The impact of physical activity on the association between changes in body build and quality of life in breast cancer women undergoing endocrine therapy

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Introduction

Endocrine therapy (ET) is a common method of treatment in breast cancer patients with estrogen receptor expression, regardless of age and menopausal state.

ET in cancer patients can also have a negative influence on body composition and physique, which was presented in many studies.

Physical exercise can contribute to the outcomes of medical treatment, is advisable in the prevention of many disorders, including cancer, and has been shown to have positive effects on energy and mood.

The sexual hormones deficiency causes a range of negative metabolic results (osteoporosis, metabolic changes, etc.) and psycho-emotional disorders:

- the feeling of energy and motivation downfall, lowering of energy and drive to act, mood changes, anxiety, mental concentration difficulties, libido decrease
Purpose

The aim of the study was to evaluate changes on physique (physical body shape/measurements), body composition, and QoL in premenopausal breast cancer women during endocrine therapy under the influence of physical exercises.
Greater Poland Cancer Centre in Poznan
Setting and participants

The study was conducted at the Department of Rehabilitation in the Greater Poland Cancer Centre in Poznan.

All study procedures were reviewed and approved by the Bioethics Committee at the Marcinkowski Medical University for Medical Since in Poznan.

53 women receiving breast cancer treatment were initially selected for the study, with 41 women completing the program (study discontinuation in 12 subjects was caused by death, initiation of additional therapy due to disease progression, and failure to adhere to the required exercise protocols).
Study criteria

- **Eligibility criteria included** female breast cancer patients between 18 and 50 years old, premenopausal, regular menstruation until the introduction of ET, scheduled hormonal treatment planned to continue for a minimum of 18 months (goserelin 3.6 mg every 28 days and tamoxifen 20 mg daily), no distant metastases, no endocrinological, rheumatic, or cardiac diseases resulting in circulation failure (above Stage II of Heart Failure according to the New York Heart Association), no absorption disorders, no other tumors, and good general health (ECOG 0-1).

- **Patients were excluded** from the study if they had distant metastases and/or disease progression resulting in radiotherapy or the introduction of chemotherapy, if they resigned from the study before the 18-month period, or if patients expired during the course of the study.
### Characteristic of the study group

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Mean (SD)</th>
<th>max-min</th>
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<tbody>
<tr>
<td><strong>Age (years):</strong></td>
<td>44.3 (4.9)</td>
<td>32.8-48.2</td>
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<tr>
<td><strong>Height (cm):</strong></td>
<td>164 (5.6)</td>
<td>152-172</td>
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**Numbers of patients (% whole group)**

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<tr>
<td>right</td>
<td>17 (41.5%)</td>
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<tr>
<td>left</td>
<td>24 (58.5%)</td>
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</table>

**Surgical treatment:**

- breast conserving therapy (BCT) 27 (65.8%)
- total mastectomy (modo Patey) 14 (34.1%)

**Chemotherapy**

- 0 (0)%

**Radiotherapy**

- 41 (100%)
- brachytherapy as boost 18 (43.9%)

**Clinical advancement degrees**

- $T_1N_0M_0$ 14 (34.1%)
- $T_1N_1M_0$ 20 (48.8%)
- $T_2N_1M_0$ 7 (17%)

**Receptors**

- ER (+) 41 (100%)
- PGR(+) 34 (82.9%)
Clinical trials

In the classified group of patients, the following schedule was used:

Assessment I (Baseline) was conducted before the start of ET,
Assessment II was conducted after 6 months of ET,
Assessment III was conducted after 6 months of aerobic training and 12 months of ET,
Assessment IV (Final Assessment) was conducted after 6 months of resistance training, 12 months of aerobic activity, and 18 months of ET.
Aerobic training

Everyday 45-55min

65-75% HR max

The training process was verified through patients’ PA notebooks.
Aerobic and resistance training

The patients continued their everyday aerobic workout, as between 6 and 12 month of the study.

The sessions were conducted with:
• 1 to 2 sets of 6 to 8 isometric exercises (trunk muscles),
• 3 sets of upper body exercises with 8-16 repetitions
• a 2-sec. concentric–1-sec. static–2-sec. eccentric time under tension intermittent with 30 to 40 seconds of continuous stretching were executed using elastic belts (Thera-Band);

To ensure a progressive development of strength, different belts (1kg, 2.5 kg, 3.5 kg, 4.5 kg per 100% extension) were used.

The participants were asked to execute 16 repetitions per leg (2-second–0-second–2-second time under tension mode).
Assessment

were conducted according to the following scheme:
- Subjective examination
- Body physique – anthropometrical (BMI, WHR)
- Body composition using dual-energy X-ray absorptiometry (DXA) *LUNAR PRODIGY ADVANCE* *(GE, Madison, WI, USA)*: LBM, FFBM, FBM, % TBF, % android fat, % gynoid fat
QoL measures

The quality of life was evaluated using a questionnaire created by EORTC, *The European Organization for Research and Treatment of Cancer*:

- **QLQ-C30 v 3.0** is a self-administered questionnaire that is specifically designed for the evaluation of QoL in cancer patients during clinical trials.

- **module QLQ-BR23** is a supplementary measure used to assess QoL in breast cancer patients.

The use of the questionnaires was approved by the EORTC.
Statistical analysis

The statistical data was analyzed using STATISTICA software (version 10.0 StatSoft Poland). The quantitative data were described through mean, standard deviation.

The Shapiro-Wilks test was used to assess the normal distribution compatibility. The differences between the results were described through the t-test and Wilcoxon’s test for connected variables.

The dependence between the results of body physique measures, body composition (DXA) and QoL was attained through Spearman’s correlation rate ($r_s$). For multiple comparisons, Bonferonni correction was made.

The results with $p \leq 0.05$ were regarded as statistically significant and those with $p \leq 0.01$ were regarded as highly statistically significant.

$p \leq 0.01$  $p \leq 0.05$  N/S
RESULTS

0m-th

6m-th

12m-th

18 m-th
Body physique

BMI

WHR

![Graphs showing BMI and WHR over time with mean values and standard deviations.]

**BMI**

- **Średnia**
- **Średnia±Błąd std**
- **Średnia±Odch.std**

**WHR**

- **Średnia**
- **Średnia±Błąd std**
- **Średnia±Odch.std**

**Czas**:

- 0
- 6
- 12
- 18

**BMI Values**:

- 0
- 6
- 12
- 18

**WHR Values**:

- 0.70
- 0.72
- 0.74
- 0.76
- 0.78
- 0.80
- 0.82
- 0.84
- 0.86
Body composition

**FFBM**

**LBM**

**%TBF**

% Android Fat

% Gynoid Fat
Total QoL

Wykr. ramka-wąsy względem grup
Zmienna: QL

Mediana
25%-75%
Min-Maks
0 6 12 18
czas
-20
0
20
40
60
80
100
120
QL

Mediana
25%-75%
Min-Maks

czas
0 6 12 18
QLQ-C30

functional scale
emotional functioning
physical functioning

fatigue
pain
QLQ-BR23

functional scale

body image

side effects of therapy

symptoms scale

breast symptoms
Correlations between QLQ C30 and body physique, body composition ($A=r_s=p \leq 0.05$)

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Correlations between module QLQ-BR 23 parameters and body physique, body composition

\((A= r_s = p ≤ 0.05)\)

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<th>Comparison</th>
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<td>Future perspective &amp; BMI</td>
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Breast symptoms & BMI

Syst. ther. side effects & BMI

Syst. ther. side effects & FBM [g]

Syst. ther. side effects & TBF [%]

Syst. ther. side effects & AF [%]

Future perspective & AF [%]

Breast symptoms & AF [%]

Breast symptoms & TBF [%]

Breast symptoms & BMI
Conclusion

Hormonal therapy negatively impacts body composition, body physique, and QoL of breast cancer patients.

This study shows that physical activity may improve QoL and reduce adverse effects of endocrine therapy on body composition and body physique, indicating appropriateness for further investigation on the use of exercise programs in patients to improve the outcomes of therapy.
Thank you for attention