Introduction

Sarcopenia is a progressive and generalized loss of skeletal muscle mass and strength.

It has been recognized as a prognostic factor for poorer survival of cancer patients due to shorter time to disease progression and the occurrence of treatment toxicities that are harmful to patients. It has been under observation in recent years, but there are few studies on patients

treated for breast cancer. These premises contributed to the planned study, aimed at assessing the occurrence of sarcopenia in elderly patients with breast cancer after oncological treatment and its relationship with the quality of life of these patients

The aim of the study was to assess:

1. To evaluate the health status and psycho-physical performance of patients after breast cancer treatment among women belonging to the early rehabilitation group (GWR) and to the Amazon society (Amazonas), together with an assessment of differences between these groups and between women over 65 and younger patients.

2. assessment of the quality of life of patients after breast cancer treatment with the use of standardized questionnaires (EORTC QLQ-C30, EORTC QLQ-BR 23)

3) Assessment of the prevalence of sarcopenia in patients treated for breast cancer on the basis of bioimpedance .

4. To evaluate the usefulness of EWGSOP2 proposed alternative criteria for the diagnosis of sarcopenia based on the result of body mass composition examination by BIA (AMS and AMS/growth2).

To assess the symptom-dependent quality of life in women with sarcopenia using the SARQOL questionnaire.

6. to assess the relationship between the emotional state of patients treated for breast cancer, their nutritional status and sarcopenia.

7. to evaluate the relationship between the quality of life of elderly patients and membership in the Amazon Club.

Material and methods:

Women after surgery for breast cancer, admitted to the Department of Rehabilitation BCO in Bialystok during 13 months, at the turn of 2019/2020, were included in the study. These were patients who were in grade 0-3 according to ECOG scale. The observation included a group of "Amazons", being longer after the surgical procedure and systematically performing general mobility exercises at least once a week, and a control group - women treated for breast cancer, undergoing early rehabilitation (up to 6 months after surgery), defined as "early rehabilitation group - GWR". The data were collected by subject and physical examination of the patients and by a self-administered survey questionnaire. They included general data, assessment of anthropometric parameters, functional capacity, mental status, nutrition,

presence of chronic conditions, number of medications used, frequency of hospitalization in the last 12 months,

presence of body edema, frequency of falls and use of orthopedic supplies to facilitate functioning in daily life.

Results:

143 women (mean age 61.5± 9.4 years) treated for breast cancer participated in the study. There were 59 patients in the so-called early rehabilitation group (GWR, mean age 566 ± 10.1 years) and 84 women who were Amazons (mean age 64.9 ± 7.1 years). The most common surgical procedure performed in this group was mastectomy (total mastectomy was performed in 65 (45.8%) patients). This surgical procedure was performed mainly in the group of Amazons (51 patients; 60.7%, p<0.001) and women over 65 years of age (36 patients; 60%, p=0.01). In GWR the BCT procedure was performed more often (52.5%). Twenty (14.1%) women underwent breast reconstruction procedures. Almost half of the study group (75; 56.8%) were undergoing follow-up treatment, more often patients with GWR (88.2%), being under 65 years of age (74%). On the ECOG scale, the majority of patients (82; 57.3%) rated as normal the state of their fitness and ability to perform daily activities independently. However, the groups of Amazons and older women differed significantly in the assessment of disability according to the modified Rankin scale. In the group of GWR and younger women, lack of disability symptoms (without or with accompanying disease symptoms) predominated. There were no significant differences in the performance of most of the activities of daily living in both groups, as assessed by the Barthel Index. In the examined group of patients there were on average 5 chronic diseases. The most frequent were thyroid diseases (45;33.1)%, degenerative changes in joints (30;22.1%) and insufficiency of circulatory system (31;22.8%)%, liver (25;18.4%) and atherosclerosis of peripheral arteries (22;16.2%). Age groups, on the other hand, differed significantly in the prevalence of vascular atherosclerosis and related diseases - hypertension and heart disease. Women from GWR (69.5%) were statistically significantly more frequent than Amazons (21.4%).Half of the subjects in the study group were taking up to 3 medications chronically. Quality of life in oncological disease was assessed using the EORTC QLQ C30 and BR23 questionnaires. Both GWR and Amazon women experienced a deterioration in quality of life (QoL). This occurred in the dimension of hair loss - this problem was more frequently reported by the Amazons. Sexual functioning after oncological treatment changed in both groups and was assessed better by GWR and younger women. Higher values of self-assessed prognosis were observed among the Amazons and older women. The Amazon group performed worse than the GWR group in terms of self-assessment of side effects of cancer therapy, including breast and arm symptoms. Side effects of cancer therapy were also worse in the assessment of older women over 65 years of age. For the EORTC QLQ C30 questionnaire,

self-rated social functioning was slightly better in the Amazon group. Younger women rated their overall health and quality of life significantly better than those over 65. Older subjects scored significantly worse on the scale for assessing the severity of nausea and vomiting and dyspnea. Nutritional status was assessed using the Mini Nutritional Assessment (MNA). No malnutrition or risk of its development was detected in the study group. The presence and severity of negative emotions in the form of anxiety and depression were assessed using the Hospital Anxiety and Depression Scale (HADS) and the Geriatric Depression Rating Scale (GDS). Based on the analyses of low muscle mass index based on ASM-(cut-off point for women ASM<15kg), it was observed that the studied women mostly did not show features of

sarcopenia. We also compared the body mass index (BMI [kg/m2]) in the study groups and analyzed the risk of sarcopenia using low muscle mass index based on ASM-(cut-off point for women ASM<15kg). A statistically significant relationship was observed between body mass index and sarcopenia. Based on the SarQoL questionnaire, the association of quality of life with the occurrence of sarcopenia in patients treated for breast cancer was analyzed. Statistically significant relationships were reported. Based on the dependent variable "depression" (assessment based on GDS scale) and independent variables: "years since treatment", "number of chronic diseases", "nutritional status" (MNA scale scores), "sarcopenia" (diagnosis based on bioimpedance - criterion $ASM/height2 < 5.5 kg/m2$) and "use of complementary treatment", a classification-regression tree model was created, which showed that depression of increasing severity occurs in malnourished patients (≤ 16.25 points on the MNA scale), patients with an identified risk of malnutrition (MNA ≤ 26.75 points), who had at least one concomitant chronic disease, who were 20.5 years or less after surgical treatment, who were not receiving follow-up treatment or whose treatment had been terminated, and in patients with normal nutritional status according to MNA (>26.75points) but who could be diagnosed with sarcopenia based on bioimpedance ($ASM/growth2 < 5.5 kg/m2$).

Conclusions:

1. Patients after breast cancer treatment benefiting from rehabilitation holidays and participating in organized activities of the Amazon Club, regardless of the type of treatment performed, are characterized by a fairly good state of health and normal psycho-physical fitness. In spite of the difference in age and forms of oncological treatment applied in their case, the groups did not differ in performing most activities of daily living and in Rankin scale assessment. They also did not differ in the prevalence of associated diseases, except for a significantly higher incidence of vascular atherosclerosis and related diseases - hypertension and heart disease in older patients.

2. Standardized questionnaires of quality of life assessment in patients with cancer and in patients after breast cancer treatment (EORTC QLQ-C30, EORTC QLQ-BR 23) showed that both GWR and Amazon patients experienced deterioration of quality of life (QoL) as a result of oncological treatment for breast cancer.

3. The analysis of the frequency of sarcopenia diagnosis in the study group based on EWGOSP2 proposed criteria for bioimpedance-based indicators confirmed that sarcopenia was significantly more frequently diagnosed using the ASM-based criterion than the ASM/growth2-based criterion. This may indicate a need for further research and verification of the cut-off points for the indices proposed as alternatives to each other for the diagnosis of sarcopenia and for the establishment of uniform criteria for the diagnosis of low muscle mass in the population of women after breast cancer treatment using BIA.

4. Subjects diagnosed with low muscle mass did not report more severe subjective symptoms of sarcopenia as assessed by the SarQol questionnaire. This may indicate a beneficial effect of rehabilitation and undertaken activity on the quality of life of patients also with objective exponents of low muscle mass.

5. The significantly higher incidence of depression in women treated for breast cancer with malnutrition/risk of malnutrition, as well as in patients with normal nutritional status but in whom sarcopenia could be diagnosed on the basis of bioimpedance, may indicate a greater

need to take into account the assessment of mental status and the implementation of appropriate interventions in this group of patients. However, the reverse direction of this relationship should be taken into account, as nutritional status and muscle mass may be a derivative of general health status, affecting the mental condition of patients.

6. The study population of patients treated for breast cancer was predominantly characterized by higher BMI, with overweight or obesity suspected in more than half of those with sarcopenia. The potentiating effects of sarcopenia and obesity may adversely affect the health status of patients, indicating the need to consider nutritional and physiotherapeutic interventions in this patient group.

7. Elderly female patients belonging to the Amazon Club, despite multimorbidity, did not show significant differences in performing daily activities and in a typical week of the year they exercised more intensively, slightly less frequently showed features of sarcopenia than GWR patients, which is probably a result of educational and proactive activity of the organization. This may indicate a greater need to spread information about the activities of the Amazon Club and to encourage and actively participate in its activities, which may translate into the

prevention of sarcopenia and improvement in the quality of life of elderly patients treated for breast cancer.