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Ethnicity-based Differences in Post-diagnosis Dietary and Lifestyle Changes among Breast Cancer Patients in Israel: A Cross-sectional Study

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Abstract

Background: Integrative oncology emphasizes the role of dietary and lifestyle factors in cancer recovery and survivorship. Cultural and ethnic differences may influence patients' behaviors following diagnosis.

Objective: To evaluate ethnicity-based differences in dietary and lifestyle changes after breast cancer diagnosis in Israel and explore their associations with clinical and informational factors.

Material and methods: A cross-sectional survey was conducted at a tertiary oncology center in northern Israel. A structured questionnaire was administered to 462 breast cancer patients (233 Arab and 229 Jewish women) during follow-up visits. Data included demographics, cancer stage, dietary habits before and after diagnosis, use of Complementary and Alternative Medicine (CAM) and trust in health information sources. Non-parametric statistical tests were used.

Results: Arab women were significantly younger than Jewish women (mean age 47 vs. 56.9 years; $p<0.0001$). Post-diagnosis dietary changes were reported by 74% of Arab and 89% of Jewish women ($p=0.0018$). Sugar reduction was more common among Arab women (68.4% vs. 56.1%; $p=0.0135$), while meat reduction was more frequent among Jewish women (73.9% vs. 61.5%; $p=0.0097$). Among Arab women, an earlier cancer stage was associated with dietary change ($p<0.00001$). Lower trust in social media was associated with a greater likelihood of dietary change ($p<0.0001$). The use of CAM increased post-diagnosis in both groups, with no significant ethnic differences observed.

Conclusion: Ethnicity significantly influences dietary behavior and trust in health information among breast cancer patients. These findings support the need for culturally tailored, evidence-based nutritional counseling as part of integrative oncology care.

Keywords: Breast cancer • Dietary change • Complementary medicine • Ethnicity • Integrative oncology

Abbreviations: BC: Breast Cancer; CAM: Complementary and Alternative Medicine; IRB: Institutional Review Board; IF: Impact Factor; Q: Quartile (Journal Ranking Quartile); WCRF/AICR: World Cancer Research Fund/American Institute for Cancer Research; WHO: World Health Organization; SD: Standard Deviation; r: Effect Size (Correlation Coefficient); p: p-value (Statistical Significance)

Introduction

With the growing emphasis on promoting healthy behaviors in survivorship care, breast cancer remains the most frequently diagnosed malignancy and the leading cause of cancer-related death among women worldwide [1]. Its global impact extends beyond the immediate medical context, affecting psychological, social and behavioral domains of patients' lives [2-4]. With improved survival rates resulting from advances in screening and treatment [5,6], there is growing recognition of the need to address long-term survivorship issues, including lifestyle factors such as diet, physical activity and complementary and integrative therapies.

Integrative oncology is an evolving field combining conventional cancer treatment with evidence-based complementary approaches to address patients' physical, emotional and spiritual well-being. Among these approaches, dietary change is one of the most common lifestyle modifications reported by breast cancer patients [7,8]. Patients may reduce or eliminate certain food groups, such as sugar or meat, adopt vegetarian or plant-based diets, or increase their perceived "anti-cancer" foods [7,8]. These changes are often driven by a desire to enhance recovery, prevent recurrence, reduce treatment-related side effects, or regain control over one's health [9-11].

Despite increasing interest in the relationship between diet and cancer, the scientific evidence supporting specific dietary recommendations for breast cancer survivors remains mixed [12-15]. Nevertheless, numerous patients independently adopt dietary changes following their diagnosis, frequently based on information from non-professional sources, including social media, blogs and peer communities [16,17]. This trend underscores a growing need to better understand patient motivations, perceptions and sources of guidance in making these health-related decisions.

Israel presents a unique setting for studying ethnicity-related differences in integrative cancer care. While Israel provides universal health coverage, structural and cultural barriers may still impact how different groups access, interpret and act upon medical information [18-21]. Previous studies have highlighted differences in breast cancer incidence, age at diagnosis and

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survival between Arab and Jewish women in Israel [22,23]. Arab women are generally diagnosed at a younger age and may be more likely to present with advanced-stage disease [22,23].

Given these differences, it is plausible that post-diagnosis behavior, including dietary change and use of CAM, also varies between ethnic groups. Moreover, the sources from which patients receive health-related information and the level of trust they place in these sources may significantly influence the nature and extent of such changes. Social media platforms, in particular, have become a prominent source of medical advice and misinformation [24,25]. Understanding patients' trust in these platforms and whether it affects health decisions is vital in the era of digital health.

To date, limited research has examined how ethnicity influences integrative health behaviors among breast cancer patients in Israel. Even fewer studies have specifically assessed how dietary change, complementary medicine use and trust in information sources interact with clinical variables such as age, stage of disease and pre-diagnosis habits [26-30].

This study addresses these gaps by conducting a cross-sectional survey of Arab and Jewish breast cancer patients in a large area in Israel. The objectives of the study were: (1) to assess the prevalence and types of dietary changes reported post-diagnosis; (2) to compare the use of complementary medicine and trust in health information sources between the two ethnic groups; (3) to evaluate the association between pre-diagnosis dietary habits and post-diagnosis change; and (4) to analyze whether demographic or clinical factors such as age or disease stage are associated with these behaviors.

The findings from this study aim to provide evidence that can inform culturally appropriate integrative oncology practices. By identifying patterns and disparities in lifestyle changes and health information trust, this research can contribute to developing tailored patient education strategies and supportive care interventions that respect patients' cultural backgrounds and promote evidence-based survivorship care.

Materials and Methods

Study design and data sources

This study utilized a cross-sectional survey design to examine ethnicity-based differences in post-diagnosis dietary and lifestyle behaviors among breast cancer patients in Israel. Data were collected through a structured, paper-based questionnaire administered to patients attending routine oncology follow-up appointments at Emek Medical Center, a tertiary hospital in northern Israel.

The questionnaire captured a wide range of information, including sociodemographic variables (age, ethnicity, education level and community size), clinical data (cancer stage at diagnosis), pre-and post-diagnosis dietary habits, use of Complementary and Alternative Medicine (CAM), sources of health-related information and the level of trust patients placed in those sources.

Population and control

The study included a total of 462 female breast cancer patients, comprising 233 Arab and 229 Jewish women. Eligibility criteria included age ≥ 18 years, a confirmed diagnosis of breast cancer and the ability to provide informed consent. The design focused on cross-ethnic comparisons within a clinical population, allowing for the identification of culturally driven behavioral differences without the confounding effects of disease presence *vs.* absence.

Before selecting the appropriate statistical tests, the distribution of continuous variables, including age, was assessed using the Shapiro-Wilk test. The results demonstrated that age was not normally distributed within either the Arab or Jewish patient groups (p<0.001 for both groups), justifying the use of non-parametric tests such as the Wilcoxon and Kruskal-Wallis tests for further analysis (Table 1).

Table 1 displays the results of Shapiro–Wilk normality tests for age distribution in each ethnic group. Both distributions were found to be non-normal (p<0.001), supporting the use of non-parametric statistical tests in subsequent analyses.

Study outcomes and analysis

The primary outcomes were (1) the proportion of patients reporting dietary changes after breast cancer diagnosis and (2) the types of changes made (e.g., reduced sugar or meat consumption). Secondary outcomes included the use of complementary medicine and levels of trust in various sources of health information, particularly social media. The required sample size was calculated to achieve statistical significance for a 12.5% proportion difference, with a 95% confidence level and 0.80 power. This resulted in a required sample size of 193 participants in each group. The primary objective of this study was to examine dietary trends among breast cancer patients as a function of ethnicity.

The data in the current study were collected using paper-based surveys. The items in the survey included scale-based items (e.g., age), Likert-scale items (e.g., mistrust of medical recommendations on social media), binary-response items and multiple-response items (e.g., items allowing participants to select more than one answer).

Likert-scale items were analyzed using the Wilcoxon and Kruskal-Wallis tests. Binary-response items were analyzed using chi-squared tests. Multiple-response items were categorized by response categories and were analyzed using chi-squared tests, provided that at least 30% gave a specific response. For example, if 300 patients reported having made post-diagnosis dietary changes, a particular reaction regarding the nature of these changes would only be analyzed if at least 90 participants chose this response. Since age was not normally distributed within ethnicity groups, it was analyzed using the Wilcoxon and Kruskal-Wallis tests. Normality was assessed using the Shapiro-Wilk test.

P-values are reported for all analyses, including non-significant ones. Effect sizes and Wilcoxon/Kruskal-Wallis effects are reported to be significant. Some considerable results are displayed graphically throughout the text. Percentages are calculated based on the total number of respondents in a given item. All statistical analyses were performed using R ver. 4.4.2.

Covariates

Collected covariates included age, education level, ethnicity, stage of cancer, community size (as a proxy for urban *vs.* rural residence) and pre-diagnosis dietary habits. These variables were used to stratify outcomes and assess associations between demographic/clinical features and post-diagnosis behavior.

Ethical statement

This study was approved by the Institutional Review Board (IRB) of Emek Medical Center (Approval number: All participants provided informed consent before participation. As part of the survey documentation, respondents were asked to record their full name, surname and national identification number, allowing for verification of eligibility and linkage to medical records where necessary. The study adhered to the principles of the Declaration of Helsinki.

Results

Participant characteristics

A total of 462 breast cancer patients completed the survey, including 233 Arab and 229 Jewish women. The mean age of participants was 51.9

Table 1. Shapiro-wilk normality tests for age distribution by ethnicity.

Analysis Category	Comparison	n	Statistic	p-value	Significance
Age	Age among Arabs	233	0.97228	0.000159	***
Age	Age among Jews	228	0.96311	1.25E-05	***

years (SD=13.2), with Arab women significantly younger than Jewish women (p<0.0001, r=0.37). Stage at diagnosis also differed between groups (p=0.0034, r=0.14), with a higher proportion of Arab women diagnosed at later stages. No significant group differences were observed in education level (p=0.23) or community size; however, most Arab women (66.4%) lived in communities with more than 5,000 residents. Full details are presented in Table 2.

Table 2 summarizes the demographic characteristics of the study participants according to ethnicity. A total of 233 Arab and 228 Jewish breast cancer patients were included. Arab patients were diagnosed at a younger age compared to Jewish patients (mean age 47 *vs.* 56.9 years, respectively). The distribution of cancer stage at diagnosis was relatively similar between the groups, with a slightly higher proportion of early-stage disease (stages 0–1) among Jewish patients. Educational attainment differed between groups, with a higher proportion of Arab patients having an academic education (55.95%) than Jewish patients (47.14%). Regarding community size, most Arab participants resided in larger communities (>5,000 residents), whereas Jewish participants were more evenly distributed across different community sizes. These demographic differences may influence post-diagnosis dietary and lifestyle changes and are essential to consider in interpreting the study findings.

Dietary habits and changes

Pre-diagnosis dietary change differed significantly between ethnicities: only 17.2% of Arab women reported dietary changes before diagnosis compared to 32.4% of Jewish women (p=0.0025). Post-diagnosis, a higher proportion of both groups reported nutritional changes, with 74.0% of Arab women and 89.1% of Jewish women indicating they changed their diet after diagnosis (p=0.0018). Among those who changed their diet post-diagnosis, the nature of change also varied: reduction in sugar consumption was more common among Arab women (68.4%) than Jewish women (56.1%; p=0.0135), whereas meat reduction was more prevalent among Jewish women (73.9%) than Arabs (61.5%; p=0.0097) (Figure 1). A marginally significant association was found between following a specific diet before diagnosis and changing one's diet afterward (p=0.0523), with patients with prior dietary habits being more likely to continue or intensify dietary change post-diagnosis. When stratified by ethnicity, among Arab women, dietary change was significantly associated with the cancer stage (p<0.00001, r=0.30), with patients diagnosed at earlier stages more likely to report nutritional modifications. No association was observed among Jewish women (p=0.263).

Figure 1 illustrates the significant differences in dietary behaviors between Arab and Jewish breast cancer patients, with a focus on four key nutritional changes.

Jewish patients were significantly more likely to report dietary modifications both before and after diagnosis, as well as a reduction in meat consumption after diagnosis, compared to Arab patients (p<0.01 for all three comparisons). Conversely, a significantly higher proportion of Arab patients reported adopting a sugar-reduced diet after diagnosis compared to Jewish patients (p<0.05).

The Figure highlights ethnicity-based variations in dietary adjustments following a cancer diagnosis, which may reflect cultural differences, access to information, or variations in the type of dietary counseling received.

Use of Complementary and Alternative Medicine (CAM)

There were no significant differences in Complementary and Alternative Medicine (CAM) use between ethnic groups. Before diagnosis, 25.2% of Arab women and 28.7% of Jewish women reported using CAM (p=0.62). Post-diagnosis usage increased in both groups (45.9% in Arabs and 55.8% in Jews), yet the difference remained non-significant (p=0.18). These findings suggest a moderate but ethnically consistent increase in the use of integrative practices following cancer diagnosis.

Information sources and trust

Regarding sources of health-related information, the most commonly cited platforms across all participants were social media (54.4%), followed by friends and family (42.5%), medical websites (45.3%) and medical staff (33.2%) (Table 3). No significant ethnic differences were observed in the likelihood of consulting social media (p=0.43), friends (p=0.42), or medical staff (p=0.46). However, Jewish patients were significantly more likely to consult medical websites (54.5% *vs.* 37.0%, p=0.0007).

Among participants who received information from social media, the likelihood of following that advice did not differ by ethnicity (p=1.0). Additionally, no significant difference was found in whether patients consulted diet-specific sources of information by ethnicity (p=0.99), nor when comparing only those who changed their diet (p=0.35).

Table 3 presents the results of chi-squared tests comparing Arab and Jewish breast cancer patients across a range of post-diagnosis behaviors, including dietary changes, use of complementary medicine and trust in information sources. Percentages reflect the proportion of patients responding affirmatively within each group. Significant p-values are noted with asterisks.

Trust in social media

Mistrust in social media as a source of health information was significantly associated with ethnicity and behavior. Arab women expressed higher mistrust

Table 2. Demographic characteristics of study participants by ethnicity.

	Arab(n=233)	Jewish(n=228)
	Age	
Min	20	32
Max	86	81
Mean	47	56.9
SD	11.7	12.8
	Stage	
0	15(6.7%)	22(10.14%)
1	66(29.5%)	81(37.33%)
2	63(28.12%)	63(29.03%)
3	39(28.12%)	25(11.52%)
4	41(17.41%)	26(12%)
	Education	
<High school	27(11.9%)	17(7.5%)
High school	73(32.16%)	103(45.4%)
Academic	127(55.95%)	107(47.14%)
	Community size	
<1,000 residents	23(10.04%)	71(34%)
1,000–4,999	54(23.6%)	36(17.22%)
≥ 5,000	152(66.4%)	102(48.8%)

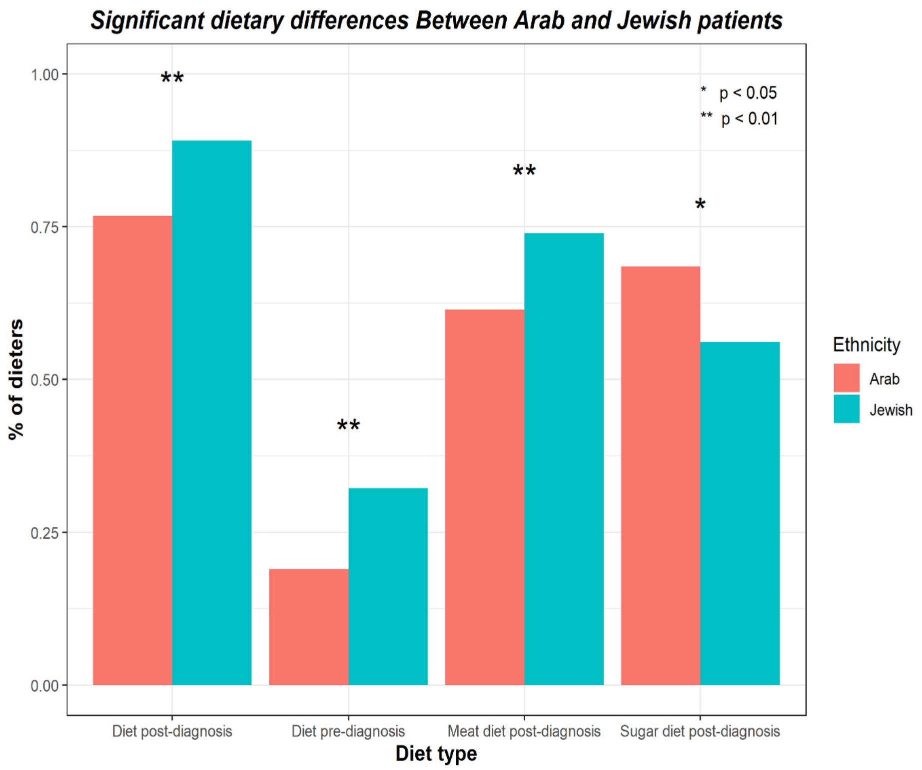

Figure 1. Significant differences in dietary changes between Arab and Jewish breast cancer patients.

Table 3. Summary of proportion tests and normality assessments by ethnicity.

Comparison Category	Variable Compared	Group 1(n)	Group 2(n)	% Group 1	% Group 2	Chi-squared	p-value	Significance
Diet and consultation	Diet pre × Ethnicity	211	214	0.1896	0.3224	9.15	0.0025	**
	Diet post × Ethnicity	224	231	0.7402	0.8918	10.06	0.0018	**
	Alt. med pre × Ethnicity	208	207	0.2517	0.287	0.64	0.4242	
	Alt. med post × Ethnicity	210	210	0.3905	0.4602	2.63	0.1047	
	Sugar diet post × Ethnicity	224	231	0.6836	0.561	6.17	0.0135	*
	Meat diet post × Ethnicity	224	231	0.5982	0.739	6.79	0.0097	**
	SM use × Ethnicity	203	203	0.5099	0.5829	2.86	0.0908	
	SM info consult × Ethnicity	196	192	0.4489	0.4434	0.06	0.8091	
	Diet info(among dieters) × Ethnicity	172	165	0.4535	0.4788	0.24	0.6242	
	Diet post × Diet pre	141	141	0.8074	0.8265	0.33	0.5233	
	Sugar diet post × Diet pre	64	64	0.6093	0.8281	2.99	0.0839	
	Meat diet post × Diet pre	73	73	0.726	0.8356	0.36	0.5486	
Info source among dieters/SM users	SM use × Ethnicity	103	203	0.5099	0.5829	2.86	0.0908	
	SM consult × Ethnicity	103	203	0.5829	0.5891	0.09	0.7642	
	Friends × Ethnicity	87	187	0.4483	0.459	0.68	0.4083	
	Medical staff × Ethnicity	91	193	0.5165	0.5932	1.58	0.2082	
Diet reasons	Remission × Ethnicity	172	164	0.6163	0.5976	0.32	0.5744	
	General health × Ethnicity	172	164	0.5434	0.4573	5.07	0.0244	*

levels than Jewish women (p=0.049, r=0.10). Moreover, patients who reported post-diagnosis dietary changes were significantly more mistrustful of social media than those who did not (p<0.0001, r=0.23). When analyzed by ethnicity, the association between diet change and mistrust in social media remained significant among Arab women (p<0.000001, r=0.35) but was not significant among Jewish women (p=0.87, r=0.01). A combined Kruskal-Wallis analysis confirmed a strong interaction effect between ethnicity and dietary change on mistrust levels (p=0.0000038).

Motivations for dietary change

Participants who reported making dietary changes post-diagnosis most commonly cited “remission” (48.2%) and “general health” (39.3%) as motivating factors. A smaller proportion mentioned side effects of treatment (11.9%) or a desire for greater personal control (7.4%). Among those who did not change their diet, the primary reasons included the belief that dietary change was ineffective (36.1%) or a lack of information (27.8%).

When stratified by ethnicity, motivations for dietary change showed minimal differences. For example, the proportion of patients citing “remission” as a motivator did not significantly differ between Arabs and Jews (p=0.57). However, Jewish women were more likely to cite “general health” as a reason for change (45.7%) compared to Arab women (33.1%; p=0.024).

Age and education associations

There was no significant association between age and dietary change post-diagnosis across the sample (p=0.64). However, a subgroup analysis found a significant association among Arab women (p=0.033), where younger women were more likely to change their diets. Among Jewish women, no age association was observed (p=0.69). Education level was not significantly associated with dietary change (p=0.54) or ethnic group (p=0.23).

Discussion

International dietary guidelines for breast cancer survivors, including those by the American Cancer Society and the WCRF/AICR, recommend a balanced, plant-based diet rich in vegetables, fruits, whole grains and legumes, while limiting red and processed meats, added sugars and highly processed foods [31,32]. These emphasize moderation rather than restrictive patterns.

Against this backdrop, our findings reveal a growing trend toward radical dietary changes, notably the near-complete elimination of carbohydrates. While motivated by health improvement, such extreme behaviors diverge from evidence-based recommendations and may cause nutritional deficiencies or food-related anxiety.

This discrepancy raises critical questions about access to nutritional guidance, cultural influences on health beliefs and the role of informal information sources. Our study was motivated by the clinical observation that breast cancer patients often seek radical dietary changes, especially in communities with limited access to registered dietitians, where social media and informal networks fill the information gap.

Our findings confirmed these concerns. Arab women were more likely to eliminate sugar and staple carbohydrates, suggesting a broader belief that "carbohydrates feed cancer," despite the lack of definitive scientific evidence. This likely stems from misinterpretations of studies on glucose metabolism and the "Warburg effect" [33]. Without professional supervision, such restrictive practices may lead to fatigue, micronutrient deficiencies, constipation and weight loss, adversely affecting recovery [34-36]. The prevalence among Arab women highlights possible gaps in culturally accessible dietary guidance.

In contrast, Jewish women more commonly reduced meat consumption post-diagnosis. While less extreme, this trend reflects the influence of Western health narratives. The WHO classifies processed meat as a Group 1 carcinogen and red meat as a probable Group 2A carcinogen [37], although the link to breast cancer remains modest [38,39]. Nevertheless, unsupervised meat reduction can also cause deficiencies, especially in chemotherapy patients [40]. Thus, despite differing dietary changes across ethnic groups, both trends carry risks without professional advice.

Both Arab and Jewish women were motivated to act post-diagnosis, but their motivations differed. Arab women were more driven by the goal of remission, reflecting a reactive approach. In contrast, Jewish women framed changes to improve general health, suggesting a proactive, survivorship-focused mindset. These differences underline the importance of culturally tailored communication strategies.

Importantly, Arab women diagnosed at earlier stages were more likely to adopt dietary changes, supporting theories linking perceived control over illness to behavior modification [40]. In contrast, no significant stage-behavior relationship was observed among Jewish women, possibly due to higher baseline engagement in health-promoting behaviors or greater access to dietary counseling.

Information sources played a significant role. Jewish women more often consulted formal medical websites, while Arab women relied on interpersonal networks and social platforms. Interestingly, despite relying on social media, many Arab women reported distrust toward these sources, highlighting a psychological tension between the need for information and doubts about its reliability. Such dissonance may risk patients abandoning both professional and non-professional advice.

Dietary change barriers, explored more thoroughly among Jewish women, included doubts about effectiveness, lack of information and distrust of advice. Similar obstacles likely exist among Arab women, emphasizing the need for targeted, culturally sensitive dietary counseling to avoid both unsupervised restrictive diets and complete inaction.

This study underscores the need to integrate culturally competent nutrition counseling into breast cancer care, recognize ethnic-specific beliefs when discussing lifestyle modifications and equip patients to evaluate the health information they encounter online critically.

Limitations

This study's cross-sectional design limits causal inference between diagnosis and behavior changes. Self-reported data may introduce recall and social desirability biases. The sample was drawn from a single medical center, which may affect the generalizability of the findings to broader populations.

Conclusion

This study highlights meaningful ethnic differences in post-diagnosis dietary behaviors, motivations and trust in health information among breast cancer patients in Israel. While Arab women were more likely to reduce sugar intake and express mistrust in social media, Jewish women more often adopted meat-restricted diets and cited general health as a primary motivator. These findings underscore the importance of culturally sensitive, evidence-based dietary counseling and emphasize the need to address health misinformation. Integrative oncology strategies must be adapted to diverse patient populations' unique cultural, informational and motivational contexts to improve survivorship care.

Conflict of Interest

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