



Physical Function in Breast Cancer Survivors: A systematic review of published values

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Objectives

The primary objective of this review is to examine the published values of physical function in breast cancer survivors in current research literature

- Limited data on normative or expected values of physical function in breast cancer survivors – difficult to interpret research and clinical findings
- **Aim:** Provide a summary of published values of physical function in breast cancer survivors and identify gaps to provide direction for future research

Introduction

Background Information

In 2012, 22,700 women will be diagnosed with breast cancer in Canada¹

- 5-year survival rate - 88% in Canada¹
- Growing population of cancer survivors left with long term effects of the disease and its treatments²
- Declining physical function common in women who have undergone treatments³

Domains of physical function included **lower extremity strength, upper extremity strength, aerobic fitness, balance, and mobility**

Study Design

Population - Females \geq 18 y.o. diagnosed with breast cancer

Intervention - Any type of treatment (no treatment, chemotherapy, radiation, medications, etc.) or combination

Outcomes - Primary outcome measures chosen are most commonly used among the healthy or clinical populations determined by the authors of this review *a priori*

Methods

Data sources and searches

- Five independent search strategies for five aspects of physical function
- Same terms for breast cancer survivors for all searches combined with specific terms for each component of physical function

Databases used:

- Medline (1990 to present + In-process & Other Non-Indexed Citations)
- Embase (1990 to present, daily update)
- CINAHL (1990 to present)
- Limited to English and human studies
- Duplicates taken out with Refworks
- "Surgery" not explicitly searched

Study selection

Exclusion criteria:

- Did not report data of females, who were 18 years of age or older and were breast cancer survivors
- Did not provide the outcome measure of interest
- Did not report the baseline data
- If the studies were not observational, cohort, case control and random clinical trials
- Not published between 1990 and February 28th, 2012

Relevant values are included if they are retrieved from a search within another aspect of physical function

Data extraction

- Data extracted include: age, publication information, values of outcome measures of interest
- Only baseline values of original studies were extracted
- Values were calculated if original studies reported only post-intervention values and percentage of change

Quality Assessment

Quality of the papers were not assessed, as primary objective of the study is to report values of physical function at baseline

Data Analysis

- Relevant characteristics of the studies
- Values of physical function reported
- Outcome measures identified for each domain of physical function
- Normative data in healthy and clinical populations identified in the literature if available
- No statistical techniques were utilised

Results

Physical Function

Lower Extremity Strength – Total Studies

# of Studies	Range of values	Normative Values
18		
4	73.02 - 99.3 kg	-
4	24.4 - 134.8 kg	-
2	60.40 - 84.4 kg	-
3	10.1 - 16.9 reps	-
3	7.53 - 12.6 s	11.4 s (60-69 y.o.)
3	10 - 13.6 reps	15 reps (60-64 y.o.)
2	27.3 - 27.7 peak torque/BW; 69.1 - 72.1 kg	-

Upper Extremity Strength – Total Studies

# of Studies	Range of values	Normative Values
23	13 - 34 kg	28.6 kg (40-49)
7	-	-
3	15.4 - 19.5 kg	-
1	12.2 kg	-
1	32.7 kg	-
1	3.6 kg	-
1	4.5 kg	-
3	29.8 - 56 kg	-
4	0 - 10.7 reps	-

Aerobic Fitness – Total Studies

# of Studies	Range of values	Normative Values
42	-	-
1	16.5 mL/kg/min	29.4mL/kg/min (40-49 y.o.)**
3	17.1-26.1 mL/kg/min	26.6 mL/kg/min (50-59 y.o.)**
4	24.3 - 25.5 mL/kg/min	-
10	14.5 - 32.9 mL/kg/min	-
6	73 - 86 bpm	70 - 73 bpm (46-55 y.o.)
4	403 - 611 m	400 - 700m
10	753 - 1128 m	-
2	1.38 - 1.43 W/kg	-

Balance – Total Studies

# of Studies	Range of values	Normative Values
5	12.6 - 14.6s	-
2	-	-
2	-	-
-	94.6 - 95.6	-
-	77.6 - 84.1	-
-	41.4 - 57.3	-
-	96.6 - 98.6	-
-	44.90	-
-	49.00	-
1	60.6 s / 15.7 s	40.4s / 7.4s (40-49 y.o.)
1	33.90	-

Mobility – Total Studies

# of Studies	Range of values	Normative Values
6	97.9 - 124.4	-
1	0.25 - 0.27 m/s, 19 s	-
2	0.28 - 0.31 m/, 27.2 s	-
1	7.3 s	-
1	6.0 s	-
1	10 out of 12	-
1	0.33 - 0.33 m/s	1.10 m/s (50-59 y.o.)
1	0.43 - 0.48 m/s	1.47 m/s (50-59 y.o.)
2	5.7 - 6.7 s	8.1 s (60-99 y.o.)

*1-RM (NA): Methods not defined as measured or predicted

**VO₂ Max normative values at 25th percentile

Discussions

Lower Extremity Strength

- Most common outcome measure **1-RM leg press**
- Normative values are 1.18, 1.05, and 0.99 (units=kg/kg of body weight) for aged 40-49, 50-59, and 60+⁴
- Cannot compare normative values to literature as they are measured in different units⁴
- One study measured 1-RM in kg/kg of bodyweight, but values were extraordinarily high⁵
- **Sit to stands** are also commonly used (two types)
 - Repetitions in 30s: Lower than healthy population

Upper Extremity Strength

- Most common outcome measure **handgrip strength**
- Weaker handgrip strengths compared to age-matched healthy women⁶
- Other measures of upper extremity strength are also decreased⁷
- Proximal UE movements are more common in recent studies to predict UE strength

Aerobic Fitness

- **VO₂ max** measurements mostly scored below 25th percentile⁴
- **Resting heart rate** elevated
- **6MWT** falls within range of healthy population⁸

Balance

- **Single legged stance** was longer than the normative values^{9,10}
- **Fullerton Advanced Balance Scale** score lower than healthy control (36.48.) but still above cut off for the risk of falls, which is equal or below 25¹¹

Mobility

- **Timed-up-and-go (TUG) test** faster than norms, but age of the population is younger^{11,12}
- Decreased **gait speed** (normal and fast) despite walking for shorter distance¹³
- Mixed results for ascending/descending stairs^{13,14}

Limitations

- Search strategy and methods may not have captured all relevant papers
- Specific outcome measures for physical function were identified *a priori* - some appropriate outcome measures may have not been included
- Studies had varying methods for the same outcome measures
- Lack of normative values for some of the selected outcome measures and normative values vary by age

Conclusion

- **Upper extremity strength and aerobic fitness values reported in breast cancer survivors are significantly lower than normative values**
- **Lower extremity strength, mobility, and balance measures are less conclusive**
- **More consistent outcome measures needed in the future to assess mobility and balance**

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