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Effects of Melatonin and Omega-3 Fatty Acids on Female Reproductive Hormones, Ovarian Follicles, and Blood Parameters in New Zealand White Female Rabbits

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Abstract | The present study aimed to investigate the impact of dietary supplementation with Melatonin (MT) and Omega-3 fatty acids on ovarian follicle development, blood hematology, female reproductive hormones, and reproductive histology in New Zealand White (NZW) female rabbits. Melatonin (MT) and Omega-3 fatty acids are essential for regulating follicular development, ovulation, and cell growth and proliferation. Many physiological processes in animals are regulated by Melatonin (N-acetyl-5-methoxytryptamine) (MT). According to recent research, MT influences the quantity and level of ovarian follicle maturation. This study was conducted at the Department of Surgery and Obstetrics, College of Veterinary Medicine, Basrah University, between January 15, 2025, and December 15, 2024. Fifteen female New Zealand White rabbits, each weighing around 3 kg and 12 weeks of age, were employed in this investigation. Three groups of five female rabbits each were randomly assigned to the adaptation experiment: The G1 (control group) without addition of supplement, G2 experimental group were treated by a single dose of Melatonin 2.5 mg/kg/day orally by capsule in evening and G3 experimental group of Omega 3 a single dose of it (1 mL/kg/day) orally by syringe in evening. Results showed that level of follicular stimulating hormone (FSH) in the female rabbits at (15) days increased significantly ($p < 0.05$) in G2 and G3 groups compared with G1. As well as the study appear the levels of FSH increased significantly ($p < 0.05$) at 30 days in G2 and G3 groups compared with G1 control group. The estrogen (E2) level was highest in the G2 and G3 groups ($p < 0.05$) at 15 days compared to the G1 group. On the other hand, the differences in E2 levels were significantly higher ($p < 0.05$) at 30 days in the G2 and G3 groups compared to the G1 group. The Luteinizing hormone (LH) level was the highest at 15 and 30 days in the G2 and G3 groups, significantly higher than in the G1 group. The results showed that the rate of WBC decreased significantly ($P < 0.05$) in the G2 group at 15 days compared with the G1 and G3 groups. On the other hand, the study showed that the value of white blood cells (WBCs) significantly decreased ($P < 0.05$) at 30 days in G2 and G3 compared with G1. As observed in the current study, the level of blood hemoglobin (Hb) was significantly increased ($P < 0.05$) in G2 at 15 days compared with G1 and G3. However, when compared to G1, the mean HB was substantially greater in G2 and G3 after 30 days ($P < 0.05$). Additionally, the study revealed that, at 15 days, platelet (PLT) levels in the G2 and G3 groups were considerably higher ($P < 0.05$) than those in the G1 group. The findings showed that, at 30 days, the rate of PLT was significantly higher ($P < 0.05$) in the G2 and G3 groups than in the G1 group. According to the current study, G2 had substantially more primary, secondary, and tertiary follicles at 15 days than G1, with a value of $P < 0.05$. Additionally, the study showed that at 30 days, G2 had considerably more primary, secondary, and tertiary follicles than G1 ($P < 0.05$). In the present study, at 15 days, the number of primary, secondary, and tertiary follicles in G3 is significantly larger than that in G1 ($P < 0.05$) while the study showed the numbers of primary follicles and tertiary follicles become increased significantly value ($P < 0.05$) at 30 days compared with G1. In conclusion, the present study demonstrates that Melatonin and Omega-3 are effective in enhancing ovarian follicle development, blood hematology (WBC, HB, and PLT), and reproductive hormones (FSH, LH, and E2) in New Zealand White (NZW) female rabbits.

Keywords | Ovary, Melatonin, Omega 3, Ovarian follicle