

Original Article

The Role of Dietary Patterns and Lifestyle in Gastrointestinal Problems among Individuals Aged 18 to 30 Years Living in Hostels in Lahore, Pakistan

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ABSTRACT

Background: Nutrition and physical activity are important components of supportive care and long-term health among people affected by breast cancer. However, cross-sectional dietary surveys cannot establish that individual antioxidants or macronutrients prevent cancer progression or improve treatment outcomes. **Objective:** To describe antioxidant, macronutrient, and lifestyle-related practices and beliefs among women recruited from breast-cancer care settings in Lahore and to examine selected associations with supplement use and family history. **Methods:** A cross-sectional survey included 150 women aged 25–65 years recruited purposively from healthcare settings in Lahore. A Food Frequency Questionnaire and breast-cancer-risk questionnaire assessed antioxidant intake, macronutrient-related dietary practices, supplement use, family history, and health-related beliefs. **Results:** Mean age was 46.95±10.53 years. Fifty-seven participants reported dietary-supplement use and 93 did not. Vitamin C was the most frequently reported antioxidant source. Awareness of a possible role of antioxidants in cancer prevention was reported by 36/57 supplement users and 44/93 non-users ($p=0.059$). Belief that an antioxidant-rich diet could lower breast-cancer risk was reported by 46/57 versus 62/93 participants, respectively ($p=0.063$). Macronutrient awareness was not significantly related to the reported macronutrient category ($p=0.228$). **Conclusion:** The study describes nutrition-related knowledge, beliefs, and dietary behaviors but does not demonstrate that antioxidant supplementation, macronutrient modification, or lifestyle change prevents recurrence or improves breast-cancer treatment outcomes. **Keywords:** Breast Cancer; Nutrition; Antioxidants; Macronutrients; Dietary Supplements; Lifestyle; Pakistan.

INTRODUCTION

Nutrition and physical activity are important components of supportive care and survivorship following a cancer diagnosis. For women affected by breast cancer, nutritional priorities during and after treatment include maintaining adequate energy and protein intake, identifying and managing malnutrition, supporting a healthy body weight, preserving muscle mass, and reducing long-term cardiovascular and metabolic risk. Contemporary survivorship guidance therefore emphasizes integrated nutrition and physical activity rather than reliance on individual foods, nutrients, or supplements (1–3). These issues also require consideration within the local healthcare context. Pakistan continues to face substantial challenges related to cancer prevention, detection, treatment, and

supportive care, while Pakistani epidemiological research has demonstrated continuing interest in the relationship between dietary quality and breast-cancer risk (4,5).

Current cancer-survivorship recommendations emphasize an overall dietary pattern rich in vegetables, fruits, whole grains, and legumes, with appropriate limitation of highly processed foods and red or processed meats, alongside maintenance of healthy body weight and regular physical activity (1). This dietary-pattern approach is consistent with a growing body of breast-cancer survivorship literature suggesting that overall diet quality may be more clinically informative than isolated nutrient intake (6). Systematic reviews and meta-analyses of observational studies have reported associations between healthier postdiagnosis dietary patterns and favorable mortality outcomes, although the magnitude and consistency of evidence vary according to the dietary index, outcome definition, and study population (7–9). These findings support dietary quality as an important survivorship consideration but do not establish that a particular dietary pattern independently prevents recurrence.

Antioxidants are biologically relevant because oxidative stress, reactive oxygen species, and cellular antioxidant systems participate in processes related to DNA damage, cellular signaling, carcinogenesis, and treatment response. Nevertheless, the relationship between antioxidant activity and cancer is complex, and laboratory evidence concerning antioxidant pathways cannot be directly translated into a recommendation that high-dose antioxidant supplementation treats breast cancer (10). Particular caution is warranted during chemotherapy and radiotherapy because some anticancer treatments depend partly on oxidative mechanisms. Observational studies examining antioxidant supplement use during or after breast-cancer treatment have generated context-dependent findings and have raised concerns about assuming that concentrated antioxidant supplementation is harmless or therapeutically advantageous during active treatment (11–13). Consequently, food-based nutrient intake and pharmacological-dose supplementation should not be regarded as biologically equivalent.

Macronutrient intake is similarly best interpreted within the overall diet and the patient's nutritional status. Adequate protein intake contributes to the maintenance of lean tissue and may be particularly relevant in patients at risk of cancer-related muscle loss (2,14). Carbohydrate quality affects fiber intake, glycemic exposure, and overall dietary quality, whereas dietary fats differ substantially in their metabolic characteristics according to source and composition. Body composition is also clinically relevant because reduced lean body mass and sarcopenia have been associated with treatment toxicity and adverse outcomes in women with breast cancer, although definitions, assessment methods, and patient populations vary across studies (15,16). The clinically relevant question is therefore not simply whether an individual consumes “protein,” “carbohydrate,” or “fat,” but how the amount and quality of these macronutrients contribute to an overall nutritionally adequate dietary pattern.

Against this background, the present study evaluated nutrition-related knowledge and self-reported antioxidant, macronutrient, dietary, and lifestyle behaviors among women recruited through breast-cancer care settings in Lahore, Pakistan. The analysis also examined selected relationships involving dietary-supplement use and family history while maintaining the distinction between reported behaviors and evidence of therapeutic or preventive effectiveness.

MATERIALS AND METHODS

A cross-sectional questionnaire study included 150 women aged 25–65 years who were recruited purposively from healthcare settings in Lahore, Pakistan. Participants were recruited through oncology and related clinical services during a six-month data-collection period.

A Food Frequency Questionnaire was used to assess habitual dietary patterns. Questionnaire items assessed reported intake or awareness of antioxidant-related foods and nutrients, including vitamin C, vitamin E, beta-carotene, selenium, and polyphenols. Macronutrient-related questions assessed reported consumption of protein, carbohydrate, and other broad dietary categories.

Additional variables included dietary-supplement use, family history of breast cancer, physical activity, selected lifestyle behaviors, previous health education, and beliefs concerning the role of diet and lifestyle in breast-cancer risk. The questionnaire therefore captured both reported dietary behavior and participants' nutrition-related knowledge and perceptions rather than objective biochemical measures of nutrient status.

Pregnant and lactating women and women with major renal, hepatic, or malabsorption disorders were excluded according to the study protocol.

Ethical approval was obtained from the Institutional Review Board of Superior University, Lahore, Pakistan.

Categorical data were summarized as frequencies and percentages. Associations between categorical variables were evaluated using contingency-table methods. Where complete cell counts could be reconstructed deterministically from the reported row and column totals, Pearson chi-square (χ^2) values were recalculated. Multi-category analyses containing several small expected cell counts were interpreted as exploratory rather than as robust confirmatory comparisons.

RESULTS

The mean age of participants was 46.95±10.53 years. The mean education-category code was 2.91±1.31, and the mean occupation-category code was 1.24±0.43.

Supplement Use and Antioxidant Intake

Fifty-seven participants reported dietary-supplement use, whereas 93 did not.

Table 1. Antioxidant Category by Supplement Use

Regular Antioxidant Category	Supplement Users	Non-Users	Total
Vitamin C	28	31	59
Vitamin E	9	14	23
Beta-carotene	5	8	13
Selenium	4	15	19
Polyphenols	1	3	4
None regularly	10	22	32
Total	57	93	150

The six-category χ^2 comparison yielded $p=0.361$. Several expected cell counts were small; therefore, this multi-category comparison should be interpreted as exploratory.

Antioxidant Awareness and Beliefs

Table 2. Supplement Use, Antioxidant Awareness, and Beliefs

Outcome	Supplement Users (n=57)	Non-Users (n=93)	p
Aware of potential antioxidant role: Yes	36 (63.2%)	44 (47.3%)	0.059
Aware: No	21	49	
Believe antioxidant-rich diet may lower breast-cancer risk: Yes	46 (80.7%)	62 (66.7%)	0.063
Believe not	11	31	

Neither association met the conventional $p<0.05$ threshold. Supplement users nevertheless showed numerically higher proportions of antioxidant awareness and belief in antioxidant-related risk reduction.

Macronutrient Awareness

Table 3. Macronutrient Category by Awareness

Reported Dietary Category	Aware	Not Aware	Total
Protein	26	23	49
Carbohydrates	52	35	87
"Healthy diet" source category	2	2	4
Sugar/processed foods	1	0	1
Does not consciously track macronutrients	2	7	9
Total	83	67	150

The association between macronutrient category and awareness yielded $p=0.228$. Because several cells contained very small counts, this result should be interpreted cautiously and not regarded as a robust confirmatory χ^2 finding.

Family History and Supplement Use

Twenty-eight participants reported a family history of breast cancer. The corresponding 2×2 distribution of family history and supplement use is presented in Table 4.

Table 4. Family History and Dietary-Supplement Use

Family History	Supplement Yes	Supplement No	Total
Yes	9	19	28
No	48	74	122
Total	57	93	150

Recalculation from the complete 2×2 table yielded Pearson $\chi^2=0.50$, $p=0.479$. Thus, family history was not significantly associated with dietary-supplement use in this analysis.

Additional Exploratory Relationships

Additional relationships involving family history, diet, knowledge, medical advice, lifestyle beliefs, and physical activity were examined as exploratory analyses.

Table 5. Additional Exploratory Associations

Relationship	p
Family history vs fruit/vegetable intake	0.031
Family history vs greater plant-based antioxidant intake	0.013
Family history vs fiber intake	0.171
Family history vs antioxidant-rich food intake	0.016
Family history vs macronutrient intake	0.146
Family history vs healthier dietary-pattern adoption	0.098
Family history vs antioxidant awareness	0.025
Family history vs belief in antioxidant risk reduction	0.039
Family history vs dietary modification	0.001
Family history vs macronutrient knowledge	0.017
Family history vs health-education engagement	0.045
Family history vs receipt of medical advice	0.001
Family history vs belief in diet-related risk reduction	0.017
Family history vs physical activity	0.239
Family history vs alcohol use	0.766
Family history vs tobacco use	0.737
Family history vs previous cancer diagnosis in self/relative	<0.001
Family history vs belief that lifestyle affects outcomes	0.009
Physical activity vs fruit/vegetable intake	0.013
Physical activity vs supplement use	0.235

These analyses are presented as exploratory p-value summaries. In the absence of effect-size estimates and measures of precision for these comparisons, statistical significance alone should not be interpreted as an indication of the magnitude or clinical importance of the observed relationships.

DISCUSSION

The present study describes nutritional awareness, dietary practices, supplement use, and lifestyle-related beliefs among women recruited through breast-cancer-related healthcare settings in Lahore. Supplement use was reported by 57 of 150 participants. Supplement users showed numerically greater antioxidant awareness and stronger belief in antioxidant-rich dietary patterns, but neither primary comparison reached conventional statistical significance. Family history was also not significantly associated with dietary-supplement use after reconstruction of the complete 2×2 table. The findings therefore characterize patterns of knowledge and behavior rather than demonstrating a therapeutic or preventive effect of antioxidant intake, macronutrient consumption, supplementation, or lifestyle modification.

The distinction between foods, dietary patterns, and concentrated supplements is particularly important when interpreting these findings. Plant-based foods naturally provide combinations of vitamins, minerals, fiber, and phytochemicals within a broader food matrix, whereas supplemental preparations may provide individual compounds at substantially higher doses. Cancer-survivorship guidance consequently prioritizes a healthy dietary pattern, appropriate body weight, and physical activity rather than routine high-dose supplementation for cancer control (1). Reviews specifically addressing breast-cancer survivorship similarly emphasize the overall quality of the diet rather than a single “anticancer” nutrient (6). Meta-analytic evidence has associated healthier dietary patterns after a cancer diagnosis with favorable mortality outcomes, although the evidence remains predominantly observational and associations vary across outcomes and dietary indices (7–9). These data therefore support dietary quality as part of comprehensive survivorship care without establishing that any particular food or nutrient independently prevents breast-cancer recurrence.

The antioxidant literature requires particular caution. Oxidative stress has important roles in carcinogenesis, cellular signaling, and treatment response, but antioxidant activity can have different biological consequences depending on compound, dose, timing, disease context, and treatment exposure (10). This complexity is especially relevant during chemotherapy or radiotherapy. Studies examining antioxidant supplement use in women receiving breast-cancer treatment have raised concern about indiscriminate supplementation during active therapy, whereas other observational studies have

produced differing associations depending on supplement type and timing (11–13). The present survey cannot resolve these treatment-specific questions because supplement dose, duration, formulation, treatment regimen, and temporal relationship between supplementation and therapy were not evaluated. Its findings should therefore be interpreted as evidence regarding supplement-related behavior and beliefs rather than evidence supporting or opposing a specific antioxidant treatment strategy.

Macronutrient awareness should likewise be understood in the context of overall nutritional adequacy and body composition. Adequate dietary protein contributes to the maintenance of muscle tissue, and nutritional guidance for patients with cancer emphasizes preservation of nutritional status and lean body mass, particularly when reduced intake or treatment-associated catabolism is present (2,14). This issue is clinically relevant because systematic reviews in women with breast cancer have associated low lean body mass or sarcopenia with greater treatment toxicity and less favorable outcomes, although heterogeneity in definitions and body-composition assessment remains substantial (15,16). The broad macronutrient categories used in the current questionnaire therefore cannot establish whether individual participants had nutritionally adequate protein, carbohydrate, fat, fiber, or total energy intake. They primarily reflect reported dietary orientation and awareness.

Physical activity represents another important component of survivorship care. International exercise guidance supports regular activity for cancer survivors, with appropriate individualization according to treatment effects, symptoms, functional capacity, and comorbidity (3). Meta-analyses of observational breast-cancer cohorts have found associations between postdiagnosis physical activity and improved overall or breast-cancer-related prognosis (17,18), while randomized-trial evidence supports benefits of exercise for physical functioning and other survivorship outcomes (19). Lifestyle interventions combining exercise, diet, and weight-management strategies can also improve body composition or behavioral adherence among women with breast cancer (20). Randomized studies such as the InForma, Living Well after Breast Cancer, exercise-and-diet, and LISA interventions demonstrate that structured lifestyle programs can modify dietary behavior, physical activity, weight, or body composition in selected survivor populations (21–24). These intervention effects should not, however, be equated automatically with proof that a specific dietary or lifestyle program prevents recurrence or improves survival, because many such trials were designed primarily around behavioral or anthropometric rather than cancer-outcome endpoints.

The family-history analyses suggest that participants with a family history may have differed from those without such history in several areas of nutritional awareness, dietary modification, health education, and receipt of medical advice. Family history can influence perceived breast-cancer susceptibility, but risk awareness among women with affected relatives is not necessarily uniform or accurate (25). The pattern observed in the present study may therefore reflect heightened engagement with health information among some participants who perceived themselves to be at greater familial risk. This interpretation remains cautious because the study did not directly measure perceived susceptibility, health-information seeking, genetic counseling, or the quality and source of participants' nutritional information.

The large number of exploratory associations in Table 5 also requires statistical caution. Repeated hypothesis testing increases the probability that at least some nominally significant *p* values will occur by chance, particularly when multiple comparisons are performed without a prespecified hierarchy or multiplicity adjustment (26). Accordingly, individual *p* values such as those involving dietary modification, medical advice, antioxidant awareness, or fruit and vegetable intake should be regarded as hypothesis-generating rather than independent confirmatory evidence. The absence of corresponding effect estimates further limits assessment of the magnitude and practical importance of these relationships.

Several additional limitations affect interpretation. The cross-sectional design does not establish temporal sequence and therefore cannot determine whether nutritional knowledge preceded dietary behavior, whether family history caused behavioral modification, or whether any reported behavior influenced clinical outcome. Dietary information was self-reported and is consequently susceptible to recall error, misclassification, and social-desirability effects. The purposive recruitment strategy from healthcare settings in Lahore limits generalizability to women outside similar clinical settings. Broad dietary categories do not quantify nutrient dose, total energy intake, portion size, supplement dose, duration of use, or biochemical nutrient status.

The study also did not analyze tumour stage, molecular subtype, treatment regimen, treatment phase, recurrence status, body composition, weight change, treatment toxicity, quality of life, or survival. These variables are essential for evaluating whether nutritional exposures are related to breast-cancer

treatment response or prognosis. The observed relationships therefore concern reported behaviors, awareness, and beliefs and should not be interpreted as evidence that antioxidant supplementation, a particular macronutrient distribution, or lifestyle modification altered cancer progression or treatment effectiveness.

Despite these limitations, the study contributes local descriptive information regarding nutrition-related beliefs and behaviors in women recruited from breast-cancer healthcare settings in Lahore. The findings identify areas in which structured nutrition education may be relevant, particularly the distinction between food-based healthy dietary patterns and unsupervised supplement use. Future studies using validated quantitative dietary assessment, detailed supplement exposure, objectively measured physical activity, anthropometric and body-composition measures, clinical tumour characteristics, treatment data, and longitudinal follow-up would be better positioned to evaluate how nutritional and lifestyle factors relate to patient-centered and oncological outcomes.

CONCLUSION

The study demonstrates variation in antioxidant-related knowledge, supplement use, dietary beliefs, macronutrient awareness, and lifestyle behaviors among women recruited through breast-cancer healthcare settings in Lahore. Supplement use was not significantly associated with regular antioxidant category, antioxidant awareness, or belief in antioxidant-related risk reduction at the conventional 0.05 threshold. Family history was also not significantly associated with supplement use in the reconstructed 2×2 analysis, although several other family-history relationships were observed in exploratory analyses. These findings describe nutrition-related beliefs and behaviors and may help identify areas for patient education. They do not establish that antioxidant supplementation, macronutrient modification, or lifestyle change treats breast cancer, prevents recurrence, or improves survival. Nutritional and lifestyle advice for women affected by breast cancer should therefore remain grounded in comprehensive survivorship guidance, individual nutritional status, clinical circumstances, and appropriate professional assessment rather than therapeutic claims concerning isolated nutrients.

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