

# “Effects of Medroxy Progesterone Acetate (Inject-Able Contraceptive) on Diameter of Graafian Follicle (Ovary) of Adult Albino Rats”

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## ABSTRACT

**Objective:** An injectable birth control called Medroxy Progesterone Acetate (MPA) was used in the study to see how it affects adult female albino rats' ovaries.

**Study design** An experimental study

**Place of study :** To conduct the research, scientists worked with animals at the Dow University of Health Sciences' Animal House, the Institute of Basic Medical Sciences, and the Dow Diagnostic Research and Reference Laboratory (DDRRL). In the months of April and July of 2012, researchers conducted their investigation.

**Materials and Method:** For the purpose of the research, a total of 72 female albino rats were chosen and divided into three distinct categories. Each group was further subdivided into three smaller groups based on the length of time that the therapy session lasted. The experiment utilized a group size of  $n = 24$ , which served as the control. The dose of MPA that was given to Group B (which consisted of 24 people) was 3 mg/kg of body weight. Participants in Group C ( $n = 24$ ) were given an MPA dose that was two times higher than those in Group A (3 mg/kg). A single injection of MPA was given to group B as well as group C at the beginning of the experiment. During the course of the research, it was noticed that the ovaries of the animals had changed both in terms of their shape and their structure. Hematoxylin, eosin, and masson's trichrome were the stains that were used to color the tissues of the ovary. With the assistance of an ocular and stage micrometer, even minute differences could be detected and measured. The Kruskal-Wallis test and Tukey's test are two examples of nonparametric statistical analysis that were used to investigate the differences in each group's variables.

**Result:** In comparison to control groups, experimental animals fed MPA had significantly smaller diameters of graafian follicles (DOF) than animals in the control groups. There was a significant difference in depth-of-field (DOF) between groups A1, B1, and C1 after one month of treatment. Groups A2, B2, and C2 each had a DOF of 571.25 98.26 meters, 288.25 100.80 meters, and 179.0 37.23 meters. In groups A3, B3, and C3, the DOF ranged from 699.75 m to 128.7 m, 230.37 m to 20.83 m, and 159.37 m to 47.65 m.

**Conclusion:** Research shows that MPA can lower the amount of follicular atresia as well as chronic anovulation, according to the findings of this study. With this study's findings, we can better understand the risks that hormonal contraceptives like injections have to women's health.

**Keywords:** MPA: Medroxy progesterone acetate FSH:Follicular Stimulating Hormone ,LH: Luteinizing Hormone. DOF : Diameter of graafian follicles

## INTRODUCTION

Contraception is the practice of utilizing pills, procedures, or devices to prevent pregnancy in order to keep a woman from getting pregnant or from getting pregnant in the first place. <sup>1</sup> The world's population continues to grow at an accelerating rate, and it cannot be halted. So, I'm looking into methods of birth control that are more affordable, reliable, and safe, as well as effective and acceptable. <sup>2</sup> Maternal mortality is particularly high in developing countries, when the number of newborns outnumbers the number of mothers. MPA vials contain 150 mg. Medroxy progesterone acetate, or MPA, is a steroid that mimics the effects of progesterone on the body. <sup>3</sup> Inhibiting the body's production of the gonadotropin hormone, MPA, can impede ovulation. <sup>4,5</sup> It eases the tension in the tubes, allowing the egg to travel more easily to the uterus. The MPA produced by the body throughout the menstrual cycle affects the hypothalamic-pituitary-ovarian axis. Consequently, ovulation is stymied. Steroids play an important role in birth control's effectiveness because of this activity. <sup>6</sup> The number of GnRH pulses decreases when progesterone is present. Because ovulation is reliant on a sufficient number of LH pulses, the action of progesterone is critical in the operation of birth control. <sup>7</sup> When progesterone is injected intramuscularly, the hormone's concentration in the bloodstream rises. <sup>8</sup> Birth control injections (MPA) are easy to obtain, affordable, and diminish the anterior pituitary gland's likelihood of secreting FSH and LH. As a result of these reasons, large doses of MPA injections are delivered, but few people are aware of the dangers associated with them. <sup>9</sup> This study raised awareness about the negative effects that drugs have on one's health. The effects of MPA on Graafian

follicle diameters have been studied in a scientific manner. <sup>10</sup> Many people in Karachi, where there are a lot of family planning institutions, make use of contraceptive injections (MPA) without being aware of the potential side effects. <sup>11</sup> Over the next few years, those who aren't aware of possible side effects are expected to become a major public health issue, which will affect everyone in the community. <sup>12,13</sup>

## MATERIALS AND METHODS

The Dow University of Health Sciences Institutional Review Board (IRB) has approved all of the study's steps.

### Inclusion criteria:

- The Wistar breed of albino rats used in this investigation were female adult albino rats.
- Age range from 90 to 120 days
- Weigh between 190 and 220 grams.

### Exclusion criteria:

Pregnant Female Rats.  
**Sample Selection:** 72 albino female rats from the animal house of the IBMS of Dow University of Health Sciences were donated (DUHS). Each of these creatures was assigned an A, B, or C based on their classification. Finally, each group was broken into three smaller groups, each of which had a total of eight animals in it. Group A comprised of twenty-four people and was referred to be the "control" group. Group B ( $n = 24$ ) received MPA at a dose of 3 mg/kg, based on the weight of the participants. Group C ( $n = 24$ ) received MPA at a dose of 6 mg/kg, which was more than double the original amount.

Each participant in the B and C groups received a single injection of MPA at the start of the research. It took one, two, or

three months for the animals to be put to death under the influence of an ether-inducing dose. The ovaries were removed by an abdominal incision and preserved for 24 to 48 hours in a formalin solution containing 10 percent formalin. Hematoxylin and eosin were then applied to the tissues. Some micrometry was carried out.

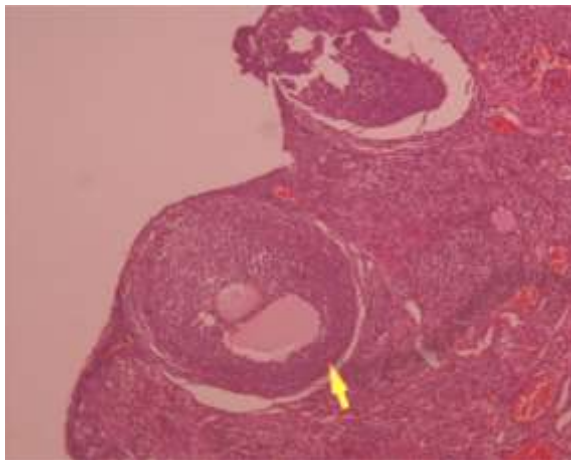
A variety of proforma were used to record the raw data after a thorough assessment at both the macro and micro levels. Finally, it was imported into SPSS. a total of sixteen distinct iterations could be found To see if the treatment and control groups differed significantly when the variables were not normal, the Kruskal-Wallis and Tukey's tests were used.

**RESULTS**

The goal of this study was to see if providing MPA to albino rats altered the size of the graafian follicle. This was done. In comparison to control groups, experimental animals fed MPA had significantly smaller diameters of graafian follicles (DOF) than animals in the control groups. The DOF was 610.6273.15 meters in group A1, 287.1254.35 meters in group B1, and 185.8716.47 meters in group C1 after one month of treatment.1 The p-value for the comparison of the two groups A1 and B1 as indicated in table-1 and graph-1 was 0.005. Group B1 was the one that saw the biggest percentage drop.

Table 1: Statistical Analysis and Comparison of Mean Size of Graafian Follicle,

Group		1 <sup>st</sup> month size of graafian follicle	2 <sup>nd</sup> month size of graafian follicle	3 <sup>rd</sup> month size of graafian follicle
A	Mean +- SD	610.625	571.25	699.75
		+-	+-	+-
		73.157	98.266	128.718
B	Mean +- SD	287.125	288.25	230.375
		+-	+-	+-
		54.341	100.80	20.832
C	Mean +- SD	185.875	179	159.375
		+-	+-	+-
		16.479	37.237	47.659
A v/s B	P value	<0.005	<0.005	<0.005
A v/s C	P value	<0.005	<0.005	<0.005
B v/s C	P value	<0.005	<0.005	<0.001



Graafian Follicle

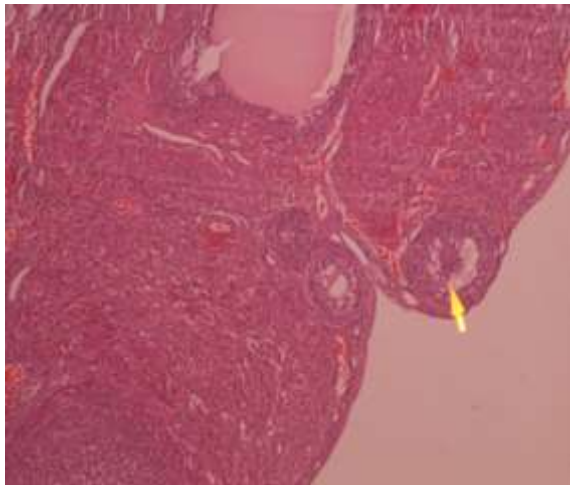
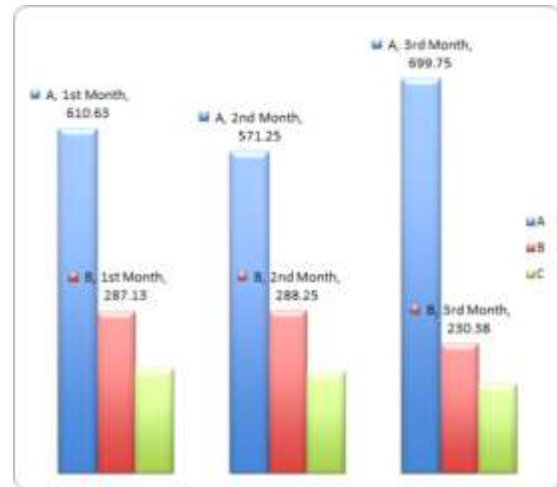


Figure-1: Hematoxylin and Eosin stained, 5 micrometer thick, transverse section of ovary showing normal appearance of cortex, mature Graafian Follicle



Cystic Cavity

Figure-2: Hematoxylin and Eosin stained, 5 micrometer thick, transverse section of rat's ovary showing decrease size of Graafian follicle (arrow), Cystic cavity (arrow) and increased vascularity from group -C (1-month treatment) rat. Photomicrograph x10

Graph 1: Mean Size of Graafian Follicle (µm) of Ovary of Female Albino Rats in Different Groups at Variable Time Interval

A. Control group	B. Treated group	C. Treated group (double dose)
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Groups A2, B2, and C2 each had a DOF of 571.25 98.26 meters, 288.25 100.80 meters, and 179.0 37.23 meters. In groups A3, B3, and C3, the DOF ranged from 699.75 m to 128.7 m, 230.37 m to 20.83 m, and 159.37 m to 47.65 m. A substantial difference between groups A3 and C3 was found in the diameter of the graafian follicle, as illustrated in table-1 and figure-1 (p value of 0.005).

**DISCUSSION**

Ovarian cells can be killed by a xenobiotic known as MPA, which reduces the number of ovulation cycles. To determine the ovary's role in reproduction, a histomorphometric investigation is required. 14,15 Animals in the treatment group had a different DOF in the

ovary than those in the control group. Observations were made on both species. The level of individual choice was significantly reduced in the study groups. Research undertaken in the past has also backed up these conclusions.<sup>16,17,18</sup> Another study found that higher serum progesterone levels are to blame for the decrease in DOF. The hypothalamic-pituitary-gonadal axis is disrupted and the anterior pituitary gland is unable to produce FSH and LH.<sup>19,20</sup> Ovarian morphological alterations are caused by the buildup of superoxide radicals, another term for oxidative stress. The findings of current investigations corroborate these assumptions.<sup>21,22</sup> When graafian follicles are inhibited by MPA, the result is anovulation, which is long-lasting.<sup>23</sup> The amount of estrogen produced by the body when using MPA is much reduced when compared to the effects of other hormonal birth control techniques or having a natural monthly cycle. Ovarian fibrosis was discovered throughout the course of this investigation. An injured cell undergoes fibrosis as part of the healing process, which is critical. Fibrosis was observed in both of our study groups that received therapy (group B and C). There was a little amount of growth in elastic fibers around the blood vessels, but this was offset by considerable growth in collagen and reticular fibers. Collagen fibers grew extensively around the blood artery, whereas elastic fibers did not. Cell damage is caused by the MPA, which behaves in a manner similar to that of a free radical.<sup>24</sup> These injections can lead to infertility if used over a lengthy period of time, according to this study's findings.<sup>25,26</sup>

## CONCLUSION

The ovaries will look and function differently as a result of the use of MPA. As a result, the graafian follicle of the albino female rat shrinks. Infertility can be caused by an increased number of cystic ovarian follicles and an increased number of ovarian follicles that do not function correctly. As a result of this study, both the general public and medical professionals will have a greater awareness of the harmful effects that contraceptive injections have on women's health. It is imperative that the media and the general public are made aware of the dangers of this substance (Television, radio, magazines, newspaper and family planning workers).

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