

ABSTRAK

PENGARUH UKURAN JARINGAN OVARIUM TERHADAP REKRUTMEN FOLIKEL MELALUI JALUR PTEN AKIBAT CYROINJURY PASCA VITRIFIKASI

Latar Belakang: Kesehatan organ reproduksi merupakan salah satu hal yang esensial pada manusia dalam mempertahankan keturunan. Namun, kehilangan kesuburan atau infertilitas dapat terjadi pada seseorang sebagai akibat efek pengobatan kanker. Simpan beku korteks ovarium adalah teknik yang paling banyak dilakukan untuk preservasi fertilitas seperti pada pasien kanker. Proses simpan beku dikategorikan menjadi beberapa jenis, yaitu: (1) vitrifikasi yang melibatkan pemadatan lingkungan berair sel atau jaringan menjadi fase kaca nonkristalin; (2) *slow freezing*; (3) pengawetan dalam keadaan kering; dan (4) penyimpanan *nonfreezing* di bawah nol derajat. Hingga saat ini, penelitian yang membahas secara spesifik mengenai dampak simpan beku, khususnya *cryoinjury*, terhadap rekrutmen folikel pada jaringan ovarium masih terbatas. Berdasarkan hal tersebut, perlu dilakukan penelitian mengenai pengaruh *cryoinjury* terhadap rekrutmen folikel melalui jalur PTEN pada berbagai ukuran jaringan ovarium pasca vitrifikasi.

Metodologi penelitian: Sampel jaringan korteks ovarium kambing menjadi kelompok fresh dan pasca vitrifikasi. Jaringan ovarium dikelompokkan sesuai ukuran 10x10x1 mm, 5x5x1 mm, dan 2,5x2,5x1 mm. Jumlah, proporsi folikel, dan ekspresi protein PTEN menjadi parameter luaran.

Hasil penelitian: Total 412 folikel dari seluruh sampel perlakuan, dengan rincian 301 folikel ditemukan pada sampel fresh dan 111 folikel ditemukan pada sampel vitrifikasi. Total jumlah folikel pada sampel vitrifikasi ($11,56 \pm 4,71$) menunjukkan jumlah lebih rendah yang signifikan ($P < 0,05$) jika dibandingkan dengan sampel fresh ($25,44 \pm 14,52$). Terkait ekspresi PTEN, jumlah folikel yang terekspresi PTEN lebih rendah pada jaringan yang divitrifikasi. Hal tersebut menunjukkan menurunnya pula jumlah folikel yang menginhibisi rekrutmen folikel pada korteks ovarium. Jumlah folikel primordial positif pada sampel vitrifikasi ($12,61 \pm 1,83$) mengalami penurunan secara signifikan ($P < 0,05$) dibandingkan pada sampel fresh ($24,39 \pm 2,72$).

Kesimpulan: Terdapat pengaruh ukuran terhadap rekrutmen folikel melalui jalur PTEN akibat *cryoinjury* pasca vitrifikasi dan hubungan antara perubahan ekspresi antibody PTEN pada jalur PI3K- PTEN-Akt terhadap perubahan persentase folikel primordial pasca vitrifikasi PTEN.

Kata kunci: ukuran jaringan ovarium, preservasi fertilitas, vitrifikasi, jumlah folikel, ekspresi PTEN

ABSTRACT

THE INFLUENCE OF OVARIAN TISSUE SIZE ON FOLLICLE RECRUITMENT THROUGH THE PTEN PATHWAY DUE TO POST VITRIFICATION *CYROINJURY*

Background: The health of the reproductive organs is one of the most essential things in humans for maintaining offspring. However, loss of fertility or infertility can occur in a person as a result of the effects of cancer treatment. The frozen method of the ovarian cortex is the most widely used technique for fertility preservation, such as in cancer patients. The frozen storage process is categorized into several phases, namely: (1) vitrification, which involves solidifying the aqueous environment of cells or tissue into a non-crystalline glass phase; (2) slow freezing; (3) dry preservation; and (4) nonfreezing storage below zero degrees. Recently, research that specifically discusses the impact of frozen storage, especially *cryoinjury*, on follicle recruitment in ovarian tissue has been limited. It is necessary to conduct research on the effect of *cryoinjury* on follicle recruitment via the PTEN pathway in various sizes of ovarian tissue after vitrification.

Method: Goat ovarian cortex tissue samples were divided into fresh and post-vitrification groups. Ovarian tissue is grouped according to the sizes 10x10x1 mm, 5x5x1 mm, and 2.5x2.5x1 mm. The number and proportion of follicles and PTEN protein expression are outcome parameters.

Result: A total of 412 follicles were found in all treatment samples, with details of 301 follicles found in the fresh samples and 111 follicles found in the vitrified samples. The total number of follicles in vitrified samples (11.56 ± 4.71) showed a significantly lower number ($P < 0.05$) when compared with fresh samples (25.44 ± 14.52). Regarding PTEN expression, the number of follicles expressing PTEN was lower in vitrified tissue. This shows a decrease in the number of follicles, which inhibits follicle recruitment in the ovarian cortex. The number of positive primordial follicles in vitrified samples (12.61 ± 1.83) decreased significantly ($P < 0.05$) compared to fresh samples (24.39 ± 2.72).

Conclusion: There is an effect of various sizes of ovarian on follicle recruitment through the PTEN pathway due to *cryoinjury* after vitrification and a relationship between changes in PTEN antibody expression in the PI3K-PTEN-Akt pathway and changes in the percentage of primordial follicles after PTEN vitrification.

Keyword: size of ovarian tissue, fertility preservation, vitrification, number of follicles, PTEN expression

