

Microscopic Changes of Radiations and Combined Effect of 2G Mobile Phone Radiations with Turmeric (*Curcuma Longa*) On Germ Cells of Testis in Albino Rats

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ABSTRACT

Background: This study was conducted to observe the histological Effects of Radiations and Combined Effect of 2g mobile Phone Radiations with Turmeric (*curcuma longa*) on germ cells of Testis in Albino Rats.

Subject and Methods: The study was conducted on 32 male albino rats. They were divided into four groups A, B, C, D. Group A was control group. Group B was exposed to radiations from cell phone (2G mobile 900-1900 Mhz). Group C was given *curcuma longa* orally and group D was exposed to both radiations and *curcuma longa* given orally.

Results: After given two month of mobile phone radiation the animals were sacrificed by cervical dislocation method and testis were used for observation of germ cells. the regularly cell phone radiation exposure on testis decrease the number of germ cells.

Conclusion: The regularly exposure of radiation leads to decrease the number of germ cells, the harmful effect could be

decrease by *curcuma longa*.

Keywords: 2G Mobile Phone, Albino Rats, *Curcuma Longa* (Turmeric).

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INTRODUCTION

In recent years rapid proliferation of wireless telecommunication industry has resulted in an increase in the number of cell phone users so much, that the radiation emitted from the cell phone has become a cause of concern for public health in general and the cell phone users in particular. Scientific researches have highlighted some extremely hazardous effects of exposure to radiation emitted from the cell phone on the human body. These effects range from those at the molecular level manifested as an increase in single and double strand DNA breakages, The cellphone emit the electromagnetic radiations which has frequency ranging from 300MHz to 300GHz. According to some studies electromagnetic waves emitted from a cell phone even with the power density lower than the permitted limit (1mw/cm²) can lead to many disorders such as memory loss, fatigue, headache, heat sensations in ears. Since the cell phones are usually placed by many peoples near the pelvic region in females, the scrotum in males it can lead to damage of their reproductive organs. Standard dose of *curcuma longa* 166.5 mg/kg of albino rats was calculated for each albino rat's biweekly. After calculation of doses for each rat *curcuma* powder was mixed to make an

emulsion with sufficient amount of olive oil and water in a mortar using spatula before giving it to rats.

The emulsified turmeric powder was than orally administered daily for two months, albino rats of group c (*curcuma* exposed) and group d (EMR and *curcuma longa*) exposed.

The therapeutic effects of curcumin on the di-n-butylphthalate (DBP) induced testicular damage in rats. Benzene dicarboxylic acid dibutyl ester also known as butylphthalate or di-n-butylphthalate (DBP) is extensively used as a plasticizer in cellulose plastics, as a solvent for dye and for a variety of other products.

SUBJECTS AND METHODS

This study was conducted on 32 male albino rats in the department of Anatomy and department of pharmacology of Dr. S. N. Medical College Jodhpur, Rajasthan (India). All the animals (albino rats) were housed in a standard animal facility with a controlled temperature of 25-27 degree Celsius, 5 to 10% humidity. Animals were divided into four groups A, B, C, D Each group having eight number of animals. Group A-taken as control

Group B-exposure to radiations from cell phone (2G MOBILE 900-1900MhZ), Group C-given orally curcuma longa, Group D-exposure to both radiations and orally curcuma longa. After 2 months of exposure Animals were sacrificed by cervical dislocation method and their organs (testis) will be fixed in 10% formalin solution. The formalin fixed organs will be used for observing histological changes in germ of testis.

RESULTS

Histological Changes in Testis Germ Cells in Experimental Rats: In contrast to control group, all (100.00%) of subjects of EMR group showed decreased germ cells and on applying chi square test, this difference was found significant ($p < 0.05$). All subjects of control and curcuma exposed group showed normal germ cells and this difference was not significant ($p > .05$). Majority of the subjects of control and curcuma exposed group showed normal germ cells and this difference was not significant ($p > 0.05$).

Table 1: Distribution of microscopic changes in Germ cells in control and EMR exposed group

Experimental group	Histological changes		Total
	Normal	Decreased	
Control	7(87.50%)	1(12.50%)	8(100.00%)
EMR	0(0.00%)	8(100.00%)	8(100.00%)

$\chi^2 = 12.44, df = 1, p \text{ value} = 0.00$

Figures in parenthesis indicate percentage

Table 2: Distribution of microscopic changes in Germ cells in control and curcuma exposed group

Experimental group	Histological changes		Total
	Normal	Decreased	
Control	8(100.00%)	0(0)	8(100.00%)
Curcuma	8(100.00%)	0(0)	8(100.00%)

$\chi^2 = 0.00, df = 1, p \text{ value} = 1.00$

Table 3: Distribution of microscopic changes in Germ cells in control and curcuma+EMR exposed group

Experimental group	Histological changes		Total
	Normal	Decreased	
Control	7(87.50%)	1(12.50%)	8(100.00%)
Curcuma+EMR	5(62.50%)	3(37.50%)	8(100.00%)

$\chi^2 = 1.33, df = 1, p \text{ value} = 0.24$



Fig 1: Control group (A)- showing Normal histological structures of testis. A. Leydig cells B. Spermatogonia C. Spermatids D. Seminiferous tubules

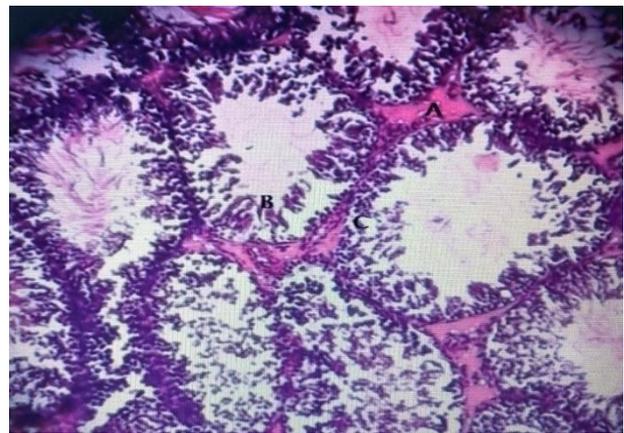


Fig 2: EMR exposed group (Group B)-showing decrease number of germ cells. A. Leydig Cells B. Spermatids C. Spermatogonia

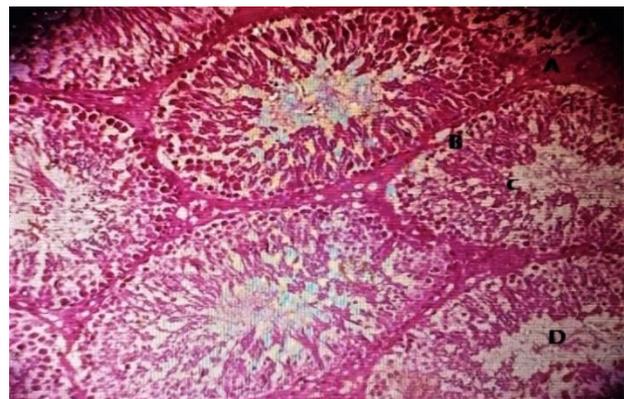


Fig 3: Curcuma longa (Group C) exposed group-Resembling normal microscopic structures due to anti-oxidant effect of curcuma longa. A. Leydig Cells B. Spermatids C. Spermatogonia D.

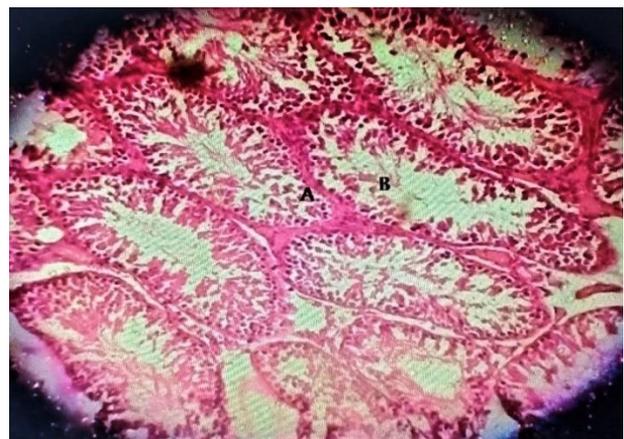


Fig 4: EMR & curcuma longa exposed (Group D)-showing minimal changes in germ cells than EMR exposed group due to preventive effects of curcuma. A. Spermatids B. Spermatogonia

DISCUSSION

In this study light microscopic examination of sections from testis of Albino rats exposed to mobile phone radiations 1 hour /day for two months with standard dose of curcuma longa showed, hypoplasia in germ cells.

According to study that there were no significant changes observed in testis of Albino rats exposed to as EMR+curcuma longa showing preventive effects of curcuma longa. In similar study done by Forgacs Z et al (2006) observed effect of whole-body 1800 MHz GSM-like microwave exposure on testicular

steroidogenesis and histology in mice. Khaki AA et al (2006) showed the effect of an electromagnetic field on the boundary tissue of the seminiferous tubules of the rat: A light and transmission electron microscopic study. Lopez-Lazaro M (2008) reported Anticancer and carcinogenic properties of curcumin: considerations for its clinical development as a cancer chemo protective and chemotherapeutic agent. By Sharaf A Hafiza (2012) there Study revealed that exposure to ultraviolet rays lead to changes blood vessels and disturbance of spermatogenic layers, while using curcumin prior to exposure to ultraviolet rays in a small dose (5 mg/kg) led to restoration of the normal structure in most of the seminiferous tubules.

CONCLUSION

After two months all experimental animals were sacrificed by cervical dislocation and their organs (Testis) were dissected out to observe microscopic changes. EMR exposure (900-1900 MHz) in group B showed significant microscopic changes in germ cells. Effectivity of curcuma longa was significant in dose 166.5mg/kg/day in proper manner to minimize microscopic changes in, germ cells.

Thus, curcuma longa act as an effective anti-inflammatory and anti-oxidant agent. On applying ANOVA there was no significant difference found between pre exposure mean weight of all four experimental groups. But significant difference was observed in post exposure mean weight. No significant change in mean weight of pre exposure and post exposure groups was observed. The experimental data of the present preliminary study shows that exposure to 2G mobile phone (900-1900 MHz) one hour daily for two months is sufficient to cause histological changes in germ cells, in Albino rats. Effects of mobile phone exposure on testis can be reduced or minimized if curcuma longa 166.5mg/kg/day is orally administered.

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