ρ : *Probabilitas*

RINGKASAN

EFEK ZAT AKTIF EKSTRAK DAUN JAMBU BIJI MERAH *(Psidium guajava.L)* TERHADAP KADAR *FOLLICLE STIMULATING HORMONE* (FSH) DAN SPERMATOGENESIS PADA TIKUS PUTIH JANTAN *(Rattus norvegicus)*

Ervi Husni

Penduduk Indonesia tahun 2010 sebanyak 237,6 juta jiwa, laju pertumbuhan penduduk 1,49 % per tahun. Target Rencana Pembangunan Jangka Menengah Nasional (RPJMN) 2010-2014 sebesar1,14 %, laju pertumbuhan penduduk saat ini 0,53 % masih lebih tinggi. Pengendalian penduduk diperlukan dengan cara pengendalian kelahiran berupa program Keluarga Berencana. Usaha yang dilaksanakan dengan penyediaan sarana kontrasepsi. Kontrasepsi banyak ditujukan pada wanita, pada pria masih terbatas. Laporan hasil pelayanan kontrasepsi oktober 2013 jumlah peserta baru Kondom hanya 6,00 % dan MOP 6,20 %. Keikutsertaan pria dalam program KB masih sangat rendah hanya 6,26 %

Proses spermatogenesis dikendalikan oleh poros hipotalamus hipofisis dan testis. *Gonadotropin realeasing hormon* (GnRH) dilepaskan oleh hipotalamus sampai pada sasaran hipofise anterior. GnRH merangsang kelenjar hipofisa mengeluarkan homon gonadotropin FSH dan LH yang akan mempengaruhi testis untuk berfungsi. FSH menstimulasi pertumbuhan sel-sel germinatif dari tubulus seminiferus dan mendorong terjadinya proses spematogenesis secara sempurna. LH menstimulasi aktivitas dan pertumbuhan sel Leydig dalam jaringan interstitial untuk menghasilkan hormon testosteron. Spermatogenesis dikendalikan oleh interaksi hormon FSH, LH dan testosteron, gangguan interaksi ini dapat menyebabkan proses spematogenesis terganggu..

Berbagai metoda dikembangkan untuk menurunkan fertilitas pria dengan penggunaan senyawa bersifat antifertilitas yang dapat menurunkan jumlah spermatozoa dan pengaturan hormonal. Tanaman yang diharapkan dapat menjadi antifertilitas adalah daun jambu biji (*Psidium guajava L*). Penelitian tentang tanaman jambu biji sebagai alternatif alat kontrasepsi pria secara tradisional belum banyak diteliti. Daun jambu biji merah mengandung zat aktif seperti alkaloid, flavonoid (*kuesertin*), saponin, tanin, minyak atsiri, *avicullarin, oleanolic acid* dan beta-sitosterol yang diduga bersifat antifertilitas. Tujuan penelitian membuktikan zat aktif daun jambu biji merah dapat menurunkan kadar FSH dan spermatogenesis pada tikus putih jantan *(Rattus norvegikus).*

Penelitian ini eksperimen dengan rancangan *Post test only control group design*. Besar sampel menggunakan rumus Federer dengan jumlah sampel 30 ekor tikus putih dibagi menjadi tiga kelompok yaitu Kelompok 1 (K1) kelompok kontrol diberikan larutan CMC 0,5 % sebanyak 1 ml/ hari, Kelompok Perlakuan 1 (P1) diberikan ekstrak daun jambu biji merah dosis 40 mg/ml/hari dan kelopok Perlakuan 2 (P2) diberikan ekstrak daun jambu biji merah dosis 80 mg/ml/hari

dan diberikan selama 30 hari. Variabel penelitian adalah kadar FSH, jumlah sel spermatogenik dan jumlah sel spermatozoa. Data dianalisis menggunakan uji ANOVA.

Hasil nilai rata-rata kadar FSH terendah pada kelompok kontrol nilai 105,20; rata-rata tertinggi terdapat pada P2 nilai 301,70. Nilai Rata-rata penurunan jumlah spermatogoniun terendah pada P2 nilai 55,580 ; tertinggi pada P1 nilai 58, 400. Nilai rata-rata penurunan jumlah spermatosit primer pada P2 nilai 56,850 tertinggi pada Kontrol.(81,570). Nilai rata-rata penurunan jumlah spermatosit primer terendah pada P2 nilai 91,600 dan tertinggi pada kontrol (149,540). Rata-rata penurunan jumlah sel spermatozoa tertinggi pada P2 nilai 50,000 dan rata-rata tertinggi pada kontrol (142,187). Hasil uji normalitas One Sample Kolmogorov-Smirnov test nilai $p < 0,05$ dapat disimpulkan semua data berdistribusi normal.

Hasil analisi data menggunakan Uji ANOVA kadar FSH nilai $p = 0,044$, berarti terdapat perbedaan signifikan pada ketiga kelompok. Hasil uji Post Hoc LSD kontrol dengan P2 (p 0,013) : berbeda, kontrol dengan P1(p 0,159) : tidak berbeda dan P1 dengan P2 juga tidak berbeda nilai p 0,240. Hasil uji ANOVA jumlah sel spermatogonium nilai p 0,801 ($p < 0,05$): tidak ada perbedaan signifikan diantara ketiga kelompok, uji LSD tidak dilakukan. Hasil uji ANOVA untuk jumlah sel spermatosit primer didapatkan nilai p 0,102 ($p < 0,05$), berarti tidak ada perbedaan signifikan diantara ketiga kelompok, uji LSD tidak dilakukan. Hasil uji ANOVA untuk jumlah sel spermatid nilai p 0,001 ($p < 0,05$) berarti terdapat perbedaan signifikan diantara ketiga kelompok. Hasil uji LSD kontrol dengan P1 (p 0,036): berbeda, Kontrol dengan P2 ($p <0,000$): berbeda, P1 dengan P2 ($p <0,033$) : berbeda. Hasil uji ANOVA jumlah sel spermatozoa nilai p 0,000 ($p < 0,05$) berarti ada perbedaan signifikan diantara ketiga kelompok. Hasil uji LSD kontrol dengan P1 ($p <008$) : berbeda, kontrol dengan P2 ($p < 0,000$): berbeda danP1 dengan P2 ($p < 0,046$) : berbeda.

Kesimpulan penelitian ini adalah pemberian ekstrak daun jambu biji merah meningkatkan kadar FSH dan tidak menurunkan spermatogonium dan spermatosit primer tetapi menurunkan spermatid dan spermatozoa pada tikus putih jantan.

SUMMARY

EFFECTS OF RED GUAJAVA LEAF EXTRACT (*Psidium guajava. L*) ACTIVE SUBSTANCE ON FOLLICLE STIMULATING HORMONE (FSH) LEVEL AND SPERMATOGENESIS IN MALE WHITE RATS (*Rattus norvegicus*)

Ervi Husni

The number of Indonesian population according to the census in 2010 was 237.6 million with a population growth rate of 1.49% per year. Compared to the target of the National Medium Term Development Plan (*Rencana Pembangunan Jangka Menengah Nasional*, RPJMN) from 2010 to 2014, which was 1.14%, the current population growth rate of 0.53 is still high. Population growth control has been implemented by the government, among others, through birth control in the form of family planning program. One of the efforts that has been implemented in this program is the provision of contraceptives. In principle, the use of contraception is to prevent fertilization or fusion of sperm cell and ovum. Means of contraception is aimed more at women, while those for men are still limited. Based on the reports of contraceptive services in October 2013, according to the type of contraception, the number of new participants using condom was only 6.00%. The participation of men in family planning programs is still very low, which was only amounted to 6.26%.

The process of spermatogenesis is controlled by the hypothalamic pituitary axis and testes. Gonadotropin hormone is released by the nerve endings in the hypothalamus pituitary portal system. Through portal vein, the hormone comes to the target, the anterior pituitary. Anterior pituitary produces gonadotropin hormone that helps maintaining testicular function. The loss of gonadotropin hormones will have an impact on spermatogenesis cessation, testicular atrophy and testicular tissue becomes weak. Gonadotropin-releasing hormone stimulates the pituitary gland to secrete gonadotropin hormones, ie FSH and LH, which in turn will affect the testes to function. FSH stimulates the growth of germ cells of the seminiferous tubules and encourages spematogenetic process perfectly. LH stimulates the activity and growth of the Leydig cells in interstitial tissue to produce testosterone. Testosterone works synergistically to encourage changes in primary spermatocytes to become secondary spermatocytes, then entering meiosis, resulting in spermatids and followed by spermiogenesis. So, spermatogenesis is controlled by the interaction of hormones FSH, LH and testosterone. If interference occurs on this interaction, spematogenesis process can be disturbed.

Various methods are being developed to reduce male fertility with the use of antifertility compounds, which can reduce the number of spermatozoa or related to hormonal regulation. Plants expected to be an antifertility is guava leaves (*Psidium guajava L*). Research on guava plants as an alternative to

traditionally male contraceptives has not been widely performed. Red guava leaves contain active substances such as alkaloids, flavonoids (quecertin), saponins, tannins, essential oils, avicullarin, oleanolic acid and beta-sitosterol which are supposed to have antifertilization characteristics.

Therefore, it is necessary to conduct research on the effects of the active substance of red guava leaves on FSH and spermatogenesis in male rats (*Rattus norvegicus*). The purpose of this study was to prove that the active substance of red guava leaves can reduce FSH level and spermatogenesis in male rats (*Rattus norvegicus*).

This was an experimental study using post-test only control group design. Sample size using Federer's formula obtained 30 white rats. Samples were divided into three groups: Group 1 (K1), the control group, was given with 0.5% CMC solution of 1 ml/day. Treatment group 1 (P1) was given red guava leaf extract in a dose of 40 mg/ml/day, and the treatment group 2 (P2) was given with red guava leaf extract in a dose of 80 mg/ml/day for 30 days. The variables in this study were FSH, spermatogenic cell count and sperm count. Data were analyzed using ANOVA test.

Lowest FSH level mean was found in control group with a value of 105.20, while the highest was found in P2 with the value of 301.70. Lowest spermatogoniun reduction mean was found in P2 with 55.580 while the highest in P1 with a value of 58.400. Primary spermatocytes reduction mean was found in P2, while the highest in control group (81.570). Lowest primary spermatocytes count reduction mean was found in P2 with 91.600 and the highest in control group (149.540). Highest sperm cells reduction mean was present in P2 with the value of 50,000, and the highest was in control (142.187). The results of normality test with Kolmogorov-Smirnov test revealed $p < 0.05$, so that it was concluded that all data had normal distribution.

The results of data analysis using ANOVA test on FSH level produced $p = 0.044$, showing significant differences in all three groups. From the results of Post Hoc LSD test significant difference was found only in control with P2 (p: 0.013), whereas control with P1 showed no difference, with a p-value 0.159 and between PI and P2 also showed no difference with a p-value 0.240. Results of ANOVA on spermatogonial cell count produced p value 0.801 ($p < 0.05$), showing no significant difference in three groups, so it was proceeded with LSD test. ANOVA test results on primary spermatocytes cell count showed p-value 0.102 ($p < 0.05$), meaning there was no significant difference between the three groups, so the LSD test was not carried out. Results of ANOVA on spermatid cell count produced p-value of 0.001 ($p < 0.05$), showing no significant differences between the three groups. From the results of LSD test we obtained significant differences between control with P1 (p 0.036), control with P2 ($p < 0.000$), and P1 and P2 ($p < 0.033$). ANOVA test results on spermatozoa count produced p 0.000 ($p < 0.05$), showing significant differences between the three groups. LSD test results showed difference between control with P1 ($p < 0.08$), control with P2 ($p < 0.000$), and P1 and P2 ($p < 0.046$).

The conclusion of this study was that the administration of guava leaf extract does not reduce FSH level but reduced spermatogenesis in male rats.

ABSTRAK

EFEK ZAT AKTIF EKSTRAK DAUN JAMBU BIJI MERAH *(Psidium guajava.L)* TERHADAP KADAR FOLLICLE STIMULATING HORMONE (FSH) DAN SPERMATOGENESIS PADA TIKUS PUTIH JANTAN *(Rattus norvegicus)*

Jumlah penduduk Indonesia sensus tahun 2010 sebanyak 237,6 juta jiwa dengan laju pertumbuhan penduduk 1,49 % per tahun. Target RPJPMN 2010-2014 sebesar1,14 %, laju pertumbuhan penduduk saat ini 0,53 % masih lebih tinggi. Pengendalian penduduk diperlukan antara lain dengan pemakaian kontrasepsi pada wanita maupun pria. Keterlibatan pria dalam KB masih rendah hanya 6,26 %. Tujuan penelitian untuk membuktikan zat aktif daun jambu biji merah dapat menurunkan kadar FSH dan spermatogenesis pada tikus putih jantan *(Rattus norvegikus).*

Penelitian ini merupakan penelitian eksperimen dengan rancangan *Post test only control group design*. Besar sampel menggunakan rumus Federer dengan jumlah sampel 30 ekor tikus putih, terbagi tiga kelompok yaitu Kelompok 1 (K1) kelompok kontrol diberikan larutan CMC 0,5 % 1 ml/ hari, Kelompok Perlakuan 1 (P1) diberikan ekstrak daun jambu biji merah dosis 40 mg/ml/hari dan kelompok Perlakuan 2 (P2) diberikan ekstrak daun jambu biji merah dosis 80 mg/ml/hari dan diberikan selama 30 hari. Variabel penelitian kadar FSH, jumlah sel spermatogenik dan jumlah spermatozoa. Data dianalisis menggunakan uji ANOVA.

Hasil analisi data menggunakan Uji ANOVA kadar FSH nilai p = 0,044, berarti terdapat perbedaan signifikan pada ketiga kelompok. Hasil uji Post Hoc LSD kontrol dengan P2 (p 0,013) : berbeda, kontrol dengan P1(p 0,159) : tidak berbeda dan P1 dengan P2 juga tidak berbeda nilai p 0,240. Hasil uji ANOVA jumlah sel spermatogonium nilai p 0,801 ($p < 0,05$): tidak ada perbedaan signifikan diantara ketiga kelompok, uji LSD tidak dilakukan. Hasil uji ANOVA untuk jumlah sel spermatosit primer didapatkan nilai p 0,102 ($p < 0,05$), berarti tidak ada perbedaan signifikan diantara ketiga kelompok, uji LSD tidak dilakukan. Hasil uji ANOVA untuk jumlah sel spermatid nilai p 0,001 ($p < 0,05$) berarti terdapat perbedaan signifikan diantara ketiga kelompok. Hasil uji LSD kontrol dengan P1 (p 0,036): berbeda, Kontrol dengan P2 (p <0,000): berbeda, P1 dengan P2 (p <0,033) : berbeda. Hasil uji ANOVA jumlah sel spermatozoa nilai p 0,000 ($p < 0,05$) berarti ada perbedaan signifikan diantara ketiga kelompok. Hasil uji LSD kontrol dengan P1 (p <008) : berbeda, kontrol dengan P2 ($p < 0,000$): berbeda danP1 dengan P2 ($p < 0,046$) : berbeda.

Kesimpulan penelitian ini adalah pemberian ekstrak daun jambu biji merah meningkatkan kadar FSH dan menurunkan spermatogenesis pada tikus putih jantan.

Kata kunci : Ekstrak daun jambu biji merah *(Psidium guajava.L,* Kadar FSH, sel spermatogenik, spermatozoa.

ABSTRACT

EFFECTS OF RED GUAJAVA LEAF EXTRACT (*Psidium guajava. L*) ACTIVE SUBSTANCE ON FSH LEVEL AND SPERMATOGENESIS IN MALE WHITE RATS (*Rattus norvegicus*)

The census in 2010 showed that the population of Indonesia was as many as 237.6 million with a population growth rate of 1.49% per year. RPJPMN target in 2010-2014 was 1.14%, so the current population growth rate, which is 0.53, is still high. It is necessary to control population growth. One method to control population is the use of contraception, both in women and men. Male involvement in family planning remains low, only 6.26%. The purpose of this study was to prove that the active substance of red guava leaves can reduce FSH level and spermatogenesis in male rats (*Rattus norvegicus*).

This was an experimental study using post-test only control group design. Sample size using Federer's formula obtained 30 white rats. Samples were divided into three groups: Group 1 (K1), the control group, was given with 0.5% CMC solution of 1 ml/day. Treatment group 1 (P1) was given red guava leaf extract in a dose of 40 mg/ml/day, and the treatment group 2 (P2) was given with red guava leaf extract in a dose of 80 mg/ml/day for 30 days. The variables in this study were FSH, spermatogenic cell count and sperm count. Data were analyzed using ANOVA test.

The results of data analysis using ANOVA test on FSH level produced p = 0.044, showing significant differences in all three groups. From the results of Post Hoc LSD test significant difference was found only in control with P2 (p: 0.013), whereas control with P1 showed no difference, with a p-value 0.159 and between PI and P2 showed no difference with a p-value 0.240. Results of ANOVA on spermatogonial cell count produced p-value 0.801 ($p < 0.05$), showing no significant difference in three groups, so it was proceeded with LSD test. ANOVA test results on primary spermatocytes cell count showed p-value 0.102 ($p < 0.05$), meaning there was no significant difference between the three groups, so the LSD test was not carried out. Results of ANOVA on spermatid cell count produced p-value of 0.001 ($p < 0.05$), showing no significant differences between the three groups. From the results of LSD test we obtained significant differences between control with P1 (p 0.036), control with P2 ($p < 0.000$), and P1 and P2 ($p < 0.033$). ANOVA test results on spermatozoa count produced p 0.000 ($p < 0.05$), showing significant differences between the three groups. LSD test results showed difference between control with P1 ($p < 008$), control with P2 ($p < 0.000$), and P1 and P2 ($p < 0.046$). The conclusion of this study was that the administration of guava leaf extract does not reduce FSH level but reduced spermatogenesis in male rats.

Keywords: red guava (*Psidium guajava. L*) leaf extract, FSH, spermatogenic cells, spermatozoa