

Adverse Reproductive Outcomes Among Young Female Breast Cancer Survivors

In A Population-based Cohort Study

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BACKGROUND

- Approximately 10% of breast cancer patients are diagnosed during their reproductive years.
- Previous studies reported increased risks of adverse reproductive among female breast cancer survivors due to chemotherapy. However, the majority of those studies used self-reported outcomes or were in clinical settings.

OBJECTIVE

- The aim of our study is to estimate the risk of adverse reproductive outcomes among young female breast cancer survivors compared to women from the general population.

METHODS

Study Population

- 5,609 young female breast cancer survivors diagnosed at 18–50 years of age between 1996–2017 were identified in the Utah Cancer Registry.
- Comparison group: up to five cancer-free women were matched to breast cancer survivors on birth year and birth state from the Utah Population Database. We included 26,922 women from the general population.

Inclusion criteria for breast cancer survivors

- First primary cancer cases (ICD-O-3 code: C50)
- Invasive cancer stage
- Utah resident
- Alive a year after cancer diagnosis

Outcome (identified by ICD9 and ICD10 codes)

- Premature ovarian failure
- Pelvic infection and inflammation
- Ovarian cyst
- Endometriosis
- Infertility/Subfertility

Statistical analysis

- Cox proportional hazards models were used to estimate hazard ratios (HR) and 95% confidence intervals (CI).



CONCLUSION

Young female breast cancer survivors had 1.7- to 2.5-fold risk of adverse reproductive outcomes compared to women from the general population, highlighting the need for further studies on the impact of cancer treatment agents on reproductive health.

Table 1. Demographic characteristics of the young female breast cancer survivors and women from a general population

	Breast cancer survivors	General population	P-value ^b
	N= 5,609 n (%)	N=26,922 n (%)	
Race			<0.001
White	5195 (92.6)	24499 (91.0)	
Asian or Native Hawaiian or other Pacific Islander	148 (2.6)	525 (2.0)	
American Indian or Alaska Native	10 (0.2)	212 (0.8)	
Black or African American	19 (0.3)	110 (0.4)	
Multiple races	233 (4.2)	841 (3.1)	
Unknown	4 (0.1)	735 (2.7)	
Education			<0.001
High school degree or lower	1510 (26.9)	8845 (32.9)	
Some college	1539 (27.4)	8252 (30.7)	
College or higher	1466 (26.1)	6490 (24.1)	
Unknown	1094 (19.5)	3335 (12.4)	
Follow up period (years)			<0.001
>1 to 5	1670 (29.8)	6209 (23.1)	
>5 to 10	1546 (27.6)	7028 (26.1)	
>10 to 15	1174 (20.9)	6020 (22.4)	
>15	1219 (21.7)	7665 (28.5)	
Baseline Charlson Comorbidity Index (CCI)			0.186
0	4373 (78.0)	20687 (76.8)	
1	916 (16.3)	4601 (17.1)	
2+	320 (5.7)	1634 (6.1)	
Baseline BMI^a			0.016
<18.5 kg/m ²	196 (3.5)	913 (3.4)	
18.5 to 24.9 kg/m ²	3274 (58.4)	15133 (56.2)	
25 to 29.9 kg/m ²	1322 (23.6)	6647 (24.7)	
30+ kg/m ²	817 (14.6)	4229 (15.7)	
Had children			
Before cancer diagnosis	3894 (69.4)	21776 (80.9)	<0.001
0-1 year of cancer diagnosis	60 (1.1)	502 (1.9)	<0.001
> 1 year after cancer diagnosis	92 (1.6)	1200 (4.5)	<0.001

a. Imputed BMI
b. p for chi-square test

Table 2. Hazard ratio^a of adverse reproductive outcomes among young breast cancer survivors compared to a general population of women, one year after cancer diagnosis

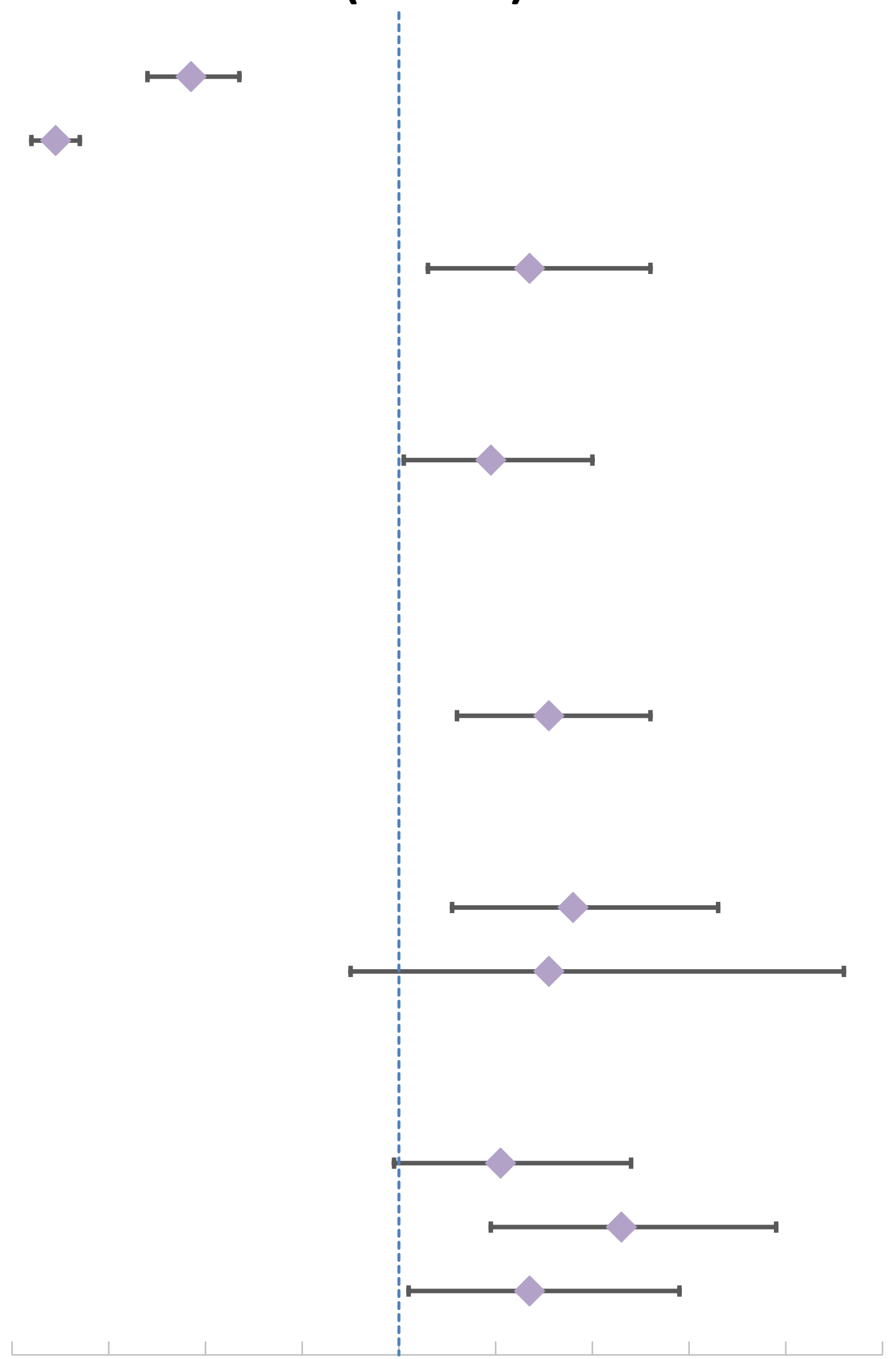
Adverse reproductive outcomes	Breast cancer cases, n(%)	General population, n(%)	HR (95 % CI)
Premature ovarian failure	126 (2.3)	272 (1.0)	2.50 (1.99, 3.13)
Pelvic infection and inflammation	513 (10.8)	1527 (7.7)	1.78 (1.60, 1.98)
Infertility/Subfertility, ovarian cyst, endometriosis	748 (17.7)	1790 (10.9)	2.14 (1.95, 2.35)
Infertility/Subfertility	236 (4.7)	733 (3.3)	1.59 (1.36, 1.85)
Ovarian cyst	584 (12.0)	1242 (6.0)	2.52 (2.27, 2.80)
Endometriosis	234 (4.5)	701 (3.0)	1.73 (1.48, 2.02)

a. Model adjusted for matching factors, race, baseline BMI, baseline Charlson Comorbidity Index

	Infertility/Subfertility, ovarian cyst, endometriosis	
	Yes, n (%)	No, n (%)
Age at diagnosis^a		
18–40	344 (45.9)	876 (25.1)
41–45	230 (30.7)	1023 (29.4)
46–50	175 (23.4)	1586 (45.5)
ER status^b		
ER+	569 (78.9)	2527 (76.3)
ER-	152 (21.1)	785 (23.7)
PR status^b		
PR+	512 (71.8)	2288 (69.6)
PR-	201 (28.2)	997 (30.4)
Hormone therapy^b		
No	450 (60.1)	2170 (62.3)
Yes	299 (39.9)	1315 (37.7)
Baseline CCI^c		
0	601 (80.2)	2859 (82.0)
1	119 (15.9)	485 (13.9)
2+	29 (3.9)	141 (4.0)
Education^d		
High school or lower	171 (22.8)	1004 (28.8)
Some college	207 (27.6)	915 (26.3)
College or higher	222 (29.6)	844 (24.2)
Unknown	149 (19.9)	722 (20.7)

Table 3. Risk factors for adverse reproductive outcomes among young breast cancer survivors

HR (95% CI)



Model adjusted for a. race, baseline BMI, baseline CCI; b. age at cancer diagnosis, race, baseline BMI, baseline CCI, year of cancer diagnosis; c. age at cancer diagnosis, race, baseline BMI, year of cancer diagnosis; d. age at cancer diagnosis, baseline BMI, baseline CCI, race.

