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The effect of physical exercise on the biomarkers BDNF, VEGF, and CRP in chemotherapy-exposed breast cancer patients with cognitive complaints

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Background
One in three breast cancer survivors develops cognitive complaints after chemotherapy. Physical exercise is a promising non-pharmacological treatment option for these complaints. The Physical Activity and Memory (PAM) study showed that physical exercise positively affects self-reported cognition. To get insight into underlying mechanisms, the role of biological markers needs to be explored. Therefore, this study explored the effect of physical exercise on BDNF, VEGF, and CRP in participants of the PAM study.

Methods
The PAM study is a randomized controlled trial with two study arms. The intervention group followed a 6-month strength and aerobic exercise program (4h per week, 2h supervised). The control group maintained their habitual activity pattern. Measurements (e.g., cognitive complaints (MDASI-MM), Quality of Life (EORTC QLQ-C30), and blood sampling) were performed at baseline and after six months. Between-group differences were analysed with ANCOVA, adjusting for baseline biomarker levels, age, endocrine therapy, and menopausal status. Subgroup analyses were conducted in highly fatigued patients and patients who attended ≥80% of the training sessions. VEGF and CRP were log-transformed, and treatment effect ratios (TERs) were obtained by exponentiating estimates. Increases in BDNF and VEGF and a decrease in CRP were considered favourable.

Results
Of the 181 participants, 175 had biomarker data. Participants were female, on average 52.4 ± 8.7 years old, and had a BMI of 28.7 ± 5.4 kg/m2. We found no significant exercise effects on BDNF (mean difference 4.66, 95% CI: -7.61 to 16.93), VEGF (TER 0.96, 95% CI: 0.88 to 1.06), and CRP (TER 1.07, 95% CI: 0.83 to 1.38). Results were similar in subgroup analyses.

Discussion
The 6-month physical exercise program did not have a significant effect on BDNF, VEGF, and CRP. Therefore, in the present study, these markers represent a less likely explanation for the exercise-related improvements in self-reported cognition.

Keywords

Biomarkers, Exercise, Chemotherapy, Cognition

Conflict of Interest & Ethical Approval

yes

Abstract submitters declaration

yes

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