

To Observe and study the adverse Effects of Lithium Carbonate on Rat Ovaries

TAZEEN KOHARI¹, ZAFFAR IQBAL MALIK², FAIZA IRSHAD¹Associate Professor Anatomy M.Islam Medical and Dental College, Gujranwala²Assistant Professor Anatomy Sahara medical college Narowal³Associate Professor Anatomy M.Islam Medical and Dental College, GujranwalaCorrespondence to Dr. Tazeen Kohari Email: tazeenk67@gmail.com, contact 0323-29789

ABSTRACT

Background: The female reproductive organs include uterus, fallopian tubes and ovaries, these organs when exposed to drugs and metals lead to anatomical damage resulting in infertility.

Researchers have documented the harmful effects of the favorable antidepressant Lithium Carbonate on many human viscera's but even today the medicinal world has scarce knowledge of the ablation of ovarian anatomy by lithium carbonate.

Aim: To study and document the results of the detrimental effects of Lithium on the ovaries.

Methods: We selected Twenty four adult female rats for this observational and experimental study. The female albinos were divided into two groups. Twelve animals were present in Group A and Group B consisted of twelve female rats. The hygienically prepared laboratory diet which consisted of flour pellets and green vegetables was given to Group A animals and Group B rodents received Lithium carbonate in powder form for eight weeks. After completion of the study time animals were sacrificed and weight of ovaries were recorded and compared in both groups.

Results: The results in Group B documented that animals had a highly significantly decline in ovarian weight after chronic Lithium carbonate than in Group A.

Conclusion: Our prospective study concluded that chronic administration of Lithium Carbonate causes distortion of its tissue and highly significant decrement of weight of the ovary.

Keywords: Ovary, decrement, infertility

INTRODUCTION

The female reproductive system consists of Uterus, Ovaries and Fallopian tubes¹. The Ovaries one on each side of the body are located in the pelvis². Human ovary weighs almost 3-8 grams³ and the weight of each ovary in rat is 9 to 10mgs^{4,5}. Each ovary is oval shaped and is present behind the Broad ligament. Broad ligament extends from the mesovarium to the lateral pelvic wall and the round ligament of ovary attaches the lateral uterine margin to the ovary on both sides⁵. The ovarian fossas is occupied by the ovary on both pelvic sides; mostly it is found hanging in the rectouterine pouch⁶. The ovarian artery is the arterial supply of the ovary on each side⁷.

Ovaries are lined by cuboidal epithelium⁸, in section each ovary consists of outer Cortex and inner Medulla. The Cortex consists of ovarian follicles and stromal cells. During reproductive life each ovary consists of Primary follicles, Secondary follicles and Graffian follicles. The medulla comprises of Loose Connective tissue, Blood and lymph vessels⁹.

Among soft alkali metals the popular metal Lithium Carbonate¹⁰ is used to stabilize patients suffering from various psychiatric disorders¹¹ but plenty harmful side effects of this drug have been reported on various organs like brain¹², heart¹³ and kidneys¹⁴. It causes distortion of neural cortex, cardiac myocytes, renal tubules and ovarian tissue but the Clinicians and the population are unaware of the side effects of this drug on female reproductive organs that is the reason this study was conducted.

MATERIALS AND METHODS

This research was carried out at the Animal house of Basic Medical Sciences Institute Jinnah Postgraduate Medical Centre Karachi from first May to thirtieth June 2013. For our study twenty four adult female albino rats of fifty days old weighing 165-175 grams animals were acclimitized for a week. The animals were divided into two groups. Group A which contained twelve albinos and Group B which comprised of twelve rodents. Laboratory prepared diet consisted of green leafy vegetables, flour pellets was provided to Control Group A along with water and Group B

animals were treated with Lithium carbonate 20¹⁵ mg/gram body weight (Adamjee pharmaceuticals) in flour pellets for eight weeks. At the end of eight weeks the animals were sacrificed and the both ovaries were removed and weighed on electronic weighing balance in Group A and in Group B animals.

Statistical analysis: SPSS version -16 was utilized for statistical analysis. Statistical differences between means and experimental data was carried out by student's 't' test. The statistical differences between means and experimental data of ovarian weights were carried out. The differences in ovarian weights at the end of eight weeks was regarded as highly significant if the Pvalue was equal to or less than .001.

RESULTS

The weight of the Ovaries in Group A (Control) and Group B (Lithium Carbonate) treated groups are in Table 1.

Weight of ovaries in mg in different groups of albino rats

Groups	Treatment Received	Sub-Groups	8 TH Week Mean weight of ovaries(mg)
A (n=12)	Control	A	92±0.67 mg
B(n=12)	Lithium carbonate	B	62.89±0.88mg

P value (A vs B) P≤.001

In control Group A which were on laboratory diet showed highly significant increased (Pvalue, ≤ 001) Mean weight of ovaries 92±0.67mg as compared to Group B animals which were treated with lithium carbonate and Hematoxylin and Eosin stained sections showed all stages development of follicles ,no follicular apoptosis was found. The values of Mean ovarian weights were highly significantly decreased (p≤.001) in treated Group B 62.89±0.88mg mg as compared to Control group. Histology of Haematoxylin and Eosin stained ovarian tissue of Group B albinos showed atretic follicles and a significant distance between the remaining follicles.

DISCUSSION

The drug Lithium the Aspirin of bipolar disorder ,was discovered in 1949¹⁶, but still today it is the most common prescribed drug in various psychiatric disorders. The female patients who ingest Lithium were found to suffer from infertility due to follicular atresia as found by Mirakhori F (2013)¹⁷ and the same results of

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decreased number of follicles leading to decline in weight of ovaries has been reported in our research. Lithium use causes release of reactive oxygen radicals¹⁸ which inhibits production of Follicle stimulating hormone resulting in follicular death¹⁹ and decrease in the weight of ovaries. The same results of decreased weight of ovaries due to Lithium ingestion is in accordance with our study.

CONCLUSION

This study has enlightened the cause of infertility in female patients who ingest Lithium, caution should be taken in prescribing Lithium to fertile female patients and they should be regularly followed up.

Conflict of interest: Nil

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