EVIDENCE OF AXONAL DYSFUNCTION IN CEREBRAL WHITE MATTER IN PATIENTS WITH SYSTEMIC SCLEROSIS: A PROTON MAGNETIC RESONANCE SPECTROSCOPIC IMAGING (^{1}H-MRSI) STUDY

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BACKGROUND

Systemic sclerosis (SSc) is a multisystem disease characterized by functional and structural abnormalities of small blood vessels, fibrosis of the skin and internal organs. In addition, central nervous system (CNS) involvements are often observed. Magnetic resonance spectroscopy (MRS) is an important non-invasive method of quantification of biological metabolites. The purpose of this study was to investigate the presence of axonal dysfunction in SSc patients using ^{1}H-MRSI technique and to determine if clinical, laboratory and treatment features are associated with its occurrences

MATERIALS AND METHODS

We included 37 SSc patients (mean age of 50.86) from our Rheumatology outpatient unit and 37 controls (mean age of 49.23). We performed ^{1}H-MRSI over the superior-posterior region of the corpus callosum (3T Phillips® scanner) and signals from N-acetyl-containing compounds (NAA), choline (Cho), creatine (Cr), glutamate (Glu), glutamine (Gln) and Glx (the sum of Glu and Gln) were measured to determine NAA/Cr, Cho/Cr and Glx/Cr ratio. A complete clinical, laboratory and treatment was performed in all patients. Neurological manifestations were analyzed according to the ACR classification criteria, disease activity (Valentini Activity Index) and severity activity (Medsger Severity Index). Cognitive evaluation was performed using the Montreal Cognitive Assessment (MoCA), mood disorders were determined through Beck´s Depression and Beck´s Anxiety Inventories

RESULTS

We observed a significant reduction in NAA/Cr (value = 1.72; SD = 2.4) and Cho/Cr (value = 2.4; SD = 2.04) ratios in patients when compared to controls (NAA/Cr value = 1.85; SD = 2.7; $p = 0.034$; Cho/Cr value = 0.377; SD = 0.169; $p = 0.017$). Reduction in NAA/Cr ratio was associated with cognitive impairment ($p = 0.0170$), presence of migraine ($p = 0.001$), current use of prednisone ($p = 0.010$) and current use of methotrexate ($p < 0.001$). NAA/Cr ratio correlated with MoCA scores ($r = 0.4$; $p = 0.015$). After 48 months ^{1}H-MRSI acquisition were repeated in 29 SSc patients at study entry. Follow-up study showed a reduction in NAA/Cr values (NAA/Cr initial: value = 1.82 and NAA/Cr follow-up: value = 1.75) and increase in Cho/Cr values (Cho/Cr initial: value = 0.35 and Cho/Cr follow-up: value = 0.36) when compared to patient's baseline values

CONCLUSION

We observed axonal dysfunction in SSc. Decrease in NAA/Cr ratio was associated with cognitive impairment, presence of migraine and the use of prednisone and methotrexate during the treatment. Follow-up study showed a reduction in NAA/Cr and increase in Cho/Cr, when compared to patient's baseline values.