1H-MR spectroscopy in the frontal area in child and adolescent patients with obsessive-compulsive disorder and a subgroup of anorexia nervosa.

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Introduction Different studies have pointed out the possibility of a common etiopathogeny between obsessive-compulsive disorder (OCD) and a subgroup of anorexia nervosa patients with obsessive-compulsive symptoms (AN-OCS) (1,2,3). Although the pathophysiology of OCD is not yet understood, over the last 20 years evidence for abnormalities of frontocortico-striatal-thalamic circuitry has begun to accumulate and neuroanatomical models for obsessive-compulsive symptoms have been proposed. Neuropsychological studies have supported the hypothesis of abnormal orbital frontal and anterior cingulated functioning in OCD, with impairment principally in executive functions and non-verbal memory. In the other hand, Positron Emission Tomography (PET) studies of cerebral glucose metabolism and Single-Photon Emission Compute Tomography (SPECT) studies found hypometabolism and hypoperfusion, respectively, in the frontal region in anorexic patients. Neuropsychological studies in AN have found impairment in executive functions, attention and verbal and visual memory, suggesting these deficits involvement of prefrontal region (4,5).

Purpose Our aim was to investigate the possible correlations for metabolic alterations in the prefrontal cortex in child and adolescent among both groups of pathologies by localized proton magnetic resonance spectroscopy (^{1}H-MRS).

Study Design Eleven child and adolescents patients with AN-OCS, and 13 with OCD were investigated at the admission and 6 months follow-up, at weight recovery in AN-OCS and medication stabilization in OCD. Healthy control group were recruited and matched by age, sex and intellectual level, and were handedness right as the patients.

Methods This protocol was approved by the Research Ethics Committee of the Institution. All subjects participating in this study and their parents were oral and written informed of the study and procedure and signed written informed consent agreements. The Structural Clinical Interview for DSM-IV criteria for OCD and for anorexia nervosa of both sexes was used to establish the DSM-IV diagnosis of OCD and anorexia nervosa, and to exclude psychopathology in control subjects. A clinical evaluation was carried out in all subjects with a semistructural interview and rating scales (including LOI-CV -Leyton Obsessive Inventory, child version in all groups) and neuropsychological evaluation. Scans were performed using a 1.5 T whole body scanner (Signa LX, GE Medical Systems, Milwaukee, WI). ^{1}H-MRS was acquired using a 12 cm3 (2x3x2 cm) single voxel short-echo PRESS (TE=35ms, TR=1500ms, data points 2048, number of phase encoding steps 24x24 and FOV of 250x250 with automatic shimming and water suppression) in the midline bilateral frontal grey matter on axial 3D FSPGR images. Fitting of all ^{1}H-MRS data was performed using LCModel software (version 6.1-4A), applying an eddy current correction and using internal water signal reference to calculate absolute metabolite concentrations. We considered an initial set of: GPC+PCh (glycerophosphocholine-phosphocholine), total N-acetyl-aspartilglutamate (NAA+NAAG), mI and Glx (Glutamate+Glutamine) located at 0.09 ppm. We only considered the absolute metabolite values when the coefficient of variation for the LCModel concentrations was below 20%, indicating that these metabolites could be reliable estimated (Provencher, 2001).

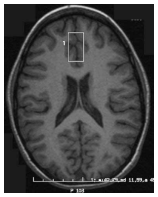

Figure. Axial 3D FSPGR image displaying effective volume position on the frontal cortex from which spectra is acquired.

Results Statistical analysis was performed using the SPSS version 12.0 for Windows. The Mann-Whitney U test and Kruskall-Wallis for independent samples, and Wilcoxon signed rank test to compare the means obtains in variables between basal and follow-up evaluation, were applied. Level of significance was set at $p<0.05$.

At the admission there was substantial decrease in NAA, mI and Glx levels among AN-OCS and controls. All metabolites levels broadly overlap between OCD and controls, in the follow-up between AN-OCS, OCS and controls, and among AN-OCS after recovery weight, OCD at diagnoses and controls. Only, NAA level showed significant different level after the treatment in AN-OCS patients. Significant NAA and mI different levels were noted among AN-OCS and OCD at the admission, with not significant Glx level. However, this metabolite also showed significant differences in the follow-up among controls.

Table. ^{1}H-MRS neurometabolites in prefrontal area in AN-OCS patients, OCD patients and control subjects, in a basal and follow-up evaluation.

	Basal evaluation				**Follow-up evaluation**				**Basal / Follow-up evaluation**			
	AN/C	OCD/C	AN/OCD	AN/OCD/C	AN/C	OCD/C	AN/OCD	AN/OCD/C	AN	TOC	C	AN/OCD/C*
Cr	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns	ns
mI	.009	ns	.013	.012	ns	ns	ns	ns	ns	ns	ns	ns
Cho	ns	ns	ns	ns	ns	ns	.043	ns	ns	ns	ns	ns
NAA	.000	ns	.011	.002	ns	ns	ns	ns	.009	ns	ns	ns
Glx	.006	ns	ns	.025	ns	ns	ns	ns	ns	ns	.019	ns

C= control, ns=no significant, * = AN with weight recovery / OCD and control basal evaluation

Conclusion In this pilot study, the hypothesis that similar altered metabolites levels in the frontal area might to be present in a group of anorexic patients with OCS and patients with OCD, probably related to a common neuropsycological alteration, was not confirmed. OCD patients not show differences compared with healthy subjects, moreover AN-OCS show significant differences with controls. Limitations of this study exposure are the small sample size, and not include other subgroups of patients with anorexia or other cerebral areas. Further assessment of larger, including AN with not OCS, and other cerebral areas is in progress.

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