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Potential of ganitri seed extract (elaecarpus ganitrus roxb) as an alternative of oral contraception (experimental study in female wistar rats)

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ABSTRACT

Background

Family Planning programs is a way of placing or planning the number and distance of pregnancy using contraception. Compounds of ganitri seeds, namely flavonoids can inhibit pregnancy, because flavonoids can affect FSH and LH production through the anterior pituitary gland and saponins which are derivatives of steroid compounds are compounds that are thought to cause disturbances in the hypothalamus pituitary which subsequently results in impaired GnRH secretion (Gonadotropin Releasing Hormone).

Objective

Analyzing the potential of ganitri seed extract (elaecarpus ganitrus roxb) as an alternative to oral contraception in female wistar rats.

Method

The design used by the true experiment with pretest-posttest with control group design, the researcher divided 5 groups in which the samples ³ were 5 female hemorrhoids in each group (n = 25), then pre test in 5 groups. Where 3 intervention groups, 1 positive control group and 1 negative control group, then after 14 days ganitri seed extract was given post test in 5 groups.

Result

Obtained p value for some couples in the treatment group has ² value <0.05 ⁶ which means there are significant differences between the two groups, namely in groups K1 with C+, K1 with C-, K2 with C-, K3 with C- and C+ with C-.

Conclusion

Giving the ganitri seed extract (elaecarpus ganitrus roxb) at a dose of 400 mg / g BB female wistar rats for 14 consecutive days proved to be able to increase the levels of the hormone estradiol.

Keyword: Ganitri seeds, hormone estradiol

INTRODUCTION

¹⁰ Population growth is still a complex problem in the world, bearing in mind the impact caused by

one of them is in the field of public health, especially in ⁴ developing countries such as Indonesia [1]. Based on the National Development

Planning Agency in 2015 Indonesia's population is 258 million and in 2018 it increased by 265 million [2]. The rate of addition of the Indonesian population averaged 1.49% per year, which means that every year there is an increase in the population of Indonesia as much as 3.5 million more each year, while a significant increase in population, the government makes efforts to reduce population growth through the Family Planning program [3]. Family Planning programs is a way of outlining or planning the number and distance of pregnancy using contraception [4]. Contraception is a method, or a tool and medication to prevent pregnancy.

Based on the data of the National Family Planning Coordinating Board the use of Indonesian contraception was the most short-term contraceptive injection injection 62.77%, and the second order pill oral contraception was 17.24%, for long-term contraceptive use its elf was still relatively low [5]. Common side effects of hormonal contraception, such as nausea, vomiting, headache, obesity, allergies, irregular menstruation, bleeding, edema, fluid retention, the onset of acne, alopecia, and women who have long used hormonal contraceptive methods 2,954 are more at risk of developing hypertension, and fertile age women contraceptive pill users 17.2 times at risk of developing hypertension [6].

Herbal contraception is a method of utilizing natural ingredients both in the form of fruit, seeds, leaves, flowers, stems and roots of a plant as an antifertility ingredient [7]. The use of herbal medicine itself has advantages, namely relatively small side effects, components in one ingredient have mutually supportive effects, are cheaper, and easier to obtain [8].

Antifertility is a term often used for compounds or substances that can disrupt the reproductive system. Antifertility compounds are compounds that have the ability to prevent fertility and interfere with some normal reproductive working mechanisms in women, namely ganitri seeds (elaecarpus ganitrus roxb) which are thought to be used as herbal medicinal ingredients [8].

Ganitri (elaecarpus ganitrus roxb) is one of 76 herbal medicinal plants developed in India. The active compounds in ganitri seeds include flavonoids, alkaloids, steroids, saponins, terpenoids, carbohydrates, glucose and phenol [9]. Flavonoids can affect FSH and LH production

through the anterior pituitary gland and saponins which are still derivatives of steroid compounds are compounds that are thought to cause interference with the hypothalamus pituitary which subsequently disrupts the secretion of GnRH (Gonadotropin Releasing Hormone), whereas the total flavonoids in the leaves are only $0.255 \pm 0.16\%$, while in ganitri seeds themselves have a total flavonoids of $91.24 \text{ mg} \pm 0.44\text{gram}$, so ganitri seeds can be expected to be more significant in reducing fertility [10].

The purpose of this study was to "analyze the potential of ganitri seed extract (elaecarpus ganitrus roxb) as an alternative to oral contraception in female wistar rats".

METHOD

Study Design

The design used in this study is a true experiment with a pre-test-post test with control group design study design, which groups the experimental group members and randomized control groups [11].

The researcher divided 5 groups, then pre-test in 5 groups. Where 3 intervention groups, 1 positive control group and 1 negative control group, then after 14 days ganitri seed extract was posttest in the 5 groups. Intervention Group 1 (K1) was given ganitri seed extract (elaecarpus ganitrus roxb) at a dose of 100 mg/gr BB wistar female rats on days 8 to 14 days. The intervention group 2 (K2) was given ganitri seed extract (elaecarpus ganitrus roxb) at a dose of 200 mg/gr BB wistar female rats on the 8th to 14th day. Intervention group 3 (K3) was given ganitri seed extract (elaecarpus ganitrus roxb) at a dose of 400 mg/gr BB wistar female rats on days 8 to 14 days. The positive control group (C+) is a positive control, giving contraceptive tablets on the 8th to 14th day at a dose of 1, 8 mg. The negative kontrol group (C-) was negative control, giving distilled water and standard feed on day 8 to day 14.

Sampel

The minimum sample needed for each group is 5 and as a reserve for each group a minimum of 20% of the total sample is 1. So the number of samples in this study were 25 female wistar rats.

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Ethical considerations

Ethical approval was obtained from the ethics commission of the RSUD Dr. Moewardi with the ethical approval number is 606/V/HREC/2019.

RESULT

Respondent characteristics

Tabel 1 Comparison of descriptive values of female wistar rat weight according to each group

Group	Mean	Minimum	Maximum	P value
K1	205,2	200	212	0,516
K2	206,2	201	210	
K3	206,0	201	213	
C+	205,6	201	209	
C-	209,6	203	214	

Table 1 shows the mean, maximum, minimum values of rat body weight in each treatment group before experiments. The above data can be seen that the rat body weight in each group tends to be

uniform. The results of the homogeneity test between groups show p value, which is 0.516, which means there is uniformity between groups.

Analyze Bivariat

Tabel 2 Frequency Distribution of Changes in Rat Estradiol Hormone Levels Before and After Treatment at Each Group

Group	Estradiol Hormone Levels	Mean	Min-Max	Median	Std. Deviasi
K1	Pretest	41,50	34,68-48,97	41,31	5,11
	Posttest	48,55	40,19-58,11	48,67	6,45
K2	Pretest	38,19	33,34-44,90	36,05	4,65
	Posttest	46,62	42,46-50,77	45,13	3,54
K3	Pretest	39,25	35,95-43,55	39,25	3,14
	Posttest	49,76	47,03-52,65	49,66	2,14
C+	Pretest	34,97	30,68-39,93	33,92	4,48
	Posttest	46,58	40,26-52,07	45,29	5,27
C-	Pretest	38,97	34,97-43,77	38,75	3,80
	Posttest	41,39	36,90-48,91	40,17	4,68

Tabel 3 Paired T-Test Test for Estradiol Hormone Levels Before and After Given Ganitri Seed Extract in Each Group

Group	Estradiol Hormone Levels	Delta	Std. Deviasi	T	P value
K1	Pretest	7,05	1,51	-10,425	0,000
	Posttest				
K2	Pretest	8,43	1,45	-13,040	0,000
	Posttest				
K3	Pretest	10,51	1,50	-15,642	0,000
	Posttest				
C+	Pretest	11,61	1,23	-21,039	0,000
	Posttest				
C-	Pretest	2,42	3,91	-1,387	0,238
	Posttest				

Tabel 4 One Way ANOVA Test

	Sum Of Squares	Df	Mean Square	F	Sig
Between Group	257,393	4	64,348	13,755	0,000
Within Group	93,562	20	4,678		
Total	350,955	24			

Tabel 5 Comparison of Estradiol Hormone Levels between Treatment and Control Groups

Treatment Pair	P value	Conclusion
K1 vs K2	0,326	Not Different Significant
K1 vs K3	0,020	Different Significant
K1 vs C+	0,003	Different Significant
K1 vs C-	0,003	Different Significant
K2 vs C+	0,144	Not Different Significant
K2 vs C-	0,031	Different Significant
K3 vs C+	0,000	Different Significant
K3 vs C-	0,433	Not Different Significant
C+ vs C-	0,000	Different Significant

Based on the results of the One Way Anova test obtained p value for some couples in the treatment group has p value <0.05 which means there are significant differences between the two groups, namely in groups K1 with K3, K1 with C+, K1 with C-, K2 with C+, K2 with C-, K3 with C-, and C+ with C- except in groups where p value >0.05 is found in groups K1 with K2, K2 with K3, K3 with C+, which means there is no significant difference.

DISCUSSION

The results of the bivariate analysis carried out in this study before and after being given ganitri seed extract at a dose of 100 mg /weight gain gr had a p value of 0,000, a dose of 200 mg weight gain gr had a p value of 0,000, and ganitri seed extract at a dose of 400 mg/weight gain gr has a p value of 0,000, this indicates that an increase in the level of estradiol hormone that occurred in this study has a positive role and the action of giving ganitri seed extract to the hormone estradiol level orally has a significant effect on changes in estradiol hormone levels but the dose has an effect different in increasing levels of the hormone estradiol, it can be seen in the average value of hormone levels of estradiol after treatment and differences in difference between the control group. Ganitri seed extract at a dose of 400 mg/weight gain gr has an effect on the increase in hormone levels of estradiol greater than the dose of 100 mg /weight gain gr and 200 mg/weight gain gr and has

almost the same effect as giving contraceptive pills which have an average value of 10, 51 pg/ml.

Giving the ganitri seed extract at a dose of 400 mg/gr BB is an effective dose given because with this giving the average value of the hormone estradiol in mice is 10.52 pg / ml, the increase is said to be higher than the group 1 and 2 given the dose of ganitri seed extract is 100 mg/gr BB and 200 mg/gr BB with an increase in the average value of estradiol hormone in the amount of 7.05 pg/ml and 8.43 pg/ml. So that from the five groups studied, giving ganitri seed extract at a dose of 400 mg/gr BB is a treatment that is almost close to or almost the same as contraceptive pills in increasing the levels of the hormone estradiol.

Changes in the levels of estradiol in mice were caused by the presence of flavonoids and steroids in ganitri seeds [9, 12]. Flavonoids are compounds that play a role in repairing granulosa cells in the ovary so that they can inhibit FSH and LH32 secretion. Steroid compounds themselves are compounds that are thought to be capable of causing disruption in the hypothalamus pituitary pathway which subsequently results in disruption of GnRH secretion which then affects the formation, development, and maturation of follicles and inhibits the release of LH and FSH [13].

Giving ganitri seed extract in this study proved that there was an increase in hormone estradiol levels well after being given for 14 days in a row. This study is in line with Sharma P et al.'s research which showed that there was an increase in

estrogen hormone activity after being given kendal leaf extract with a p value <0.01, an increase in estrogen hormone levels affected by several hormones in the body, and in granulosa cells which is diovarium [14].

Reproductive controlling hormones in female animals, especially in female wistar rats which originate from the ovary like steroid hormones, where steroid hormones are very important in controlling the estrus cycle, steroid hormones are lipid derivatives from cholesterol and secreted by GnRH, adrenal cortex and placenta. Estrogen functions to be responsible for the growth and development of the vagina, uterus, ovum, maturation of the zygote, and the conception of zygote implantation, the content of estrogen is much higher in the body of female mice that are at fertile age or the estrus phase. The steroid hormone involved in the estrus cycle produced by the ovary, estrogen and the main type of estrogen naturally found in the body of female wistar mice is estradiol [15].

Increased levels of hormone estrogen or the persistence of levels of estradiol in female wistar rat blood are caused by the formation of granulosa cells in the ovarian follicle through a series of conversions and through enzymatic reactions formed by cholesterol, where cholesterol sequentially changes to testosterone which is then converted to estradiol 17- β which decreases FSH

and LH in maturation of follicles within the ovary, with a decrease in FSH and LH which will cause prostaglandin synthesis to be disrupted and progesterone levels in follicles to be low, so that the construction of intrafollicular plasmin decreases as a result of disturbed collagenase activity in the follicle wall until rupture does not occur ovulation [16, 17]. The peak release of estradiol hormone is before ovulation, but if ovulation has occurred and the formation of the corpus luteum in the ovary, the hormone estradiol will gradually decrease until the end of the luteal phase [18].

CONCLUSION

Giving the ganitri seed extract (elaecarpus ganitrus roxb) at a dose of 400 mg/weight gain gr female wistar rats for 14 consecutive days proved to be able to increase the hormone estradiol level which was equal to 10.51 pg/ml.

Giving the ganitri seed extract (elaecarpus ganitrus roxb) at a dose of 200 mg /weight gain gr wistar female rats within 14 consecutive days proved able to increase hormone levels of estradiol as much as 8.43 pg/ml.

The administration of ganitri seed extract (elaecarpus ganitru roxb) at a dose of 100 mg/weight gain gr wistar female rats within 14 consecutive days proved to be able to increase the hormone estradiol level by 7.05 pg/ml.

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