w języku angielskim

Electroencephalography (EEG) is a test that monitors the brain's bioelectrical activity by measuring an electric field resulting from the movement of charges (electrochemical signals) in neuronal membranes using electrodes placed on the surface of the scalp. The electrodes measure the activity of a very large number of neurons in the underlying regions of the brain, each of which produces a small electric field. Activity is measured in microvolt units and therefore must be amplified (usually 1000–100,000 times or 60–100 dB of voltage increase). The basic bioelectrical activity of the brain consists of alpha (8-12.99 Hz), beta (> 30 Hz), theta (4-7.99 Hz) and delta (1-3.99) Hz waves. To record the signal in the EEG test, specially adapted electrodes, most often mushroom-shaped or cup-shaped, are used.

The main aim of the study was to demonstrate the specificity of changes in EEG recordings in patients with first-time seizures compared to the group of children without seizures. The study included a group of 100 children (50 children in the study group - after the first seizure and 50 children in the control group - without seizures (patients of the University Children's Clinical Hospital in Bialystok) who were examined immediately after the first seizure seizure and 3 months after the observed incident. Both the study group and the control group underwent electroencephalographic (EEG) examination. The signal was recorded from the scalp surface using Ag / AgCl mushroom electrodes (21 electrodes-10 pairs and the apex electrode as a reference electrode). The impedance of the electrodes used was below 5 kΩ. The Elmiko EEG DigiTrack apparatus was used to perform the tests. Based on the EEG records, a qualitative and quantitative analysis was performed - quantitative analysis of the frequency of alpha (8-12.99 Hz), beta (13-30 Hz), delta (1-3.99 Hz), theta (4-7.99 Hz) waves) and their percentage based on the evaluation of the twenty 2-second, artifact-free segments of each of the posterior leads (due to faster brain maturation in this area). Frequencies between 1 Hz and 70 Hz have been eliminated by the use of high-pass and low-pass digital filters.

The pattern of EEG recording in the study group and in the control group differed in terms of the frequency of brain waves. Statistically significant differences were found in the delta and theta waves. In the control group, the share and frequency of individual brain waves were expressed relatively to age. The EEG record in children after the first seizure was dominated by slow waves (delta, theta). A small share of alpha waves was observed in the records immediately after the seizure. In the control group, the percentage of alpha waves statistically increased with the age of the patients, while in the test group there was no

significant increase in the number and frequency of alpha waves in the recording. In the qualitative assessment, the changes observed in the EEG recordings of the study group were mainly generalized paroxysmal. The presence of pregnancy and perinatal burdens as well as the presence of epilepsy in the family had a statistically significant influence on the pattern of brain waves in the study group. The obtained results indicate that the quantitative analysis of EEG may be a useful tool in the process of diagnosing seizures in patients of developmental age.

Key words: electroencephalography, epilepsy, neurology, convulsions