

1.1. SUMMARY

Parkinson's disease is one of the most common neurodegenerative disorders of the CNS. It affects 1%-2% of people over 65 years of age, and about 4% over 80 years of age. Due to the global ageing of the population, it is estimated that the number of people with Parkinson's disease will increase by up to 50% until 2030. In Parkinson's disease there is a loss of dopaminergic cells located in the black matter of the brain, as well as degeneration of the serotonergic, cholinergic noradrenergic, glutamatergic systems of the CNS. The development of the disease depends on a number of environmental, epigenetic, gender, and age-related factors, as well as on genetic factors, which account for 5%-15% of all cases. Other implicated factors include mitochondrial dysfunction, generation of free radicals and oxidative stress, as well as an abnormal inflammatory response. Furthermore, in the pathomechanism of Parkinson's disease, one of the most important hypotheses is the toxic effect of protein deposits (α -synuclein) on dopaminergic neuronal cells, called Lewy bodies. This disease is characterised by movement disorders, including resting tremor, muscle rigidity, and bradykinesia. There is also a characteristic walking stride, a mask-like face and a forward leaning body posture. These symptoms only occur when about 80% of the dopamine-producing cells are destroyed and the concentration of this neurotransmitter is reduced to 10-20% of the normal value. In addition to the motor symptoms, there are a number of extra-gastrointestinal symptoms (constipation), sexual dysfunction, hyperhidrosis, sleep disturbances, and a number of neuropsychiatric disorders (anxiety, depression, dementia). Parkinson's is a chronic disease that requires long-term pharmacological and non-pharmacological treatment. The treatment of Parkinson's disease is mainly symptomatic. The principal drug is levodopa, which is involved in the synthesis of dopamine. However, it should be remembered that a proper diet is a very important element to support the treatment and prevent the progression of the disease. Patients with motor fluctuations are recommended to have a diet with a controlled protein intake, which affects the absorption of levodopa. Moreover, it is important to supply the patient with macro- and microelements as well as vitamins (A, C, D, E) with antioxidant properties and preventing oxidative stress. Vitamins from the B group, which affect the proper functioning of the nervous system, also play an important role. However, excessive exposure to toxic elements leads to impairment of many biochemical and physiological processes. Studies have shown that both cadmium and lead

have neurodegenerative effects. In addition, both elements contribute to a higher incidence and severity of depressive states.

The aim of this study was to evaluate the relationship between total antioxidant status (TAS), concentration of selected elements (Se, Zn, Cu, Cd, Pb) in blood, dietary and environmental factors and clinical status of people with Parkinson's disease.

The study involved 140 people. The study group consisted of 95 people, aged from 47 to 86 years with Parkinson's disease diagnosed by a neurologist, being under care of the Neurological Outpatient Clinic NZOZ "KENDRON" in Białystok. The degree of disease progression was assessed using the Unified Parkinson's Disease Rating Scale (UPDRS). The control group consisted of 45 healthy subjects of comparable age range. A 24-hour dietary interview was conducted with the study subjects and analysed using the computer program Diet 6.0 (Institute of Food and Nutrition) and food frequency questionnaires (FFQ). Venous blood was collected from the subjects into vacuum vacutainer tubes. Total antioxidant status (TAS) was determined in blood serum by spectrophotometric method using Randox reagent kit. Concentration of antioxidant elements (Zn, Cu, Se) was determined in blood serum and toxic elements (Cd and Pb) in whole blood. Concentrations of elements were determined by atomic absorption spectrometry (ASA) on a Z-2000 Hitachi system, with Zeeman background correction, with atomisation in an acetylene-air flame (Zn) and electrothermally in a graphite cuvette (Cu, Se, Cd, Pb).

It was shown that 71% of people with Parkinson's disease had a total antioxidant status (TAS) below reference values, and cigarette smoking further reduced this. Furthermore, both Se and Zn concentrations were found to be decreased and declining with age, and decreased Zn concentrations correlated with the presence of depression as well as dementia symptoms. People with Parkinson's disease showed higher Cu/Zn, Cu/Se molar ratios and a lower Zn/Cd ratio in blood, which may indicate the presence of oxidative stress. The study concluded that the diet of people with Parkinson's disease is inadequate and requires modification in terms of energy content of meals, increased water supply and PUFA. None of the subjects met their vitamin D requirements and therefore vitamin D supplementation should be considered. Vitamin E, folate and calcium deficiencies were also demonstrated. It is recommended to increase the supply of magnesium in the group of men, who consumed 75 % of this element below the requirement. In contrast, it was noted that both women and men consumed excessive amounts of sodium and phosphorus. Dietary habits influenced the concentration of total antioxidant status (TAS) and studied elements in the blood of patients with Parkinson's disease by 16% - 26%.

The study concluded that the use of appropriate dietary modifications, including the provision of adequate amounts of antioxidants in the diet, may influence the reduction of disease symptoms and improve the quality of life of people with Parkinson's disease.

