine. However, some studies show that there is no association between cell phone radiation and cellular damage [13], [14].

V. CONCLUSION

Our findings show that long term exposure to mobile phone radiation can increase serum creatinine level, according to which, may impose damaging health effects on body function.

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