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Effect of Electromagnetic Radiation on weight of Body And Testis of Albino Rats

Ashok Kumar Srivastava, Nandini Shukla, *Ajay kumar Srivastava, **Nityanand Srivastava, Adil Asghar**

*Saraswati Medical and Dental College, Lucknow, *King George's Medical University, Lucknow ,**UPUMS, Saifai.*

Corresponding Author: Dr. Nityanand srivastava

Abstract

Introduction*: In modern age everyone are using Mobile Phones even immature children. Nowadays children are spending more time on phone. It has nowadays become an essential part of our lives. Therefore, technological advances are associated with progressive increase in intensity and frequency of emitted Electronic magnetic waves (EMR). Many authors have reported that radiation of mobile phones have adverse effect on Gonads and Reproductive health in males.*

Aims of study: *The study was carried out to investigate the effect of EMR on Albino Rats related to weight of Body and Testis.*

Material and methods: *The male Albino Rats were divided into 5 groups as well as Control groups. Six rats were used for every group of control and experimental. Experimental animals were exposed for EMR of Mobile Phones, which were placed over the cages for 5 hours per day for two months. Mobile phone was turned to answering mode for half hour per day for the Control and Experimental groups. Animals were sacrificed after two months.*

Results: *It was observed that weight of Body of animals were decreased in Experimental groups compared to Control group as well as in weight of testis.*

Conclusion*: EMR of the mobile phone is harmful for the Reproductive health of Albino rats.*

Keywords: *Albino rats, EMR (Electromagnetic Radiations), Gonads*

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I. Introduction

Markov M, Kostarakis (2007) have reported that Radio frequency Electromagnetic waves (RF-EMW) emitted on human health. Many authors have reported for EMR effect on human health like fatigue and headache (Oftedal et al, 2000) increase in reaction time (Preece et al, 1999) and alternations in electroencephalogram pattern and disturbance in Sleep (Huber et al, 2000; Davoudi et al, 2002; Fejes et al, Agarwal et al, 2008) have indicated that EMW emitted from cell phones can reduce the fertilizing potential of Men. There fore, present study was carried out to investigate the EMR effects on Gonads of Albino rats as well as related weight of Body and testis in Albino rats.

II. Materials And Methods

Thirty health Male Albino rats were used for Control and Experimental groups.

Mobile phones Model (Micromax q^5, SAR 1.87 W/Kg) were used for this study. Rats were placed in Polyethylene cages. Mobile phones were placed above cages for 5 hours in Switch on Mode.

Rats were divided in five groups which are as follows-

Group I- Control (not exposed to Mobile phones).

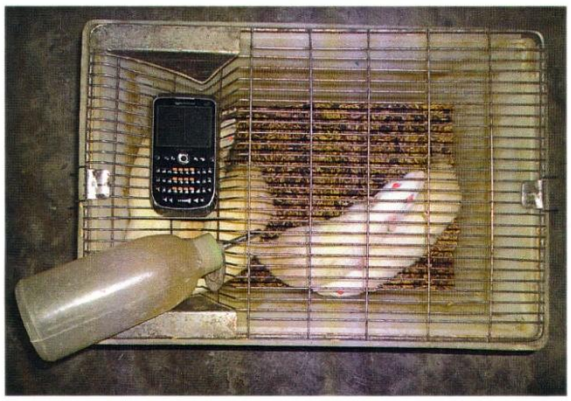
Group II- experimental group comprising of 6 rats. Exposed to mobile phones radiation for 5 hours (four and half hours on standby mode and half hour on answering mode, intermittently), daily, for 2 months.

Group III- experimental group comprising of 6 rats. Exposed to mobile phone radiation for 5 hours (four hours on standby mode and one hour on answering mode, intermittently), daily, for 2 months.

Group IV- experimental group comprising of 6 rats. Exposed to mobile phone radiation same as that of group II and kept for one month without exposure.

Group V- experimental group comprising of 6 rats. Exposed to mobile phone radiation same as that of group III and kept for one month without exposure.

Body weight of each group were taken before and after experiments. Rats were anaesthetized by intraperitonel administration of nembutol (30mg/100g body weight). Incision was made on the thoracoabdominal wall and then extended down into Scrotal region and right testis was taken out and washed with normal saline.



Photograph No. 1 Showing method of exposure to electromagnetic radiation (in cage of rats)

Photograph No. 2 Showing in vivo perfusion of rat.

III. Observations And Results-

Animals Were Distributed According To Group I To V.

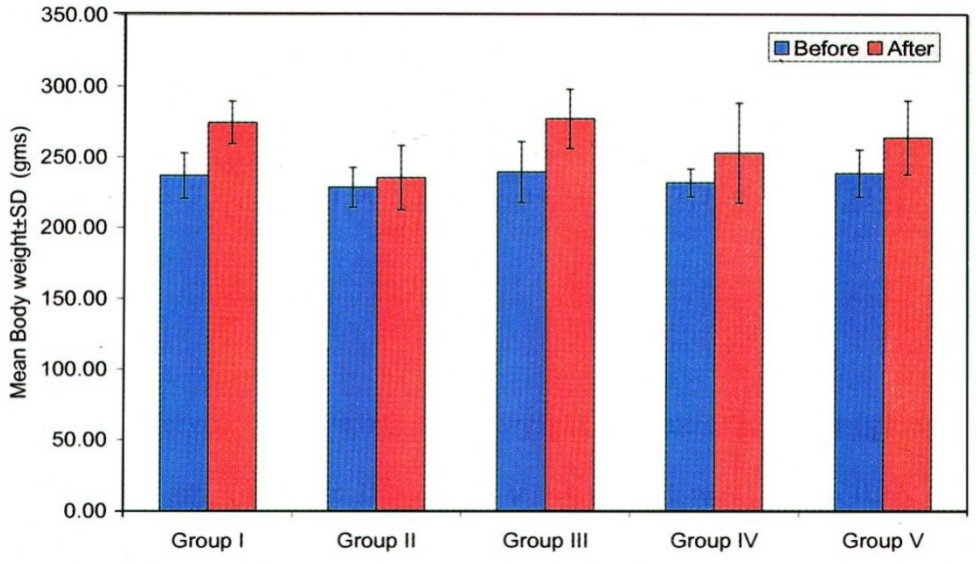
Body weight-

It was observed that change in average body weight of control animals (group I) was 37.50 ± 29.28 gm. In group II change in average body weight was 6.67 ± 31.75 gm, which was less in comparison to group I. In group III change in average body weight was 37.50 ± 33.13 gm, which was same as that of group I but was

more in comparison to group II. In group IV change in average body weight was 20.83 ± 37.07 gm, which was more in comparison to group II but was less in comparison to group I. In group V change in average body weight was 25.00 ± 13.04 gm, which was less in comparison to group I but was more in comparison to group III.

Table 1- Change in Body Weight in animals of different groups

S.No	Group	Before experiment		After experiment		Changes in Body Weight		Significance of change within group (Paired "t" – test)	
		Mean	Sd	Mean	Sd	Mean	Sd	"t"	"p"
1.	I	236.67	16.02	274.17	14.97	37.50	29.28	-3.137	0.026
2.	II	228.33	14.02	235.00	22.80	6.67	31.57	-0.517	0.627
3.	III	239.17	21.54	276.67	20.66	37.50	33.13	-2.773	0.039
4.	IV	231.67	9.83	252.50	35.18	20.83	37.07	-1.377	0.227
5.	V	238.33	16.63	263.33	25.82	25.00	13.04	-4.697	0.005
ANOVA (F)		0.504		2.854		0.612			
"p"		0.733		0.045		0.658			



Mean change in body weight was maximum in Group I and III (37.50 ± 29.28 and 37.50 ± 33.13 gm respectively). Mean change in body weight was maximum in Group II (6.67 ± 31.57 gm). Comparison of mean change in body weight among groups did not reveal a significant difference (p=0.658). As among groups comparisons of the body weight after experiments were significant statistically, hence post-hoc tests were applied to find out between group differences. Post-hoc assessment was done using Tukey's HSD (Tukey's Honestly Significant Difference). Statistically none of the intergroup differences were significant (p>0.05).

Table 2: Between Group Comparison of Mean Body Weight in Animals of different groups (Tukey's HSD – Honestly Significant Difference)

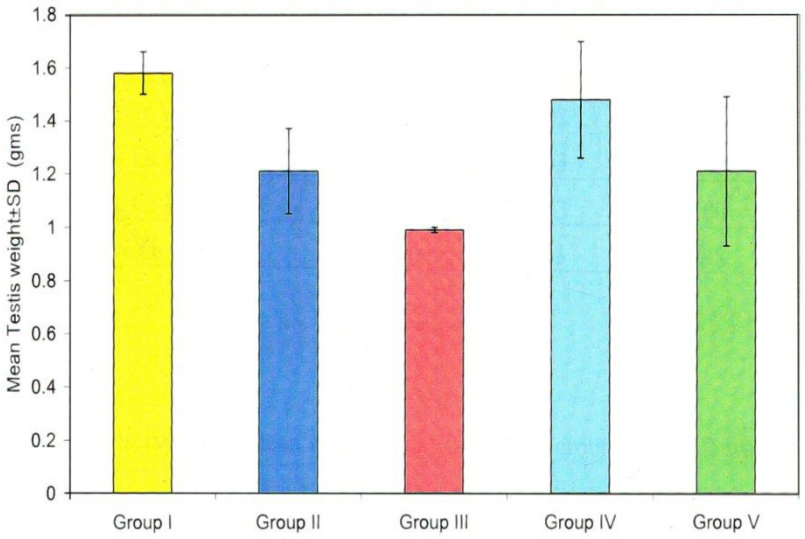
S. N.	Groups	Before Experiment			After Experiment			Change		
		Mean Diff.	SE	"p"	Mean Diff.	SE	"p"	Mean Diff.	SE	"p"
1	I vs II	8.333	9.277	0.895	39.167	14.318	0.077	30.833	17.312	0.406
2	I vs III	-2.500	9.277	0.999	-2.500	14.318	1.000	0.000	17.312	.000
3	I vs IV	5.000	9.277	0.982	21.667	14.318	0.564	16.667	17.312	0.869
4	I vs V	-1.667	9.277	1.000	10.833	14.318	0.941	12.500	17.312	0.946
5	II vs III	-10.833	9.277	0.769	-41.667	14.318	0.053	-30.833	17.312	0.406
6	II vs IV	-3.333	9.277	0.996	-17.500	14.318	0.739	-14.167	17.312	0.922
7	III vs V	0.833	9.277	1.000	13.333	14.318	0.882	12.500	17.312	0.949

Testis weight-

It was observed that average testis weight in control animals (group I) was 1.58 ± 0.08 gm. In group II average testis weight was 1.21 ± 0.16 gm, which was less in comparison to group I. In group III average testis weight was 0.99 ± 0.01 gm, which was less in comparison to group I as well as group II. In group IV average testis weight was 1.48 ± 0.22 gm, which was more in comparison to group II but was less in comparison to group I. In group V average testis weight was 1.21 ± 0.28 gm, which was more in comparison to group III but was less in comparison to group I.

Table 3: Mean testes weight in animals of different groups

S.N.	Group	n	Mean	SD	Min	Max
1.	I	6	1.58	0.08	1.50	1.68
2.	II	6	1.21	0.16	1.10	1.54
3.	III	6	0.99	0.01	0.98	1.02
4.	IV	6	1.48	0.22	1.05	1.66
5.	V	6	1.21	0.28	0.94	1.59
Significance of difference (Among Group)			F= 10.188; p<0.001			



Average mean testis weight was found to be minimum in Group III and maximum in Group I. Analysis of variance showed difference among group to be significant (p<0.001). For average testis weight maximum difference was observed between Group I and Group III and minimum difference was observed between Group I and Group V were statistically significant. Difference between Group I and Group III was very highly significant.

Table 4: Between group comparison of mean testis weight in animals of different groups (Tukey's HSD)

S.N.	Comparison	Average Testis Weight		
		Mean difference	SE	"p"
1.	Group I vs Group II	0.370	0.103	0.011
2.	Group I vs Group III	0.583	0.103	<0.001
3.	Group I vs Group IV	0.12	0.103	0.860
4.	Group I vs Group V	0.363	0.103	0.013
5.	Group II vs Group III	0.212	0.103	0.269
6.	Group II vs Group IV	-0.269	0.103	0.100
7.	Group III vs Group V	-0.220	0.103	0.238

IV. Discussion

Present study was carried out to evaluate the effect of EMR from Mobile Phones on body weight and testis weight of Male Albino rats. Mobile phones are very commonly used day by day even used by immature children.

Body weight

In the present study it is observed that body weight was increased in animals of all the groups. In group II body weight gain was much less when compared with group I. This finding was in accordance with the earlier report Wilson et al, (1999). Aziz et al, (2010) reported a significant decrease in body weight gain in rats

following exposure to electromagnetic field at whole body SAR of 1.2 W/Kg for every alternate 8 hours for 2 weeks, whereas Lee et al, (2004) found no significant difference in body weight of rats that were exposed to magnetic field. However no explanation was given for perturbation in body weight on exposure to electromagnetic radiation. This decrease in body weight may be due to increased apoptosis of cells as a result of electromagnetic radiation exposure. In our study increase in body weight in group III was same as that of group I i.e. increase in body weight was not affected by electromagnetic radiation and this may due to stress induced hyperphagia which was suggested by Rowland & Antelman (1976).

After discontinuation of exposure for one month we observed that gain in body weight was improved in group IV in comparison to group II which may be due to decrease in apoptosis after discontinuation of mobile phone exposure. In group V, body weight was decreased in comparison to group III, which may be due to decreased feeding after removal of stress.

Testis weight

In the present study after the completion of exposure duration, weight of the testis of the animals of exposed groups was compared with that of control group and a significant decrease was observed in weight of testis in group II and group III in comparison to controls. Hammodi (2011) also noted a significant decrease in testis weight in rats following exposure to electromagnetic radiation of 900 MHz from mobile phone for one hour per day for one month. Lee et al, (2004) reported insignificant change while Ribeiro et al, (2007) found no change in testicular weight in rats on exposure to electromagnetic radiation. Exact pathogenesis of these changes is not known yet. This decrease in weight of testis may be due to the apoptosis of spermatogenic cells within the seminiferous tubules.

After two months of exposure we kept the animals without exposure for one month in group IV and group V and improvement in the testicular weight of these animas was observed i.e. the decrease in testicular weight was partially reversible on discontinuation of exposure. Even after our best efforts we could not find any study in the literature in which the spontaneous reversibility of electromagnetic radiation effects were studied, so we were unable to compare our data with any other author.

V. Acknowledgement

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