SUMMARY

Introduction. Many current studies confirm the increased number of malignant tumors in patients with type 2 diabetes. The most common are cancers of pancreas, endometrium, ovary, liver, colon and rectum, breast, kidney, bladder and non-Hodgkin's lymphoma. Type 2 diabetes worsens the prognosis for cancer patients and is associated with higher mortality rate. Factors that increase the risk of cancer in diabetic patients are hyperinsulinemia, hyperglycemia, and obesity. An important problem is also the influence of diabetes therapy on cancer development.

Aim. To compare the incidence of malignancies in the group of patients with type 2 diabetes with the general population. Important aim of study was to assess the risk factors for malignant tumors in type 2 diabetic patients (body weight, BMI, smoking, family history, duration, metabolic control expressed by the mean percentage of glycated haemoglobin, comorbidities), as well as the analysis of the effect of diabetes treatment on cancer development.

Material and methods. Out of 1,087 patients treated at the Regional Diabetes Clinic in Bialystok, a group of 74 people with type 2 diabetes who had a malignant tumor were selected. The control group was composed by a random selection of patients from the entire study group (people of the same age and the same sex who did not develop malignant tumor). The frequency of individual cancers was determined in the study group. Risk factors in both groups were analyzed and treatment was applied. In the statistical analysis test t-Student, the U-Mann-Whitney test, chi2 test and a method of analysis of variance (ANOVA) were used. To assess the risk of cancer incidence, the Cox proportional hazard regression method was used by applying the risk factor (HR). In the calculations, the significance level $p < 0,05$ was assumed to be statistically significant.

Results. Out of 1,087 patients from the Provincial Diabetes Outpatient Clinic in Bialystok, 74 (6,8%) people with type 2 diabetes - 44 (59,5%) women and 30 (40,5%) men were diagnosed with malignant tumors. The average duration of diabetes in the study group until the diagnosis of cancer was 131,9±80,5 months, The most common types of cancer were: kidney cancer, which occurred in a group of 16 (33,3%) patients and colon and rectal cancer diagnosed in 14 (18,9%) cases. The highest mean body mass index (BMI) had the patients with endometrial cancer - 36,1 kg/m^2, breast gland - 32,6 kg/m^2, kidneys - 31,6 kg/m^2 and large bowel cancer - 31,3 kg/m^2. In the study group, there were 21 (28,4%) overweight and as many as 40 (54,1%) obese patients. In the control group values were 49 (33%) and 76 (51,4%) respectively. The highest percentage of HbA1c occurred in the group of patients with the following types of cancer: pancreatic – 9,32%, kidneys – 8,54%, gallbladder - 7,7% and large intestine - 7,26%.

In the group of patients with cancer, the mean HbA1c value was 7,4±1,4% and in the control group - 7,17±1,17%. Only 29 patients with type 2 diabetes (39.2%) and cancer were treated with statins, compared to 82 (55.4%) patients in the control group (p = 0.032). The mean cholesterol concentration in the study group was 177,6±50,9 mg/dl, and was lower than in the control group – 191,7±37,4 mg/dl, p=0.017. The mean values of HDL concentrations varied significantly - 44,7±14mg/dl in the study group and 53,7±13,7 mg/dl in the control group, p=0.001. Patients with cancer were treated with metformin less frequently, (49 patients (66,2%)) compared to the control group (116 patients (78,4%)) (p=0,051). The average daily dose of metformin was significantly lower in the study group and amounted to 1029,5±852 mg compared to the mean dose of 131,9±900 mg in the group of patients without cancer (p=0,024). Patients with cancer were significantly more frequently treated with sulphonylureas (64 patients-86,5%) compared to the control group (109 patients-73,6%), p=0,039. There were no differences in the use of insulin therapy in both groups (frequency of use, type of insulin, duration of treatment, average doses). In the Cox regression analysis, the use of insulin significantly reduced the relative risk of cancer in a group of patients with diabetes (HR=0,53), p=0,031. Also, the use of metformin reduced this risk of cancer incidence.

Conclusions

1. Diabetes increases the risk of some types of cancers.
2. Overall cancer incidence in people with diabetes differs from the general population
3. Significantly increased risk of developing cancer of the kidney, colon, pancreas, breast, and endometrium requires increased oncological supervision and the implementation of prophylactic examinations for the early detection of cancer in the group of patients with type 2 diabetes.
4. Most tumors were diagnosed in the first ten years after the diagnosis of diabetes.
5. The method of treatment of diabetes affects the occurrence of tumors. The influence of metformin on the reduction of cancer risk indicates the necessity of its more frequent, early inclusion, also in pre-diabetic states.

The use of metformin and statins may reduce this risk of cancer.