

INTISARI

Latar belakang: Peningkatan jumlah sitokin pro-inflamasi, metabolit merugikan, dan pembentukan agregat protein toksik pada inflamasi kronis colon mampu menembus otak dan menyebabkan gangguan kognitif, Salah satu bagian otak adalah hippocampus yang berperan pada pembentukan memori

Tujuan: Membandingkan volume stratum pyramidalis *Cornu ammonis* (CA)1, CA2/3, dan stratum granulosum *gyrus dentatus* (GD), serta jumlah neuron CA1 hippocampus pada mencit model kolitis dan karsinogenesis kolorektal

Metode: Penelitian dilakukan pada jaringan hippocampus mencit Balb/c pada dua kelompok, yaitu kontrol dan model kolitis dan karsinogenesis kolorektal melalui induksi *Azoxymethane/Dextran Sulfate Sodium* (AOM/DSS). Estimasi volume stratum pyramidalis CA1, CA3, dan stratum granulosum GD hippocampus dilakukan menggunakan metode Cavalieri, sedangkan jumlah neuron pyramidalis CA1 hippocampus menggunakan disektor fisik. Analisis data dilakukan menggunakan *independent t-test*. Nilai $p \leq 0,05$ dianggap bermakna signifikan.

Hasil Penelitian: Volume stratum pyramidalis CA1, CA2/3, dan stratum granulosum GD hippocampus kelompok mencit kontrol dan mencit kondisi kolitis dan karsinogenesis kolorektal diperoleh hasil yang tidak berbeda signifikan ($p > 0,05$), sedangkan jumlah neuron pyramidalis CA1 hippocampus mencit model kolitis dan karsinogenesis kolorektal lebih rendah ($4,82 \times 10^4 \pm 0,98 \times 10^4$) dibandingkan dengan kelompok kontrol ($6,05 \times 10^4 \pm 0,95 \times 10^4$), dan berbeda signifikan ($p \leq 0,05$). Faktor yang mempengaruhi hasil yang tidak berbeda pada volume di hippocampus dan penurunan jumlah neuron pyramidalis di CA1 kelompok AOM/DSS adalah proses gliosis dan sifat neuron pyramidalis CA1 yang lebih rentan mengalami kerusakan daripada neuron di area hippocampus yang lain.

Kesimpulan: Meskipun mencit kondisi kolitis dan karsinogenesis kolorektal memiliki volume stratum pyramidalis CA1, CA2/CA3, dan stratum granulosum GD di hippocampus tidak berbeda, jumlah neuron pyramidalis di area CA1 lebih sedikit dibandingkan dengan mencit kontrol.

Kata kunci: *Cornu ammonis*, *gyrus dentatus*, kolitis, karsinogenesis kolorektal, volume, jumlah neuron

ABSTRACT

Background: The increasing number of pro-inflammatory cytokines, harmful metabolites, and the formation of toxic protein aggregates in chronic inflamed colon are able to penetrate the brain and cause cognitive impairment, including hippocampus which plays a role in memory formation.

Objective: To compare the volume of stratum pyramidalis cornu ammonis (CA)1, CA2/3, and stratum granulosum gyrus dentatus (GD), as the pyramidal neurons number of CA1 hippocampus in mice with colitis and colorectal carcinogenesis.

Methods: The study was conducted on the hippocampus tissue of Balb/c mice in two groups, consisting of control and the Azoxymethane/Dextran Sulfate Sodium (AOM/DSS). The hippocampal slices were taken using systematic uniform random sampling with a 3 μm thickness and stained using toluidine blue. Volume estimation was carried out using Cavalieri method, while the pyramidal neuron number was measured using a physical dissector. The data was analyzed using independent t-test. The p-value ≤ 0.05 was considered significant.

Results: The volume difference of stratum pyramidalis CA1, CA2/3, and stratum granulosum GD hippocampus between the control and colitis and colorectal carcinogenesis groups of mice were not significant ($p > 0.05$), while the pyramidal neurons of CA1 hippocampus in the mice with colitis and colorectal carcinogenesis groups were significantly had a less number ($4.82 \times 10^4 \pm 0.98 \times 10^4$; $p \leq 0.05$) compared to the control groups ($6.05 \times 10^4 \pm 0.95 \times 10^4$). Those results were affected by the process of gliosis and the pyramidal neurons of CA1 properties that were more vulnerable to damage than neurons in other areas of the hippocampus.

Conclusion: Although mice with colitis and colorectal carcinogenesis conditions did not alter hippocampal subregion volumes, it resulted in a significantly lower number of pyramidal neurons in the CA1 region.

Keywords: Colitis, colorectal carcinogenesis, cornu ammonis, gyrus dentatus, volume, neuron number