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Association between Pre-diagnosis Physical Activity and Risk of Breast Cancer Recurrence – the California Teachers Study

Dan Lin, Alaina Demalis, Laila Al-Shaar, Kathleen Sturgeon. Penn State University College of Medicine, Hershey, PA

Physical activity (PA) before breast cancer (BCa) diagnosis may provide health status information related to survival outcomes. Epidemiological studies has consistently observed an inverse association between pre-diagnosis PA and all-cause mortality among BCa patients. The association between pre-diagnosis PA and BCa recurrence or BCa specific mortality is unclear.

PURPOSE: To investigate the association between pre-diagnosis PA and risk of BCa recurrence in the California Teachers Study. **METHODS:** A total of 6,479 women who had initial diagnosis of stages I-IIIb BCa after completing the baseline questionnaire (Q1) were eligible for the study. During a median follow-up of 7.3 years, 553 BCa recurrence cases were identified. BCa recurrence subtypes were defined by the expression status of estrogen receptor (ER) and progesterone receptor (PR). Long-term (from high school to age at Q1, or, age 55, whichever was younger) and recent (during 3 years prior to Q1) pre-diagnosis recreational PA were recalled at Q1 and converted to a metabolic equivalent of task hours per week (MET-h/wk).

Multivariable Cox proportional hazards models estimated hazard ratios (HRs) and 95% confidence intervals (CIs) for risk of BCa recurrence overall and by ER/PR subtypes.

RESULTS: Both long-term and recent pre-diagnosis recreational PA were not associated with risk of BCa recurrence (Long-term: $P_{\text{trend}}=0.77$; recent: $P_{\text{trend}}=0.29$). The association remained non-significant after adjusting for PA after BCa diagnosis ($P_{\text{trend}}=0.84$). The inverse association between recent pre-diagnosis recreational PA and risk of BCa recurrence was only observed in ER negative/PR negative (ER-/PR-) cases (≥ 26.0 vs. < 3.4 MET-h/wk: HR=0.28, 95% CI=0.13-0.59; $P_{\text{trend}}=0.0069$), but not ER positive/PR positive (ER+/PR+; ≥ 26.0 vs. < 3.4 MET-h/wk: HR=0.86, 95% CI=0.62-1.20; $P_{\text{trend}}=0.77$) or other (ER+/PR- or ER-/PR+; ≥ 26.0 vs. < 3.4 MET-h/wk: HR=0.83, 95% CI=0.37-1.88; $P_{\text{trend}}=0.81$) cases. **CONCLUSION:** Higher levels of recent pre-diagnosis recreational PA was associated with lower risk of ER-/PR- BCa recurrence in the California Teachers Study. Knowing the potential survival benefits of pre-diagnosis PA may help clinicians better evaluate health status and optimize treatment plans for BCa patients.

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