

# SCREENING FOR NEUROCOGNITIVE DEMANDS IN CHILDHOOD-ONSET SYSTEMIC LUPUS ERYTHEMATOSUS PATIENTS USING PEDIATRIC AUTOMATED NEUROPSYCHOLOGICAL ASSESSMENT METRICS AND ASSOCIATION WITH MAGNETIC RESONANCE IMAGING

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## BACKGROUND

Neuropsychiatric manifestations are frequently seen in patients with childhood-onset systemic lupus erythematosus (cSLE). These symptoms are difficult to diagnose and classify. In this sense, the magnetic resonance imaging (MRI) associated with cognitive dysfunction screening batteries, such as the pediatric neuropsychological assessment metrics (PedAnam), compose an investigation protocol. The objective was to explore and test approaches to calculate the cognitive performance score (CSP) of the PedAnam battery based on principal component analysis (PCA) and to correlate the results with the brain volume numbers obtained by MRI.

## METHODS

Patients responded to PedAnam and performed MRI (Siemens 3T scanner) on the same day. Basic characteristics about the disease were collected. Sagittal MR images were T1-weighted and segmented using Freesurfer software. The PedAnam results were analyzed using PCA as the cognitive performance score. The variance-covariance matrix of the normalized precision scores of the PedAnam subtests was decomposed into a series of eigenvectors with corresponding eigenvalues. The first eigenvector was used to preserve most of the total variance of the matrix. Furthermore, the score automatically generated by PedAnam is notable. The data from the PCA and effort process were correlated with volumetric results of brain volume and hippocampus.

## RESULTS

We included 54 cSLE patients (mean age 12 SD = 3.6 [86.19%] women); age at disease onset ranged from 5 to 17 years (mean 12.85, SD = 3.44); disease duration ranged from 6–30 years (mean 14, SD = 5.82); The predominant race was white, with 41 people (75.93%), followed by Afrodescendant (24.08%). We analyzed each accuracy separately in terms of measures of centrality and dispersion. After calculating the PCA, we obtained the median between 1.13 and 3.96, which shows that for our cohort, we cannot use the cut-off point of the scientific literature (0.25). While effort, a standard metric automatically provided by the software, presented an average of 7 (0–19), the score is interpreted as ranging from 0–33; the lower, the better the performance, and results greater than 15 may present cognitive deficits. From the proposed cut-off point, 6 patients had cognitive deficits. As for the association with MRI, we observed that the white brain substance volume correlated with CPS ( $r = 0.41$ ,  $p = 0.023$ ). While the effort did not show any statistically significant association.

## CONCLUSION

We observed that the PCA analyzed in our cohort presented higher indices of variance distribution. Additionally, we observed that this simplified cognitive performance score was associated with white matter volume.

## KEYWORDS

Systemic lupus erythematosus, Neurocognitive dysfunction, Magnetic resonance imaging.