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Correlation Between Female Ovariohysterectomy and Male Orchiectomy Rats With Blood Cholesterol Levels

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Abstract

Currently, sterilization is the main choice for controlling the population of pets. But sterilization also has long-term effects. One of them is related to cholesterol levels in the blood. In this study, we investigated the effect of castration on changes in cholesterol levels. Twenty-three Wistar rats aged 10 weeks were divided into four groups: the female sham surgery group (n = 6) and the male sham surgery group (n = 6) who underwent sham surgery, the orchiectomized (OCX) group (n = 6), which underwent bilateral OCX at 10 weeks of age, the ovariectomy (OVX) group of mice (n = 6) who underwent bilateral OVX at 10 weeks of age. At 8 weeks postoperatively, all 23 mice were shut off. The serum cholesterol level is measured. Serum cholesterol levels had no effect 0.168, namely (p value> 0.05) in the castration rat group (OCX + OVX) compared to the sham surgery group with 67.08 ± 13.581 and 76.00 ± 16.346, respectively. Our findings indicate that orchiectomy and ovariectomy have no effect on cholesterol levels.
Key words: Cholesterol, Orchiectomy, Ovariectomy

Introduction

Cholesterol is a natural substance with physical properties in the form of fat but has a steroid formula (Listiyana et al., 2013). Cholesterol metabolism regulation will run normally if the amount of cholesterol in the blood is sufficient and does not exceed the normal amount needed (Brunner, 2007). Cholesterol is a major component of brain and nerve cell membranes. In addition, cholesterol also acts as an intermediary for the formation of a number of important components such as the formation of the sex hormones estrogen and testosterone and bile acids for digestive function (Widyaningsih, et al., 2010).

Female rats were found to have a higher average normal blood serum cholesterol level than male rats (Widyaningsih, et al., 2010). Overall effect on cholesterol metabolism, indicating that the cholesterol synthesized and metabolized in male mice is at a much lower level than in castrated mice or in normal female mice. This is evident based on the higher rate of cholesterol oxidation in females offset by an increase in cholesterol synthesis. The increase in the level of

cholesterol biosynthesis was matched by an increase in degradation and excretion with no increase in serum cholesterol levels. The influence of sex or sex hormones on the rate of fatty acid biosynthesis or octanoic degradation suggests that there is a direct and fairly specific relationship between sex and cholesterol metabolism (Krirchevsky, et al., 1960).

Materials and Methods

Used twenty-three female and male Wistar rats in this study. At the beginning of the study, the female rats were 10 weeks of age and had a mean body weight of 200 g. Kept three to four rats in each cage. Fed them with standard feed containing 0.9 percent calcium and 0.7 percent phosphorus, and water ad libitum. The animals were divided into 4 groups consisting of 1 male control group, 1 female control group, 1 orchidectomized male (OCX) group, and 1 ovariectomized female (OVX) group. Performed the castration transabdominally under ether anasthesia. The rats in the control groups were sham-operated by opening and closing the abdominal wall. At 8 weeks after castration, groups of animals were euthanized, and blood was sampled by aortic puncture. Collected the sampels at 9 a.m. Centrifuged them immediately, and the plasma was stored at -20°C until assayed for iCT. At 6,8,10 and 12 weeks after castration, groups of animals were killed by aortic exanguination in ether anasthesia.

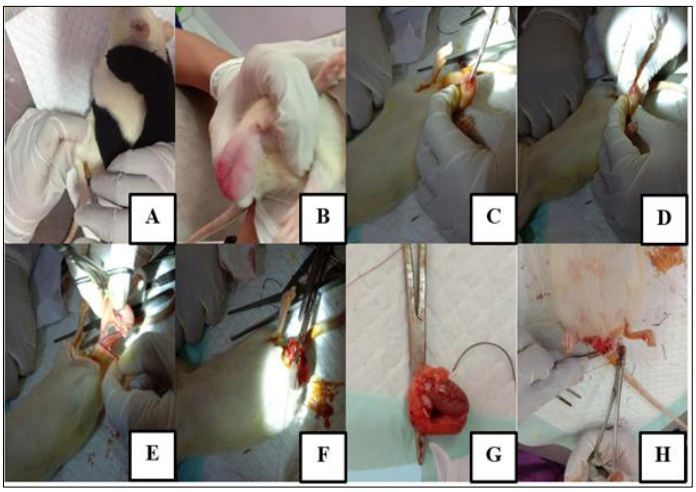

Figure 1. Ocx Procedure

We performed bilateral OCX using the inguinal approach. Anesthesia was induced with ketamine xylazine intramuscularly on the lateral femur (Fig. 2A). The scrotum was shaved to remove hair from the incision site (Fig. 2B). A 1-2 cm skin incision is made on the scrotum (Fig. 2C). Squeezed the scrotum until the testes popped out (Fig. 2D). Transect the spermatic cord (Fig. 2E). The spermatic cord was grasped with a hemostat, and 1-2 ligation was made using a 3-0 absorbable suture to prevent bleeding (Fig. 2F). Cut the testes exactly on the ligation's caudal that has been made using a scalpel blade (Fig. 2G). Close the incision with a simple interrupted pattern using a 4-0 non-absorbable suture (Fig. 2H).

We performed bilateral OVX using the ventral abdominal approach (6). The anesthesia was induced with ketamine xylazine intramuscularly on the lateral femur (Fig. 1A). The ventral abdominal area was shaved bilaterally to remove the incision site's hair (Fig. 1B). The anesthetized rat was laid supine on the operating table and fixated using hands. Chose umbilicus as the skin incision site. The ovaries were found on both sides of the abdomen, a little below

the kidney. A 1-2 cm skin incision was made to expose the ventral abdominal muscles such as the external oblique muscle and subcutaneous tissue was dissected better to visualize the ovarium (Fig. 1C).

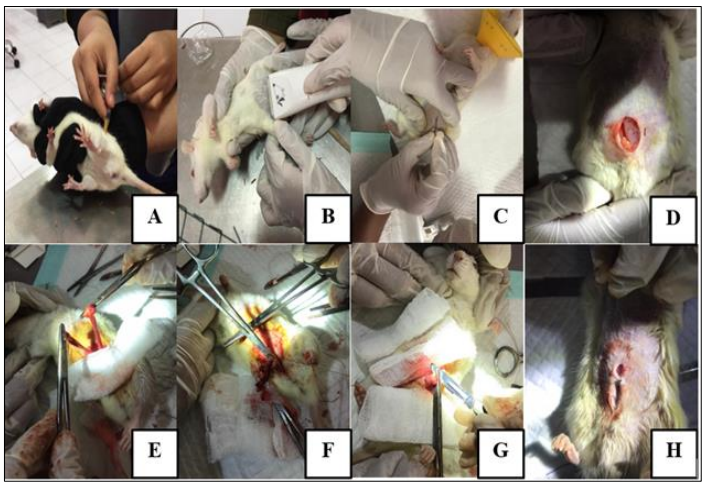

Figure 2. Ovx Procedure

It Gained Entrance to the peritoneal cavity by dissecting the muscle, which revealed the ovary's tissue. Pulled the adipose tissue away until the ovary and identified the uterine tube(Fig. 1D). The periovarian fat with the ovary was pulled away from the incision site gently to prevent detachment of a small piece of the ovary, which may fall into the abdominal cavity where it may be reimplanted and carry on its normal function (11). After identifying the ovary and uterine horn, exteriorize both of the ovarium using an ovariohysterectomy hook along with the uterus (Fig. 1E). The ligament was ligated using a 3-0 absorbable suture to prevent bleeding (Fig. 1F). Cut the uterus exactly on the cranial side of the ligation that has been made using a scalpel blade (Fig. 1G). The muscle and skin were closed with simple interrupted suture using 4-0 nonabsorbable suture (Fig. 1H).

Statistical analysis was performed using SPSS software. Mean and the standard deviation was used to express the average and the dispersion of the measured values. The normality test was evaluated using the Kolmogorov-Smirnov test. Differences were evaluated by the independent t-test and one-way Anova. The differences were considered significant when $p \leq 0.05$.

Results and Discussion

We see in the table the results of the comparison of cholesterol levels in control and treatment. Sham surgery had a mean of 67.08 with a standard deviation of 13,581 and castrated group had a mean of 876,00 with a standard deviation 16,346. with p-value 0.168. So the results show that castration has no effect on cholesterol levels.

Table 1. The comparison of cholesterol level between rat groups

	Rat groups	N	Mean	Std. Deviation	P value
Cholesterol level	Sham surgery group	12	67.08	13.581	0.168
	Castrated rat group	11	76.00	16.346	

Cholesterol is a fatty substance that occurs naturally in the human body. In balanced amounts, cholesterol is very beneficial for the body, namely making sex hormones, adrenals and forming cell walls. If you experience excess cholesterol in the body, it can cause disturbances in blood vessels which can result in strokes and even heart attacks. One of the ways to reduce cholesterol is castration technology, because castration affects hormonal mechanisms. Castration (castration) means stopping testicular activity, causing the accessory gland to retire its activity, male characteristics gradually disappear and spermatogenesis activity stops. The gonadotropin hormone will accumulate in the pars distalis of the pituitary as a result, the basophil cells undergo a change in their identity, which is then known as castration cells. Castration that is done before sexual maturity, the typical male sign will not appear. If castration is carried out after sexual maturity, changes to lose the distinctive male mark will take place slowly. Perhaps this is because the adrenal cortex can produce a little testosterone. Tumors in the prostate gland in old animals are usually given therapy through castration, due to the lack of food supply in the genitals because the cells inside the genitals atrophy, the animals that are usually intentionally castrated will become fatter. This is because there are blood nutrients that are always supplied to the body and are not distributed to the male genitalia (Yatim, 1990).

In the research of Cinci et al. (1993), previously stated that the effect of castration induced by the hormone testosterone on cholesterol levels in the liver and blood serum of white rats (Rattus norvegicus) has increased. Ho1wever, it is not in line with the previous theory which states that the hormone testosterone can reduce cholesterol levels in the blood of rats after castration. Therefore, the results in this study indicate that castration generally has no effect on blood cholesterol levels.

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References

Brunner, E.J. 2007. Prospective Eff ect of Job Strain on General and Central Obesity in the Whitehall II Study. Am. J. Epidemiol., 165(7): 828-837

Cinci. G. R.Pagani, M.L.Pandolfi, B.Porcelli, M.Pizzichini, E.Marinello. 1993. Effects Of Testosterone On Cholesterol Levels And Fatty Acid Composition In The Rat. Life sciences. 53(2); 91-97

Krirchevsky D., E. Staple, J. L. Rabinowitz dan M. W. Whitehouse. 1960. Differences in cholesterol oxidation and biosynthesis on liver of male anf female rats. Pennsylvania (USA). Oxford university.

Listiyana A.D., Mardiana Dan G. N. Prameswari. 2013, Obesitas Sentral Dan Kadar Kolesterol Darah Total. Jurnal kesmas. 9(1); 37-43.

Widyaningsih W, Aditya P., dan Sumiasih. 2010. *Pengaruh Ekstrak Etanol Daging Bekicot (Achantina Fulica) Terhadap Kadar Kolesterol Total, Hdl, Dan Ldl Serum Darah Tikus Jantan Galur Wistar*. Jurnal Sains dan Teknologi Farmasi. 15 (1); 1-10

Yatim, W. 1990. Reproduksi dan Embryologi. Penerbit Tarsito, Bandung. 604