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**ZASTOSOWANIE ELEKTRONEUROGRAFII W OCENIE
USZKODZEŃ OBWODOWEGO UKŁADU NERWOWEGO
W OKREŚLONYCH JEDNOSTKACH CHOROBY**

**Rozprawa na stopień doktora nauk medycznych i nauk o zdrowiu
w dyscyplinie nauki medyczne**

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SUMMARY

THE USE OF ELECTRONEUROGRAPHY IN THE ASSESSMENT OF DAMAGE TO THE PERIPHERAL NERVOUS SYSTEM IN SPECIFIC DISEASES

Neuropathy affects 25% of people with diabetes mellitus. Distal symmetrical polyneuropathy (DSPN) is the most common presentation of the disease. The diagnosis of DSPN is primarily clinical, and its' most important part is the physical examination, including neurologic testing. Nerve conduction study plays an important role in the diagnostic process, especially in patients with minimal or no objective symptoms. Many screening instruments based mainly on clinical criteria have been developed to evaluate the severity of diabetic neuropathy. Most of them are time-consuming and require a precise neurological examination. There is a lack of a simple, objective scoring system using electroneurographic parameters that could help monitor disease progression with the use of objective criteria, especially in patients in the initial stage of DSPN. This retrospective study investigated a group of 113 patients with DSPN due to diabetes mellitus. Additionally, a control group of 61 healthy volunteers were included. The median, ulnar, sural, tibial, and peroneal nerves were examined. Parameters such as amplitude, conduction velocity, distal latency, and F wave latency were analyzed. The results of the nerve conduction study in the investigated group were compared to those of the controls. Nerves were ranked depending on the degree of impairment to create the scoring system. The analysis with the use of the Mann-Whitney U test revealed that both amplitude and conduction velocity of sensory action potentials of the sural, peroneal, median, and ulnar nerves were reduced in the investigated group when compared to controls. Moreover, the analysis with the use of the same test revealed a reduction in the amplitude and conduction velocity, as well as elongation of distal latency and F wave latency of motor action potentials in the tibial, peroneal, median, and ulnar nerves in comparison to controls. The most sensitive parameter of the severity of peripheral nerve impairments was the reduction of sensory action potential amplitude in the peroneal nerve. Based on that data, we have created diagnostic criteria for the impairment of all investigated nerves.

The second study was created to investigate the abnormalities in peripheral nerves in post COVID patients. The predominant clinical presentation of COVID-19 infection is a respiratory disease with the most common complications including pneumonia and acute respiratory distress syndrome. Although various neurological manifestations are observed in 36.4% of patients infected with SARS-CoV-2, the incidence of post COVID neuropathy remains unknown. The study group consisted of 45 patients who survived COVID-19 in maximal time of 6 month before NCS study while the control group consisted of 45 healthy volunteers. In our study, there was statistically significant reduction of amplitude and conduction velocity in both sensory and motor neuron fibers compared with control group in all examined nerves in upper and lower limbs. Moreover, distal latency and F wave latency were also increased compared with control group. All this abnormalities are typically for polyneuropathy and our results are similar to those described in the literature. The most significant reduction of NCS parameters was observed in case of sensory action potential amplitude of sural nerve. Moreover, that correlation was the most significant in case of amplitude and conduction velocity in sensory and motor neuron fibers both in arms and legs. In the study group, NCS showed both axonal loss and demyelinating features in COVID-19 survivors who had the symptoms of polyneuropathy. In our study it was obvious that SARS-CoV-2 can impair peripheral nerves fibers resulting in polyneuropathy.

DSNP as well as post COVID neuropathy are very important problems in neurophysiology. Presented study provided information about their pathophysiology and electroneurographic changes observed in peripheral nerves. Those data enabled to create a simple scoring system that can help to monitor disease severity.