ABSTRAK

MEKANISME PERBAIKAN MEMORI SPASIAL DI HIPOKAMPUS MELALUI PEMBERIAN ASAM DOCOSAHEKSANOAT (DHA) PADA TIKUS JANTAN (*Rattus Novergicus*) MODEL MALNUTRISI PROTEIN

Didik Dwi Sanyoto

Pendahuluan: Memori sangat penting dalam kehidupan manusia. Neuron dan astrosit berperan penting dalam proses memori, tidak terkecuali memori spasial. Salah satu penyebab gangguan memori spasial adalah malnutrisi. Berbagai dampak merugikan malnutrisi protein terhadap otak menyebabkan gangguan memori spasial. Langkah efektif untuk mengatasi dampak malnutrisi melalui asupan DHA. DHA berfungsi dalam modulasi *learning* dan *memory.* Tujuan penelitian ini untuk mengetahui pengaruh pemberian DHA terhadap memori spasial melaui jalur FABP7, PPARγ, GFAP, Tuj-1 dan BDNF.
Metode: Kelompok dibagi 3, satu kelompok normal, dua kelompok Pemberian pakan malnutirisi protein (AIN-76A) selama 50 hari sejak dilahirkan lalu diikuti suplementasi DHA pada kelompok perlakuan. Pada usia ke 90 dilakukan pengukuran memori spasial dan terminasi hewan untuk mengambil otak guna pengukuran FABP7, PPARγ, GFAP, Tuj-1 dan BDNF.
Hasil: Hasil penelitian menunjukkan terdapat perbedaan bermakna pada memori spasial (p=0.000), namun tidak ditemukan perbedaan bermakna pada FABP7, PPARγ, GFAP, Tuj-1 dan BDNF.
Diskusi: Astrosit (GFAP) pada malnutrisi protein mengalami astrosit reaktif, sehingga jumlah astrositnya meningkat. Peningkatan jumlah astrosit ikut mempengaruhi ekspresi FABP7 dan PPARγ. FABP7 memiliki selektif yang tinggi terhadap DHA. Astrosit reaktif yang bersifat sementara dapat memberikan dukungan trofik untuk akson yang beregenerasi, namun jika gangguan berlangsung lama dapat menghambat regenerasi akson. Gangguan kronik seperti malnutrisi protein, dapat berakibat maladaptif sehingga menyebabkan disfungsional dari astrosit itu sendiri. Malnutrisi protein menyebabkan penurunan neurogenesis hipokampus sehingga menganggu pola pengenalan dan konsolidasi memori. Suplementasi DHA mampu memperbaiki memori spasial.
Kesimpulan: Pemberian DHA memperbaiki memori spasial pada hewan model malnutrisi protein, namun tidak terbukti melalui jalur PPARγ, GFAP, Tuj-1 dan BDNF.

Kata Kunci*:* Malnutrisi protein*,* PPARγ, GFAP, Tuj-1, memori spasial

ABSTRACT

MECHANISM OF SPATIAL MEMORY IMPROVEMENT IN HIPPOCAMPUS THROUGH DOCOSAHEXAENOIC ACID (DHA) SUPPLEMENTATION IN MALE RAT (*Rattus norvegicus*) MODEL OF PROTEIN MALNUTRITION

Didik Dwi Sanyoto

Introduction: Memory is very important in human life. One of the causes of spatial memory disorders is a protein malnutrition. The detrimental effects of protein malnutrition on the brain cause impaired spatial memory. The effective steps to solve this problem are through the important nutrient, namely DHA. DHA functions in modulation of learning and memory. The purpose of this study was to assess the effect of DHA on spatial memory through the FABP7, PPARγ, GFAP, Tuj-1 and BDNF pathways.

Methods: The rats were classified into 3 groups, namely, normal, malnutrition (control), and malnutrition supplemented with DHA (treatment). Protein malnutrition diet (AIN-76A) was given for 50 days since birth, followed by DHA supplementation in the treatment group. At 90 days, spatial memory was assessed, and the rats were terminated to obtain the brain for the measurements of FABP7, PPARγ, GFAP, Tuj-1 and BDNF expression.

Results: Results showed that there was a significant difference in spatial memory ($p=0.000$), while there were no significant differences in the FABP7, PPARγ, GFAP, Tuj-1 and BDNF expression.

Discussion: Astrocytes (GFAP) in protein malnutrition are reactive, leads to an increase in the total number of astrocytes. This increase affects the expressions of FABP7 and PPARγ. FABP7 is highly selective to DHA. A chronic dysfunction, including protein malnutrition, may become maladaptive, which leads to astrocyte dysfunction. Protein malnutrition leads to a decrease in neurogenesis of hippocampus, causing a dysfunction in pattern recognition and memory consolidation. DHA supplementation may improve the spatial memory.

Conclusion: DHA supplementation increases the spatial memory in animal model of malnutrition, but the mechanism is not through the PPARγ, GFAP, Tuj-1 and BDNF pathways.

Keywords: Protein malnutrition***,*** PPARγ, GFAP, Tuj-1, spatial memory