# Hippocampus dysfunction may explain symptoms of fibromyalgia syndrome. A study with single-voxel magnetic resonance spectroscopy

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**OBJECTIVE**: (1) To investigate dysfunction of hippocampus in patients with fibromyalgia syndrome (FM) using proton magnetic resonance spectroscopy (1H-MR S), and to compare these findings with healthy controls. (2) To correlate levels of metabolites obtained with aspects of cognition, depression, and sleep symptoms in the patient group.

**METHODS**: The case-control study was performed in 15 female patients, who met American College of Rheumatology criteria for classification of FM, and 10 healthy age-matched female controls. Patients and controls were receiving no medications known to affect cognitive functioning or central nervous system metabolites before their participation in the study. In all patients and controls, 1HMR S was used to assess N-acetylaspartate (NAA ), choline (Cho), creatine (Cr), and their ratios from both hippocampi. Levels of metabolites and their ratios were determined and the findings compared between the groups. All patients and controls underwent psychological assessment to assess cognitive function, depression, and structured sleep interview with sleep diary; Fibromyalgia Impact Questionnaire (FIQ), number of tender points, and visual analog scale (VAS) for pain were assessed in all patients.

**RESULTS**: NAA levels of right and left hippocampi differed significantly between patients and controls ($p < 0.05$). Cho levels in the right hippocampus were higher in the patient group than in controls ($p = 0.005$), while no differences were found with respect to Cr levels in both hippocampi. NAA /Cho and NAA /Cr ratios differed significantly between patients and controls ($p <0.05$), while the Cho/Cr ratio showed no differences. Significant correlations were found between language score and right Cho and right Cr levels ($p = 0.041$, $p = 0.006$, respectively), while no significant correlations were found between metabolites and their ratios with FIQ, VAS for pain, or number of tender points.

**CONCLUSION**: The hippocampus was dysfunctional in patients with FM, as shown by lower NAA levels compared to controls, representing neuronal or axonal metabolic dysfunction. As the hippocampus plays crucial roles in maintenance of cognitive functions, sleep regulation, and pain perception, we suggest that metabolic dysfunction of hippocampus may be implicated in the

appearance of these symptoms associated with this puzzling syndrome.