Fueling the Fight: Nutrition and Quality of Life in American and Taiwanese Breast Cancer Patients

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BACKGROUND

- Breast cancer (BC) patients undergoing curative treatment commonly experience appetite loss and subsequent poor dietary quality.
- The role of nutrition in symptom burden and functioning during treatment remains inadequately studied among BC patients. Dietary recommendations for BC patients undergoing treatment are primarily based on general cancer prevention guidelines.
- This study examined the associations of diet quality with treatment-related symptoms and functioning in American and Taiwanese BC patients, and whether these associations varied between the two patient groups whose diets differ.

METHODS

- This study used cross-sectional data from a longitudinal study that recruited 81 American (non-Hispanic White, Black, Hispanic) and 81 Taiwanese women who were:
  - Diagnosed with stage 0-III primary BC between 2021 and 2024,
  - Enrolled within six months after diagnosis, and
  - Undergoing primary treatment (e.g., surgery, chemotherapy, and/or radiation) at MedStar Georgetown University Hospital and National Taiwan University Hospital.
- Dietary quality was defined by Healthy Eating Index (HEI-2020), which was evaluated using three randomly selected 24-hour dietary recalls per participant (two weekdays, one weekend), collected with an automated 24-hour recall tool (ASA24):
  - HEI scores are categorized as 'good' (80-100), 'needs improvement' (70-79), 'poor' (60-69), or 'very poor' (0-59).
  - Total HEI scores are summed from 13 component scores.
- Symptom and functional outcomes were assessed by the EORTC QLQ-BR30:
  - Symptoms: Insomnia, fatigue, appetite loss, nausea and vomiting, pain, dyspnea, constipation, diarrhea, and financial difficulties.
  - Functioning: Physical, emotional, social, cognitive, and role functioning.
  - Both outcomes were normalized to a 0-100 scale.
- Linear regression models examined associations of the overall HEI and its subcomponent scores with each symptom and functioning outcome.
  - Models adjusted for nationality, age, cancer stage, body mass index (BMI), calorie intake, physical activity, financial difficulties, and appetite loss.
  - All analyses were conducted using Statistical Analysis Software (SAS) Studio 9.4.

RESULTS

Table 1. Participant Demographics

Variable	Total (n=162)	American (n=81)	Taiwanese (n=81)
Age, mean (SD)	49.69 (10.68)	49.57 (11.66)	49.81 (9.67)
BMI, mean (SD)	24.81 (5.18)	26.97 (5.85)	22.64 (3.20)
Cancer Stage, %			
Stage 0 - I	43.21	56.79	29.63
Stage II - III	56.79	43.21	70.37
Treatment Type, %			
Surgery	76.54	95.06	58.02
Radiation	30.86	49.38	12.35
Chemotherapy	73.46	67.9	79.01
Other	30.86	30.86	30.86
Physical Activity (MET-min), mean (SD)	1762.21 (2783.17)	2161.85 (3475.32)	1362.57 (1785.38)

Note. SD = standard deviation; MET-min = metabolic equivalaent of task x minutes of acitvity.

Table 2. HEI-2020 Component Scores by Nationality

HEI-2020 Component	American (n=79)	Taiwanese (n=78)	p-value
Total Fruits (SD)	3.32 (1.70)	3.43 (1.51)	0.67
Whole Fruits (SD)	3.81 (1.77)	4.20 (1.48)	0.14
Total Vegetables (SD)	4.07 (1.14)	4.44 (0.87)	0.02
Greens and Beans (SD)	3.64 (1.92)	4.29 (1.35)	0.02
Total Protein Foods (SD)	4.66 (0.84)	5.00 (0.00)	< 0.01
Seafood and Plant Protein (SD)	4.05 (1.77)	4.82 (0.72)	< 0.01
Whole Grains (SD)	3.78 (3.45)	1.75 (2.59)	< 0.01
Total Dairy (SD)	5.12 (2.89)	4.37 (2.85)	0.10
Fatty Acids (SD)	5.72 (3.44)	8.33 (2.47)	< 0.01
Refined Grains (SD)	7.18 (2.75)	6.74 (2.61)	0.31
Sodium (SD)	3.87 (3.16)	0.28 (0.87)	< 0.01
Added Sugars (SD)	8.08 (2.50)	9.58 (0.97)	< 0.01
Saturated Fats (SD)	5.78 (3.22)	8.40 (2.04)	< 0.01

Note: Scores range from 0-5 for Total Fruits through Seafood and Plant Proteins, and from 0-10 for Whole Grains through Saturated Fats. Higher scores reflect closer adherence to the HEI-2020 dietary recommendations.

Table 3. Overall Diet Quality and Outcome Scores

Oucome Scores (Mean, SD)	American (n=81)	Taiwanese (n=81)
Calorie Intake (kcal/day)	**1733.99 (518.39)**	**1649.01 (365.53)**
HEI-2020 Score	63.08 (14.03)	65.62 (9.46)
Good (%)	13.92	8.97
Needs Improvement (%)	20.25	20.51
Poor (%)	16.46	47.44
Very Poor (%)	49.37	23.08
Functioning	78.96 (17.85)	75.74 (14.14)
***Symptom Burden**	19.36 (15.02)	24.66 (14.41)

*Significant differences between American and Taiwanese samples, $p < 0.05$
Note: Sample sizes for Caloric Intake and HEI-2020 Score are American n=79, Taiwanese n=78.

Table 4. Significant HEI Subcomponents and Outcome Subdomains

HEI-2020 Component	Outcome	Estimate	95%CI	p-value
Refined Grains	Physical Functioning	1.04	(0.00, 2.08)	0.05
Saturated Fat	Physical Functioning	-1.11	(-2.16, -0.07)	0.04
*Total Vegetables	Insomnia	-5.12	(-10.1, -0.13)	0.04
*Greens and Beans	Fatigue	2.47	(0.06, 4.87)	0.05
*Total Fruit	Appetitle Loss	3.21	(0.32, 6.09)	0.03
*Total Dairy	Diarrhea	-1.52	(-2.92, -0.12)	0.03
*Seafood and Plant Protein	Diarrhea	3.44	(0.37, 6.51)	0.03

*Models did not adjust for financial difficulties or appetite loss.

- Only 11% of BC patients, regardless of nationality, had a "good" diet quality.
- The overall HEI score was not associated with the outcomes. However, several individual HEI components were related with some specific outcomes (Table 4). For example:
  - Higher refined grains intake was positively related to physical functioning
  - Higher total vegetable intake was negatively related to insomnia.

DISCUSSION and CONCLUSION

The majority of participants did not have a good diet quality. BC patients with higher intakes of total vegetables and dairy products reported less insomnia and diarrhea, whereas those with higher intakes of greens and beans, and seafood and plant protein reported more fatigue and diarrhea. Saturated fat was negatively related to physical functioning. Note that these cross-sectional associations cannot determine causal relationships. However, these observed associations may warrant future longitudinal investigations in a larger sample to inform dietary recommendations and alleviate symptom severity in BC patients undergoing treatment.

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