Cognitive Impairment in Alcohol Dependent Patients Without Major Medical Complications

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Introduction

It is well known that alcohol dependence is not only highly prevalent, but also can cause various medical complications such as liver cirrhosis, delirium, or even encephalopathies leading the patients to seek for medical help eventually.

In addition to brain imaging, proton MR spectroscopy provides information on biochemical changes in the brain even in patients without prominent morphological changes. Although most studies report N-acetyl-aspartate (NAA) decrease in chronic alcoholics, the changes in choline (Cho) or other metabolites such as myo-inositol (ml) have not been reproduced in others.

Furthermore, most of the studies hitherto performed were carried out on chronic alcoholics with physical illnesses, thus making it hard to evaluate the biochemical change in alcohol dependence per se. So, the authors have designed this study to measure the changes of cerebral metabolites in alcoholics in their relatively early phase without any medical complications, and to assess the relationship of such metabolic changes and cognitive impairment frequently encountered in alcoholic dependent patients.

Methods

Subjects: Out of 96 alcohol dependent patients detected from a community-based survey on alcohol use disorders using CIDI (version 1.1.) in a rural area in Korea, 15 patients (male=13, female=2, mean age=62.4±6.4) and age matched controls (male=12, female=3, mean age=63.1±6.5) were selected for the following study. Any subjects with prior history of medical, neurological or psychiatric illness, and abstinence period shorter than 2 weeks, or with abnormalities in brain MRI were excluded.

MR Spectroscopy: 1.5 T Signa MR system (GE, Wisconsin, USA, v5.4) was used for single voxel spectroscopy in 4 regions. In both hippocampal regions, the voxel size was 1*1*2cm^3 (TE=40ms, TR=3,000ms). The water signal was suppressed by 3-pulse CHESS method. In left frontal white matter and right basal ganglia region, 8cm^3 (2*2*2) voxel was used (TE=30ms, TR=3,000ms) with water suppression by STEAM mode. Brain metabolites such as N-acetyl-aspartate (NAA), myo-inositol (ml), choline and phosphocholine (Cho) were quantified as the area under the peak, and data analysis was done using their ratios to creatine.

Cognitive Function Assessment: Intelligence, memory, attention, frontal lobe function and fine motor coordination were assessed using Korean version of WAIS (KWIS), Wechsler Memory Scale revised version (WMS-R), color trail-making test (CTT), Wisconsin Card Sorting Test (WCST), Grooved Pegboard test (GP) and finger tapping test (FTT).

Results

Decrease in NAA/Cr in studied brain region in alcoholic group was noted as in table 1. but only the level of decrease in NAA/Cr in left hippocampus was statistically significant compared to normal controls (Table 1).

In patient group, the left hippocampal level of NAA/Cr showed positive correlation (Pearson coefficient=0.406, p<0.05) with visual memory checked by WMS-R, but not with any other subscales.

In patient group, number of total errors or perseverative errors in WCST increased as NAA/Cr ratio decreased in the basal ganglia. This relationship of executive-motor function and basal ganglia was also supported by the higher tapping number as the NAA/Cr level increase as in table 2.

Discussion

Although chronic alcohol dependence is known to induce cortical atrophy, cerebellar degeneration or mammillary body atrophy, the reversibility of such changes in 2-4 weeks abstinence render it hard to interpret the lesion to be the sole culprit of persistent cognitive impairment. Our study result shows that metabolic changes can be detected even in alcohol dependent patients without ever having any need to seek medical help. This may imply that such patients also need to be intervened in their earlier phase to prevent irreversible change of chronic alcohol dependence.

References