

SUMMARY

Degenerative spine disease is a chronic and progressive disorder that significantly reduces the quality of life of patients. It depends on too early wear and degeneration of tissues that create functional connections of the vertebrae. It is the most common cause of spinal pain. Degenerative changes are a very complex phenomenon, and the disease picture depends on many factors. For the development of spinal degenerative disease predispose mainly: advanced age, obesity, performed occupation, past injuries. Under the influence of the above-mentioned risk factors, numerous changes may occur in the spine leading to the disorder of his functions and the development of degenerative disease. During the degenerative process, comes to among others, degradation of collagen and proteoglycans breakdown, and reducing the body's water content. Degenerative spine disease is progressive damage to the intervertebral disc and cartilage of facet joints, which causes deterioration of the biomechanical properties of the spine and promotes microtraumatization of joint capsules and the ligamentous system. Healing occurs through local inflammation that generates pain, then repairing of bone growth is observed.

Very important in degenerative disease of the spine is a diet that should focus primarily on maintaining a propriate body weight and reducing inflammation. Maintaining normal body mass in patients with degenerative spine disease is extremely important. 80% of spine problems affect people who are overweight. Significant obesity can contribute, among others for excessive overloading of joints, damage to the intervertebral disc. Oxidative stress plays an important role in the destructive processes of joint cartilage. An important element in the diet of people suffering from degenerative spine disease are therefore antioxidants, which are also responsible for the anti-inflammatory effect. Trace elements such as selenium, copper, zinc, manganese are responsible for the proper functioning of the body. Homeostasis of these elements enables the proper activity of antioxidative enzymes, and thus effective fight against oxidative stress. It has been shown that zinc supplementation has a positive effect on bone formation by affecting bone morphogenetic protein (BMP). Copper increases bone strength and helps maintain their optimal condition.

Selenium, due to its antioxidant activity, may also be of great importance in osteoarthritis, in which free radicals affect the degeneration of articular cartilage and are the cause of the ongoing inflammation that accompanies this disease. Manganese plays an important role in bone formation, more and more often attention is paid to its importance in osteoarthritis.

The main objective of the study was to assess the relationship between total antioxidant status (TAS), the concentration of selected elements (Zn, Cu, Se, Mn) in blood serum, nutritional and environmental factors and the clinical condition of people with degenerative spine disease.

The study involved 130 adults, including the study group of 90 people in the age range from 21 to 73 years (mean: $48,17 \pm 12.70$) treated for degenerative spine disease in the neurological clinic "KENDRON" in Bialystok. The control group is 40 healthy people who have been properly selected in terms of sex, age and weight, percentage of people who smokes or not, to a group of people with degenerative disease of the spine.

Venous blood was collected from the subjects and information on age, sex, smoking, taking drugs and / or dietary supplements was collected as well as the frequency of consumption of individual groups of food products.

With people suffering from degenerative spine disease, 24-hour nutritional interviews were conducted using the Album of Products and Foods, making it more precise to estimate the amount of food portions consumed. Nutrition interviews were introduced into the computer program of Diet 5.0, recommended by the Institute of Food and Nutrition in Warsaw. The Diet 5.0 computer program evaluated the energy value of menus, content of proteins (animal and vegetable), fats including individual fatty acids, simple and complex carbohydrates, dietary fiber, vitamins with antioxidant properties (A, E, C) and micronutrients (Zn, Cu, Me, I) in all-day meals including dietary supplementation. Evaluation of the clinical status of patients was performed on the basis of the MRI study. In this study water and fat content were determined and fat / water ratio were determined in segments L1, L5 and L4 / 5. A higher fat / water ratio indicates a greater degree of degeneration. Patients also assessed the severity of back pain using the Visual Analogue Scale (VAS).

The concentration of elements was determined by atomic absorption spectrometry (ASA) using a flameless technique with electrothermal atomization in a graphite cuvette (Cu, Se and Mn) and atomization in an acetylene-air flame (Zn) with Zeeman background correction. The total antioxidant status was determined by spectrophotometric method using a spectrophotometer and Randox reagent kit.

The analysis of 24-hour nutritional interviews shows that the diet of people with degenerative spine disease is abnormal and requires modification. Deficiencies were found mainly in the case of: polyunsaturated fatty acids, dietary fiber, vitamins C, A, E, micronutrients: Zn, Cu, Mn, water. In addition, the study showed that frequent consumption of some product groups may influence in 47% for the concentrations of the examined elements and TAS in people with degenerative spine disease. Women, both healthy and with degenerative spine disease, had significantly lower serum TAS levels compared to men. In patients with osteoarthritis of the spine the concentration of zinc and copper in blood serum was significantly lower than in the control group. The study also showed that people with degenerative spine disease who smoked had significantly lower serum copper concentration compared to non-smokers. The present study also found a significant relationship between serum manganese concentration and the degree of spine degeneration. *One-way analysis of variance (ANOVA)* showed that people with elevated levels of serum manganese had a higher degree of spine degeneration on the L4 / L5 segment. Based on results of this study, an attempt may be made in the future to create nutritional recommendations for people with degenerative spine disease.