THE EFFECT OF PURPLE EGGPLANT EXTRACT (Solanum melongena l) ON THE MOTILITY OF SPERMATOZOA

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Abstract

Purple eggplant (Solanum melongena L.) has been proven contain alkaloid solasodin compounds that have antifertility properties, but so far scientific studies on the effects of purple eggplant on sperm motility have not been done. The aims of the study is to determine the effect of purple eggplant extract on spermatozoa motility of male rats Wistar strain. This research was an experimental research with post test only control group design. Extraction of purple eggplant used maseration method with 96% ethanol solvent. A total of 28 mice were divided into 4 groups: a control group that was given distilled water, the treatment I, II, and III were given extracts of eggplant with a dose of 175.62; 351.24; And 526.86 mg / 200 g body weight for 3 days. The motility of spermatozoa was analyzed by taking sperm samples from the cauda epididymis on day 7. Based on ANOVA test results showed that the mean spermatozoa motility between treatments there was a significant difference (p=0,000). Control group with treatment group (I and II) did not differ significantly (p> 0.05). The mean spermatozoa motility decreased significantly in treatment III (46,43 + 23,56) compared to control, treatment I, and treatment II.

Keyword : purple eggplant; motility; spermatozoa

INTRODUCTION

Population growth in Indonesia is one of the problems that until now still can not be solved. This is in accordance with the results of a survey conducted by Bappenas in 2013, Indonesia is currently ranked 4th of the world population density with a projected population of 255 million people and a growth rate of 1.19% or about 3 million per year.[1] Family Planning Program (KB) is one of the government's efforts to control the rate of population growth, but the program is still dominated for women. The World Health Organization (WHO) establishes a working group to develop contraceptive methods for men through ingredients or plants that have antifertility properties, for example purple eggplant (Solanum melongena L.).[2]

Based on Indonesia Demographic and Health Survey (SDKI) in 2012, the participation of men in the family planning program is still low, Namely condom use by 2.5%, vasectomy 0.4%, interrupted coitus 4.7% and 2% traditional contraception.[3] The figures indicate that there is still a lack of male participation and a lack of contraceptive options for men that can complicate equity and the welfare improvement of the people. Indonesia is one country that has many types of plants, which can be used as a source of basic ingredients of drugs that have antifertility substances.[4] One of them is a purple eggplant (Solanum melongena L.). This plant contains an alkaloid compound that is solasodin which has antifertility substances.[5] Several studies have been done on this purple eggplant. Alfaina, 2002, reported that solasodine was able to decrease the number of spermatogonia, spermatids, and may decrease the diameter of the seminiferous tubules.[5] Agustin, in her research also reported that purple eggplant snack's product was able to decrease the motility of spermatozoa. At dose 0; 4.1 grams; 9.4 grams; And 14.1 grams are able to give a difference from each dose can decrease sperm motility that affects the ATP-ase in the sperm cell in the center of the tail.[6]

Based on the description above, the researchers are interested to examine the effect of purple eggplant extract (Solanum melongena L) on sperm motility.

RESEARCH METHODS

This research was an experimental study with post test only control group design. The population in this study was adult male rats wistar strain in the Biomedical Laboratory of Sultan Agung Islamic University (FK Unissula). The number of samples in the experimental study according to WHO, used at least 5 rats with 2 rats reserves per group to be randomly drawn.[7] The study was divided into 4 groups: control, treatment one, treatment two, treatment three. Sample inclusion criteria were healthy mice (active that move, no defect, normal appetite and no external wound), age 3 months; And weights 200 grams. The exclusion criteria of the sample were dead rats when adaptation or treatment was given. Adaptation of rats was done for 3 days at Biomedical Laboratory, FK Unissula. Maintenance of experimental animals includes periods of adaptation and treatment. During maintenance the rats are placed in individual cages as well as fed standard feed and ad libitum. The ethical approval of the study was obtained from the FK Unissula Bioethics Committee.

Kepel extraction was done using maceration method with 96% ethanol solvent. Purple eggplant is cleaned and dried by aerated, then smoothed to form a powder. A total of 100 mg of powder is macerated using 100 ml of ethanol solvent. Extract obtained, then filtered and evaporated using vapor rotary vapor until obtained ethanol viscous extract. Based on previous research, extracts prepared into 3 doses, ie 175.62 mg; 351.24 mg; And 526.86 mg / 200 grams of rat body weight, each of which was diluted with aquadest to obtain 2 cc volume.

A total of 28 mice were divided into 4 groups according to the dose, ie 0 mg / mice as a control group (which were given distilled water only), a dose of 175.62 mg / 200 g body weight of rats (Treatment I), 351.24 mg dose / 200 gram rat body weight (treatment II), and a dose of 526.86 mg / 200 g body weight of rats (treatment III). Treatment is given for 3 days, on the 15th day, male mice sperm samples taken from the cauda epididymis by means of incisions and gently press. One drop of sperm is placed on an object glass, then added a drop of 0.9% physiological saline solution, then mixed evenly using a sterile glass rod, then covered with a glass lid. Motility examination was performed using 400 × magnification microscope. Motility of spermatozoa grouped into 4 categories: progressive sperm cells, fast (A), a progressive, slow (B), nonprogressive (C), and immotile (D), then calculated simultaneously. The percentage of motility was calculated based on the following calculation formula:

$$\frac{A+B}{A+B+C+D} \times 100\%$$

The observational data were tested for normality using One-Sample Kolmogorov Smirnov and its homogeneity with Levene test. The result of the analysis showed that the data distribution was normal and homogeneous so that the observational data were tested using one way ANOVA test followed by post hoc test with significance value p <0,05. All tests were performed using the SPSS v.16.0 program.

Table 1. Descriptive Data Of Sperm Motility In The Study Sample (N = 28)

Groups	Mean ± SD	Minimum	Maximum
K	82.29 ± 5.41	73.00	90.00
P 1	82.71 ± 9.27	70.00	94.00
P 2	64.43 ± 16.24	43.00	92.00
P 3	46.43 ± 23.56	10.00	83.00

Table 2. Normality Test Of Sperm Motility Data With One-Sample Kolmogorov-Smirnov Test

Variable	Mean ± SD	One-Sample Kolmogorov-Smirnov Test	Lavene Test
Sperm motility	68.96 ± 20.96	p = 0.417	p = 0.76

RESULT

The study was conducted on 28 wistar strain rats which were divided into 4 groups, namely control, treatment one, treatment two, treatment three. The first group as a control (K) is only fed standard feed and distilled. The second group as treatment 1 (P1) was given standard feed, distilled water, and purple eggplant extract 175,62 mg / 200 gram body weight of mouse once a day. The third group as treatment 2 (P2) was given standard feed, distilled water, and purple eggplant extract 351,24 mg / 200 gram body weight of mouse once a day. The fourth group as treatment 3 (P3) was given standard feed, distilled water, and purple eggplant extract 526.86 mg / 200 gram body weight of mice once a day. Treatment is given for 3 days. Sperm sampling was performed on day 7. The next sperm sample is assessed for its motility.

Table 3. Differences In Sperm Motility Between Treatment Group And Control Group (N = 28) With One Way ANOVA And Post Hoc Test

Groups	Post Hoc Test				One Way ANOVA
	K	P 1	P 2	P 3	
K	-	p = 1.000	p = 0.233	p = 0.001*	0.000
P 1	p = 1.000	-	p = 0.208	p = 0.001*	
P 2	p = 0.233	p = 0.208	-	p = 0.224	
P 3	p = 0.001*	p = 0.001*	p = 0.224	-	

Table 1. shows the largest average in the P1 group of 82.71 ± 9.27 and the smallest in the P3 group of 46.43 ± 23.56. Table 2. shows that the mean motile sperm is 68.96 ± 20.96. Table 3. shows the test results using One Way ANOVA obtained p value = 0.000, so it can be interpreted that there are significant differences from the 4 groups in terms of sperm motility. The groups that had significant differences were group K to P3 (p = 0.001) and group P1 to P3 (p = 0.001).

DISCUSSION

In this study it was found that in the P1 group treated with purple eggplant extract 175,62 mg / 200gram body weight of mouse a day, had the highest mean of motile sperm (82.71 + 9.27) when compared with other group. This is in accordance with Asdriyanto's research that purple eggplant interferes with the activity of ATP-ase enzymes present in sperm cell membranes.[8,9] Internal homeostasis for sodium and potassium ions is maintained by ATP-ase. Disturbed sperm membrane permeability is also suspected to be a cause of disruption of the transport of nutrients needed by sperm for movement and sperm endurance. The permeability of the cell membrane is related to its role in cell metabolism that will produce energy. Decreased sperm quality can also be caused by dionein protein disorder which is one of the proteins contained in the sperm tail.[10]

The effect of purple eggplant extract on the motility of mice spermatozoa after 3 days treatment showed that at the treatment dose there was a significant difference in spermatozoa motility, whereby the greater the dose of purple eggplant extract was given, then there will be a decrease of spermatozoa motility rate. Decreased sperm motility of mice spermatozoa allegedly caused due to the content of ethanol in purple eggplant extract. The higher the dose given, then there will be a decrease in motility in mice spermatozoa. Steroids and flavonoids are other substances that allegedly contributed to the tendency of decreased motility of spermatozoa. Bioactive compounds from the steroid group can inhibit the enzyme aromatase, the enzyme that catalyzes the conversion of androgens into estrogens that will increase the hormone testosterone.[11] The high testosterone will inhibit the secretion of Follicle Stimulating Hormone (FSH) and Luteinizing Hormone (LH) through negative feedback on the Hypothalamus-Hypophisis-Testis shaft. Decreased LH causes decreased production of testosterone in Leydig cells and decreased FSH will inhibit sertoli cells synthesize Androgen-Binding Protein (ABP). Therefore spermatogenesis will also be inhibited and the quality of sperm produced decreases.

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