ABSTRAK

PENGARUH STRES KRONIS TERHADAP EKSPRESI *GROWTH DIFFERENTIATION FACTOR* – 9 (GDF-9) DAN TEBAL LAPISAN SEL GRANULOSA FOLIKEL ANTRAL PADA *Rattus norvegicus*

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Latar belakang : Kondisi stres kronis dapat mempengaruhi folikulogenesis akibatnya menganggu komunikasi antara oosit, sel granulosa dan sel teka. Komunikasi ini bertujuan sebagai pemberi nutrisi dan sinyal pengatur, salah satunya *Growth Deferentiation Factors* – 9 (GDF-9). GDF-9 berperan dalam proses ekspansi, musifikasi kumulus dan mencegah apoptosis sel granulosa. Tebal lapisan sel granulosa terutama pada fase folikel antral dapat digunakan sebagai marker homeostasis sel dalam mempertahankan keberlangsungan folikulogenesis.

Tujuan : Membuktikan stres kronis dengan metode *Chronic Unpredictable Mild Stress* (CUMS) dapat menurunkan ekspresi GDF-9 dan tebal lapisan sel granulosa folikel antral pada *Rattus novergicus*.

Metode : Unit sampel dibagi menjadi dua kelompok yakni kelompok kontrol tanpa stres dan kelompok perlakuan dengan CUMS 21 hari. Setelah 24 jam dari perlakuan terakhir, tikus dikorbankan dan dibuat preparat ovarium dengan pewarnaan hematoxilin eosin. Pengukuran tebal lapisan sel granulosa folikel antral secara histologi. Pengukuran GDF-9 secara imunohistokimia yang dkonversi dengan *Indeks Remmele Scale*

Hasil : Uji statistik menunjukan bahwa terdapat penurunan ekspresi GDF-9 (p = 0.024) dan tebal lapisan sel granulosa ($p = 0.000 < \alpha$), pada kelompok perlakuan (3.38 ± 0.92; 62.99 ± 11.45) dibanding kelompok kontrol (6.63 ± 1.41; 76.49 ± 9.74).

Kesimpulan :stres kronis terbukti dapat menurunkan tebal lapisan sel granulosa folikel antraldan ekspresi GDF-9 yang merupakan faktor penting dalam folikulogenesis.

Kata Kunci :ekspresi GDF-9, folikel antral, stres kronis, tebal lapisan sel granulosa

ABSTRACT

THE EFFECT OF CHRONIC STRESS TOWARD THE EXPRESSION OF GROWTH DIFFERENTIATION FACTOR - 9 (GDF-9) AND GRANULOSA CELLS LAYER THICKNESS AT ANTRAL FOLLICLE IN *Rattus norvegicus*

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Background : Chronic stress affected folliculogenesis and the interaction between oocytes, granulosa cells and theca cells. This communication aimed at providing nutrition and regulatory signals, which one Growth Deferentiation Factors - 9 (GDF-9). GDF-9 was a crucial factor in the process of cumulus expansion, musification and prevents apoptosis of granulosa cells. The granulosa cells layer thickness in antral follicle phase could be used as a cell homeostasis marker to maintain the sustainability of follicologenesis.

Objective : The study aimed to prove chronic stress with Chronic Unpredictable Mild Stress (CUMS) method decreased the GDF-9 expression and the granulosa cells layer thickness of antral follicle on Rattus novergicus.

Method : The sample units was divided into two groups : control group and the treatment group with 21 days CUMS. After 24 hours of the last treatment, the rats were sacrificed and made an ovary preparation. Measurement of the granulosa cells layer thickness of antral folliclewas histologically. Measurements of GDF-9 was immunohistochemically to be converted in Remmele Scale Index

Results : The statistical test showed that there was a decrease of GDF-9 expression ($p = 0.024$) and the granulosa cell layer thickness ($p = 0.000$), in the treatment group (3.38 ± 0.92; 62.99 ± 11.45) compared to the control group (6.63 ± 1.41; 76.49 ± 9.74).

Conclution : Chronic stress was proven decreased the granulosa cells layer thickness of antral follicle and the GDF-9 expression was an important factor in folliculogenesis.

Keyword :antral follicle, chronic stress, GDF-9 expression, granulosa cells layer thickness