Streszczenie w języku angielskim

Dementia is a group of chronic, progressive diseases that significantly impair human functioning and generate high economic costs. Approximately 50 million people worldwide currently suffer from dementia, and a further increase in the number of patients due to the aging of the population is forecasted. Many patients remain undiagnosed and untreated while the diagnostic tests are time-consuming, costly, and / or not always available. The use of biomarkers would enable earlier intervention for patients with the onset of dementia.

The aim of the study was to determine the concentration of biomarkers: amyloid beta 1-40 (Aβ1-40), amyloid beta 1-42 (Aβ1-42), Aβ1-42/ Aβ1-40 ratio, tau protein (t-tau) and YKL-40 in the serum of patients with Alzheimer's (AD), vascular (VaD) and mixed dementia (MxD) to evaluate:

- the usefulness of the examined markers in the diagnosis of dementia,
- the usefulness of biomarkers in the differential diagnosis of dementia,
- the correlation of biomarker concentrations with the severity of dementia,
- the changes in marker levels after 4 weeks of hospitalization.

100 patients of the Department of Psychogeriatry without comorbid inflammatory, neoplastic and autoimmune diseases, which were considered as exclusion criteria, were initially qualified for the study. They underwent a neuroimaging examination, a panel of laboratory tests, a neuropsychological examination and a Geriatric Depression Scale (GDS) examination. The diagnosis and probable etiology of dementia was established based on the ICD-10 criteria. Ultimately, 20 patients with AD, 20 with VaD and 20 with MxD were qualified for the study. The blood collection for biomarker testing and the Mini Mental State Examination (MMSE) were performed on admission and after four weeks of hospitalization. In order to exclude the influence of age and education, the adjusted MMSE was calculated. Patients with all types of dementia were further divided into two groups: mild (MD) and moderate to severe (MSD) dementia. 20 people aged over 60 without dementia were qualified for the control group.

Serum biomarker concentrations were determined by ELISA method in duplicate tests. The correlations were assessed using the Pearson's correlation coefficient. ANOVA and Tukey's test, and in the absence of normal distribution - Kruskal-Wallis and Dunn's ANOVA were used for comparisons between groups. The analysis of the influence of independent variables on the dependent variable was performed using the linear regression. The diagnostic utility of the biomarkers was assessed using the ROC curve. The level of statistical significance was set at $p \leq 0.05$.

The concentration of YKL-40 correlated with t-tau, Aβ1-42/Aβ1-40 and C-rective protein (CRP) concentrations, as well as with the severity of dementia reflected by MMSE score, while t-tau correlated with YKL-40 and MMSE score.

The ROC analysis showed the usefulness of YKL-40 in the diagnosis of AD, VaD and MxD, and the usefulness of t-tau in the diagnosis of AD and MxD, but not VaD.

Only the concentration of Aβ1-42 in patients with AD significantly decreased compared to the baseline values after 4 weeks of hospitalization.

The ROC analysis for groups divided by dementia stage (MD and MSD) showed a high usefulness of YKL-40 and moderate usefulness of t-tau in differentiating between healthy control and patients with MD. YKL-40 was also proven useful in differentiating between MD and MSD.

The regression analysis excluded the influence of sex and age on the biomarker levels, while confirmed the influence of the severity of dementia measured as MMSE score on the levels of YKL-40 and t-tau.

Based on the results of the study, the following conclusions were drawn:

1. The concentration of YKL-40 correlated with other markers, CRP and the MMSE score. T-tau correlated with YKL-40 and MMSE. YKL-40 and t-tau concentrations were independent of sex and age.

2. YKL-40 may be useful in the diagnosis of all types of dementia, while t-tau - in the diagnosis of dementias with Alzheimer's component.

3. None of the biomarkers have shown to be useful in differential diagnosis of dementia.

4. YKL-40 may be useful in early detection and monitoring of dementia progression.

5. T-tau may be useful in the diagnosis of early dementia, especially when the use of YKL-40 is limited by comorbidities.

6. After four weeks of hospitalization, a statistically significant decrease in Aβ1-42 concentrations in AD patients was observed, which was most likely non-specific, secondary to general health improvement.