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The Effect of Cigarette Smoke on The Weight of Mice Ovariums (*Mouse muscle*)

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Abstract: This study aims to examine the effect of cigarette smoke on the weight of the mice's ovaries (*Mouse muscle*). The study used an experimental approach, with experimental female mice strains Bal b/c species *Mouse muscle* aged 2-3 months totalling 24 pregnant tails. Mice were treated with cigarette smoke using an injection where the tip was cut so that there was a hole where the cigarette was burned once a day every morning or evening for 13 days. The treatment used three doses, namely P0 (0 cigarettes), P1 (1 cigarette), and P2 (2 cigarettes). Ovarian organ harvesting was carried out on the 13th day, followed by weighing the ovaries. The data obtained were then analyzed using *One Way A*NOVA. The results showed that (a) exposure to cigarette smoke did not have a significant effect on the weight of the mice's ovaries (*Mouse muscle*) during pregnancy, and (b) exposure to cigarette smoke significantly affects the number of follicles in the ovaries.

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INTRODUCTION

The habit of smoking has infected all Indonesian people, especially men (Salsabila et al., 2022). Smoking is a habit that can damage health and cause various diseases that can result in morbidity (Satriawan, 2022). The dangers of cigarette smoke are not only for people who smoke (active smokers) but also impact passive smokers inhaling cigarette smoke produced by active smokers (Samsuria, 2009). Passive smokers have the same or even higher chance of getting the disease than active smokers. It is caused by the chemical content in cigarette smoke inhaled directly by passive smokers without a filter.

The content contained in cigarettes has an impact on ovarian cells. The polycyclic hydrocarbons contained in cigarette smoke are toxic to ovarian cells. In addition, the alkaloid components in cigarette smoke, such as nicotine, can suppress estrogen levels, leading to decreased ovarian fertility and a higher incidence of miscarriage (Oktavianis, 2011). Besides being able to cause miscarriage, nicotine can also quickly cross the placenta and affect the fetus during pregnancy (Irena, 2005).

The results of previous studies showed that cigarette smoke affected the quality of mice spermatozoa (Batubara et al, 2013). Follow-up research conducted by Putra (2016) showed no statistically significant relationship between controls and exposure to two, four, and six cigarettes per day on the number of spermatozoa in male mice (Mouse muscle, Japanese strain). Research examining cigarette smoke's effect on the weight of mice's ovaries is still limited. Therefore, this study aimed to determine the effect of exposure to cigarette smoke on the weight of the mice's ovaries (Mouse muscle).

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RESEARCH METHOD

Experimental Animals

The experimental animals used in the study were strained female mice*Balb/c* species *Mouse muscle*, aged 2-3 months in a healthy and agile condition. Weight 25-40 grams totalling 24 tails, reared in separate plastic cages with a constant state of room temperature 30^0-35^0C. The cage has adequate ventilation and lighting, so it does not get damp.

Mice Mating

Mating data of mice were taken from the presence of vaginal plugs, which was done by looking for dried sperm clumps in the mice's vaginas. Mating was done by mixing one male mice and two female mice in 1 cage.

Mice treatment

The treatment was carried out on mice declared pregnant on the first day. Exposure to cigarette smoke was carried out according to groups P_0 (0 cigarettes), P_1 (1 cigarette), and P_2 (2 cigarettes). The time interval for exposure to 1 cigarette is 10-15 minutes. The treatment was carried out every day for 13 days.

Mice surgery

Surgery was carried out on the 13th day after treatment. Surgery is done by preparing the necessary tools and materials. Mice were killed using dislocation (neck dislocation). Mice were dissected, and their ovaries were taken for weighing.

Ovarian weight

Ovarian weight data were obtained from weighing mice ovaries. The results of weighing the ovaries of mice exposed to cigarette smoke were compared to controls followed by the Least Significant Difference Test (LSD) with a significance 5%.

Data analysis

The data obtained were analyzed by the One-Way ANOVA test with a degree of confidence of 95% ($\alpha = 0.05$). If F count$\leq$ F table hence the hypothesis is rejected. On the contrary, when F counts$\geq$ F table, the hypothesis is accepted, followed by the Least Significant Difference Test (LSD) with a significance of 5%.

RESULT AND DISCUSSION

Data on the average weight of mice ovaries (*Mouse muscle*) with a treatment dose of 0 sticks (P0), one stick (P1), and two rods (P2) are shown in Figure 1.

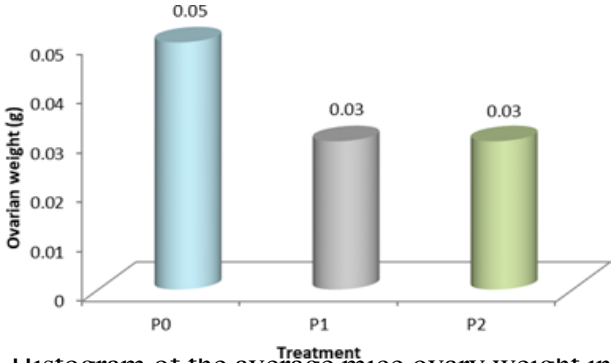

Figure 1. Histogram of the average mice ovary weight in each experiment

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Figure 1 shows that the highest average ovarian weight was obtained in the P treatment with a dose of 0 sticks, namely 0.05g. In comparison, the average weight of the ovary of P1 and P2 with a dose of one stick and two sticks there is no different. Namely, the weight of each ovary is 0.03g. The statistical analysis results show that the value p value > 0.05, namely 0.126. It proves that cigarette smoke treatment has no effect on the weight of the mice's ovaries.

Research shows that cigarette smoke does not affect the weight of the mice's ovaries (Mouse muscle) pregnant. The results of this study strengthen the results of previous research conducted by Paixao et al (2012), which showed that exposure to cigarette smoke did not make a non-significant difference to the weight of the ovary of mice in the two treatment groups. The absence of the effect of cigarette smoke on the weight of the mice's ovaries is thought to be due to the display of cigarette smoke in mice during treatment being too fast so that the nicotine in cigarette smoke did not fully affect the ovaries. Paixao et al (2012) stated that the cigarette smoke treatment given to the study showed follicular damage that occurred after quitting smoking, and there was no further exposure. According to Iranloye (2009), a significant reduction in ovarian weight can occur if nicotine administration is carried out between 30 and 60 days or longer. Exposure to cigarette smoke relatively quickly in mice will interfere with the development of oocytes which can cause a decrease in fertility.

The research results in Figure 1 show a decline in mice's ovarian weight in control and treatment display cigarette smoke, although statistically not significantly different. It also reinforces the findings of Gannon (2013), which revealed a 20% smaller reduction in ovarian weight in mice exposed to cigarette smoke compared to mice not exposed to cigarette smoke. However, this difference was not statistically significant. Another finding in this study was that exposure to cigarette smoke affected the number of mice follicles. Theoretically, cigarette smoke can interfere with the growth of follicles in oocytes and can interfere with the increase in granulosa cells (Iranloye, 2009). Furthermore, a significant decrease in the number of follicles occurred at various stages of development in the ovaries of mice exposed to cigarette smoke for eight weeks compared to mice that were not exposed. In particular, ovaries exposed to secondhand smoke had fewer follicles than mice that were not exposed to secondhand smoke (Gannon, 2013).

CONCLUSION

The results showed that the highest average ovarian weight was obtained in the P0 with a dose of 0 sticks, namely 0.05g, while the average weight of the ovary of P1 and P2 with a dose of 1 stick and two sticks did not differ. Namely, the weight of each ovary was 0.03g. The statistical analysis results show that the value p value > 0.05, namely 0.126. Smoking cigarettes with three treatment models did not significantly affect the weight of the mice's ovaries but impacted the number of follicles in the ovary.

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