RESEARCH ARTICLE

Impact of Healthy Eating Practices and Physical Activity on Quality of Life among Breast Cancer Survivors

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Abstract

Following breast cancer diagnosis, women often attempt to modify their lifestyles to improve their health and prevent recurrence. These behavioral changes typically involve diet and physical activity modification. The aim of this study was to determine association between healthy eating habits and physical activity with quality of life among Iranian breast cancer survivors. A total of 100 Iranian women, aged between 32 to 61 years were recruited to participate in this cross-sectional study. Eating practices were evaluated by a validated questionnaire modified from the Women's Healthy Eating and Living (WHEL) study. Physical activity was assessed using the International Physical Activity Questionnaire (IPAQ). A standardized questionnaire by the European Organization of Research and Treatment of Cancer Quality of Life and its breast cancer module (EORTC QLQ-C30/+BR-23) were applied to determine quality of life. Approximately 29% of the cancer survivors were categorized as having healthy eating practices, 34% had moderate eating practices and 37% had poor eating practices based on nutrition guidelines. The study found positive changes in the decreased intake of fast foods (90%), red meat (70%) and increased intake of fruits (85%) and vegetables (78%). Generally, breast cancer survivors with healthy eating practices had better global quality of life, social, emotional, cognitive and role functions. Results showed that only 12 women (12%) met the criteria for regular vigorous exercise, 22% had regular moderate-intensity exercise while the majority (65%) had low-intensity physical activity. Breast cancer survivors with higher level of physical activity had better emotional and cognitive functions. Healthy eating practices and physical activity can improve quality of life of cancer survivors. Health care professionals should promote good dietary habits and physical activity to improve survivors' health and quality of life.

Keywords: Breast cancer survivors - eating practices - physical activity - quality of life - Iran

Introduction

The number of cancer survivors worldwide is estimated to increase three times from 25 million in 2008 to 75 million in 2030 globally (Ferlay et al., 2010). In the last decade breast cancer patients had the highest survival record (27%) globally (Parkin and Fernandez, 2006; Jemal et al., 2009).

Since it is well documented that cancer patients face physical and emotional challenges after undergoing treatment (Lopez et al., 2005), they are willing to modify their lifestyle in order to increase well-being as well as prevent recurrence (Monninkhof et al., 2007); they are also enthusiastic to get more information related to food choices, dietary supplement, complementary nutritional therapies and physical activity modification to improve their quality of life (Pinto et al., 2002; Brown et al., 2003). Quality of life is a multidimensional concept which covers

various areas related to physical, emotional, sexual or social functioning (Victorson et al., 2007).

The need for informed lifestyle choices for cancer survivors becomes particularly important as they search for the best strategies to improve their response to treatment, recovery, reduce risk of recurrence and improve survivorship (Fink et al., 2006). Several studies (Salminen et al., 2000; Maunsell et al., 2002; Thomson et al., 2002; Shaharudin et al., 2012) have found the most common dietary changes were decreased consumption of dietary fat and increased intake of fruits and vegetables among breast cancer survivors.

Breast cancer patients are at an increased risk of developing fatigue, sleep disturbances, pain and psychological distress such as depression, anxiety, negative thoughts, fear of cancer recurrence, death, sense of loneliness, sexual and body image problems that adversely affect their overall quality of life and

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survivorship (Knobf, 2007). Studies show that quality of food is directly associated with quality of life among breast cancer survivors (Ravasco et al., 2005; Wayne et al., 2006). Physical activity among breast cancer survivors correlates with improved quality of life (Ogunleye and Holmes, 2009). Therefore, effective exercises improve not only the quality of life of cancer patients but also the prognosis for survival (Meyerhardt et al., 2006).

However the role of eating practices and physical activity has not fully investigated among Iranian breast cancer survivors. Therefore this study looked at the association between food intake practices and physical activity with quality of life among Iranian breast cancer survivors.

Materials and Methods

Design

This cross-sectional study was conducted to assess eating practices, level of physical activity and quality of life among Iranian breast cancer survivors. Study protocol was approved by the Ethics Committee of Universiti Kebangsaan Malaysia (UKM). A total of 100 breast cancer survivors were recruited as subjects in the study from October 2011 to February 2012 performed in the outpatient Oncology clinic of the Golestan hospital, Ahvaz, Iran. This clinic is the referral medical centre in south west of Iran.

Subjects

The 100 participants were selected through non-probability sampling method among breast cancer survivors who were referred to an out-patient oncology clinic by their oncologist and treated for breast cancer. In the context of this study, breast cancer survivors are defined as those who have completed treatment and have lived six months to five years after that. The age of the subjects ranged between 18-70 years and may or may not be receiving Hormone Replacement Therapy. The consent form was signed by the subjects and a witness who is a family member. Subjects were excluded if they had any other chronic diseases. Sample size was calculated with 95% confidence interval and 80% study power following the method of Sample Size Determination in Health Studies. All the data was collected during a face-to-face interview with the subjects.

Instruments

A set of questionnaires was used to obtain information from the subjects such as socio-demographic data, eating practices, quality of life and level of physical activity. Subjects were asked about demographic characteristics consisting of name, age, date of birth, marital status and level of education. They were also investigated about employment status and their monthly income as well permanent residential zone (urban, rural areas) and contact details.

Eating Patterns questionnaire for breast cancer survivors is a self-report questionnaire that was developed and validated by Pierce et al. (1997) in the Women's Healthy Eating and Living (WHEL) study. The questionnaire

was modified based on Iranian dietary habits. This questionnaire is a dietary assessment instrument designed to assess habits related to food selection and intake among breast cancer survivors; the questionnaire has two sections. The first section is a table which contains food known to cause cancer and those which have anti-cancer properties (Donaldson, 2004). This table was used to compare food items before diagnosis and after treatment.

Based on current dietary guidelines (Bauman and Waldman, 2012; Rock et al., 2012) for cancer survivors, dietary changes were categorized as positive or negative change (for positive change +1 and for negative change zero score). Changes were considered positive if there was an increase in the intake of fish, fruit, vegetables, legumes and white meat while changes were recorded as negative if intake of red meat, fried foods, fast foods (which may contain large quantities of fat) increased. Changes in dairy products were qualified as positive if the subject reported consuming products with a lower milk-fat content.

The second part of the questionnaire consists of questions about food preparation methods. Those who scored 38 and above were seen as having good eating practice and those with a score of 36 or less is considered low (those who scored between 36-38 was considered as having moderate eating practices). After modifying and translating the questionnaire to Persian language, it was pretested on 10 subjects equal to 10% of the entire population (sample size). The Cranach's alpha coefficient was used to test the reliability of questionnaire and a value of 0.7 was considered satisfactory.

Physical activity was assessed by International Physical Activity Questionnaire (IPAQ). The short form of IPAQ is a seven-item measure of four domains of activity: vigorous-intensity PA (defined as activities that make a person breathe much harder than normal); moderate-intensity PA (defined as activities that make a person breathe somewhat harder than normal); walking and sitting. For each activity domain, examples are provided to indicate that participants are to report activities of work, leisure-time, household chores, gardening and transportation. Participants report frequency (during the last seven days) and duration (minutes/hours usually spent on one of those days). Participants also report the total time they spend sitting on a week day during the last seven days (Craig et al., 2003). It was validated in Persian language by Ataei et al. (2004).

The IPAQ incorporates a scoring mechanism whereby each activity is assigned as an intensity code expressed in terms of Metabolic Equivalent (METs). The MET is the ratio of metabolic rate during the activity as compared with the metabolic rate during rest. For each type of activity, the weighted MET minute per week is calculated as follows (IPAQ, 2005): 1) Walking MET-minute/week = 3.3 x walking minutes x walking days. 2) Moderate MET-minute/week=4.0 x moderate intensity activity minutes x moderate activity days. 3) Vigorous MET-minute/week=8.0 x vigorous intensity activity minutes x vigorous activity days.

The total physical activity MET-minute/ week value was then computed by summing the walking, moderate and vigorous MET minute/week scores. The scores

were then categorized into low, moderate and vigorous physical activity level according to the IPAQ categorical classification (IPAQ, 2005).

Quality of life (QOL) was assessed using standard questionnaire of European Organization for Research and Treatment of Cancer entitled "Quality of life Questionnaire version 3.0 and its breast cancer module (QOL-C30/+BR23). EORTC QLQ-C30 Version 3.0 (Aaronson et al., 1993) validated in Persian language by Montazeri et al. (1999) and its breast cancer module (QOL-BR23) was validated in Persian language by Montazeri et al. (2000) which used to assess QOL among breast cancer survivors. This instrument is a 30 item multi-dimensional cancer–specific questionnaire developed to assess the QOL of cancer patients in the following domains: functional scales, symptom scales, global QOL and single items. It contains five functional scales (Physical, role, cognitive, emotional and social), symptoms scale (fatigue, nausea, vomiting, pain, dyspnea, insomnia, appetite loss, constipation, diarrhoea, financial difficulties) with one global health scale (GHS) and six single items assessing symptoms and financial impact of disease.

Breast cancer module BR-23 comprises 23 questions designed for quantifying QOL of breast cancer patient including five scales (functional scales, body image, sexual functioning, sexual enjoyment, future perspective) and four symptom scales (systematic therapy side effect, breast symptoms, arm symptom, upset by hair loss (Chie et al., 2003). The raw scores for each subscale were linearly transformed to standardize score in the range of 0-100 for each of the scales and single items according to the guidelines of EORTC scoring manual. A high score for an item on the functional scale represents a high/ healthy level of functioning. Similarly, a high score for the global health status represents a high QOL, but a high score for an item on the symptom scale represents a high level of problems which indicates a lower QOL (Fayers et al., 2001).

Statistical analysis

For data analysis, the Statistical Package for the Social Sciences (SPSS) software, version 20 (Chicago, IL, USA) was utilized. Data was interpreted using descriptive statistics and the normality of data was checked for all numeric variables using Kolmogrov-Smirnov test. Spearman test was used for non-parametric data to determine the correlation between eating practices and physical activity with QOL dimensions. Mann-Whitney test was used to analyse differences of quality of life between two groups based on the duration of survivorship (≤2 years of diagnosis and >2 years of diagnosis). The level of significance was set at p<0.05.

Results

The mean age of subjects was 47.89±6.71 years with range of 32-61 years old. Most of the survivors were 30-50 years (55%) and majority of survivors were housewives, married and illiterate or had low educational background. About 76% of the subjects lived in urban areas. Majority

of survivors (69%) had household incomes lower than 5,000,000 Rials a month (USD408). Based on the scores, healthy, moderate and poor eating practices were seen in 29%, 37%, and 34% of breast cancer survivors, respectively. Evaluation of physical activity among breast cancer survivors showed only 12 women (12%) met the criteria for regular vigorous exercise, 23% for regular moderate-intensity exercise while majority of them (65%) had low-intensity physical activity.

Around 95% of subjects used hydrogenated oil before breast cancer diagnosis but after treatment, 83% of subjects reduced its consumption. It has also found that 33% of subjects used special oil for frying, 48% vegetable oil and 19% hydrogenated oil.

Table 1 illustrates food preparation methods by the

Table 1. Methods of Cooking Meat, Poultry and Fish by Subjects (n=100)

Method	1-2 times (day)	1-2 times (week)	>3 times (week)	2-3 times (month)	Never or Rarely
Frying	9%	61%	30%	-	-
Grilling	-	41%	6%	53%	-
Boiling	-	42%	33%	11%	14%
Microwave	3%	-	-	-	97%

Table 2. Quality of Life of Breast Cancer Survivors Measured by the EORTC QLQ-C30/ +BR23 (n=100)

Quality of life Dimensions	6 months to 2 years Survivorship (n=25) Mean±SD	>2 years survivorship (n=75) Mean±SD	P value
Functioning **			
Physical	82.86±16.68	83.86±14.76	0.884
Role	98.66±6.66	96.11±10.10	0.167
Emotional	83.79±12.85	85.93±14.56	0.356
Cognitive	87.33±12.98	92.67±10.69	*0.048
Social	94.66±12.47	93.99±13.92	0.644
Global QoL	63.99±16.44	67.66±18.98	0.333
Symptoms ***			
Fatigue	12.88±14.22	15.18±18.08	0.82
Nausea/vomiting	3.33±8.33	5.99±13.03	0.49
Pain	7.99±16.04	8.44±15.58	0.916
Dyspnoea	5.33±12.47	10.22±19.73	0.348
Insomnia	7.99±16.04	8.44±16.52	0.944
Appetite loss	7.99±14.52	10.22±19.70	0.88
Constipation	1.33±6.66	4.88±11.87	0.157
Diarrhoea	6.66±16.66	3.99±13.37	0.363
Financial difficulties	17.33±25.67	22.66±25.79	0.315
EORTC QLQ-BR23			
Functioning**			
Future perspective	69.33±23.41	65.55±27.71	0.609
Body image	78.66±20.27	82.21±21.63	0.301
Sexual functioning	38.00±31.003	32.44±30.25	0.411
Sexual enjoyment	33.33±28.88	29.33±28.45	0.541
Symptoms***			
Systemic therapy side effect			
	9.13±8.68	11.86±11.66	0.5
Breast symptoms	5.99± 10.89	6.88±12.50	0.801
Arm symptoms	23.99± 11.86	19.55±13.15	0.133
Upset by hair loss	11.99±16.32	7.55±14.04	0.19

*P<0.05 shows the significant mean differences in QoL score between two groups based on duration of survivorship. Values are resulted from Mann-whitney Test. ** The higher values indicated a higher level of functioning and quality of life, min:0 , max: 100. *** The higher values indicate a greater degree of symptoms, min: 0 max: 100

Table 3. Correlation between Eating Practices and Physical Activity with Quality of Life among Breast Cancer Survivors (n=100)

Quality of Life Dimensions	Eating Practice r	P value	Physical Activity r	P value
Functioning				
Physical	0.07	0.447	-0.01	0.859
Role	0.22	0.222*	-0.04	0.63
Emotional	0.25	0.010*	0.28	0.004**
Cognitive	0.27	0.005**	0.21	0.032*
Social	0.27	0.005**	0.02	0.81
Global QoL	0.3	0.002**	0.01	0.887
Symptoms				
Fatigue	-0.03	0.754	-0.04	0.67
Nausea/Vomiting	-0.08	0.414	0.09	0.369
Pain	-0.04	0.656	0.01	0.921
Dyspnoea	-0.15	0.137	0.16	0.097
Insomnia	-0.04	0.67	0	0.997
Appetite loss	-0.13	0.17	0	0.941
Constipation	-0.06	0.518	-0.08	0.422
Diarrhoea	-0.03	0.725	-0.06	0.496
Financial Difficulties	-0.2	0.026*	0	0.927

*p<0.05, **p<0.01. significant correlation between eating practices and physical activity with quality of life dimensions. Values are resulted from Spearman test
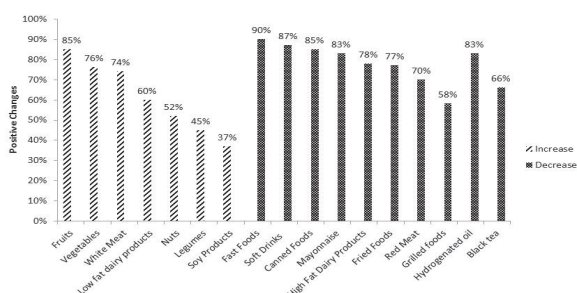

Figure 1. Positive Food Consumption Pattern among Breast Cancer Survivors Post Treatment (n=100)

subjects. Positive changes recorded with dietary changes. The most positive changes were recorded when there is increased intake of fruits (85%) and vegetables (76%) and decreased intake of fast foods (90%) and soft drinks (87%).

Table 2 shows the QOL dimensions between two groups based on duration of survivorship. There was a significant mean difference for cognitive function between the groups (≤2 years of diagnosis and >2 years of diagnosis) showing an improvement with longer survival (P<0.05).

The mean scores for QLQ – C30 and BR-23 indicated that the survivors functioned well and neither were there any intense symptoms. Although the mean scores for QLQ – C30 indicated that the survivors had an average of good functional scale scores, none of the scores for the subjects was equal or less than 33.33 criterion for problematic functioning, while 1-11% met the above 66.7 criterion for more severe symptoms. This was particularly important for the functional scales of the BR-23, in which majority of subjects performed well. Interestingly, about one-third of subjects were hopeful about the future despite their condition. Most of the breast cancer survivors (41%) scored 0 points in terms of sexual functioning and sexual

enjoyment. Arm symptoms as seen in Table 2 had the highest score in this module.

Table 3 shows correlation between eating practices and physical activity with QOL among breast cancer survivors. Significant correlations were found between healthy eating practices with social (r=0.2, p<0.01), role (r=0.2, P<0.05), cognitive (r=0.2, P<0.01) and emotional (r =0.2, p<0.05) functioning scales, global QoL (r=0.3, p<0.01) and reduced symptoms of financial difficulties (r=-0.2, p<0.05). Breast cancer survivors with healthy eating practices had better global quality of life, social, emotional, cognitive and role functions. There was significant correlation between emotional (r=0.2, P=0.004) and cognitive functioning scales (r=0.2, P=0.03) with physical activity while there wasn't any significant correlation for the rest of functioning and symptom scales with physical activity. Therefore, breast cancer survivors who had higher level of physical activity had better emotional and cognitive functions.

Discussion

This study determined food eating habits before and after breast cancer diagnosis and also level of physical activity among breast cancer survivors. Lifestyle change is common among women after diagnosis of breast cancer to improve the prognosis and reduce the probability of cancer recurrence (Salminen et al., 2000; Thomson et al., 2002).

Several studies have found eating pattern changes among breast cancer survivors; they were described as eating more nutritious foods, avoiding red meat and animal fat, eating more fruits, vegetables and avoiding fast foods and fried foods (Wayne et al., 2006; Shaharudin et al., 2012). Among the subjects, less than one third of women reported healthy eating practice based on nutrition guidelines for breast cancer survivors (Bauman and Waldman, 2012; Rock et al., 2012). The most positive changes included reduced intake of fast foods and soft drinks followed by increased consumption of fruits and vegetables.

A study that was conducted among breast cancer survivors in Taiwan indicated that cancer diagnosis increases healthy behaviors (Wang and Chung, 2012). These results are consistent with many studies (Norman et al., 2007; Holick et al., 2008; Weiner et al., 2010; Magné et al., 2011). Despite the known risk factors of breast cancer and its recurrence, 34% of subjects still led unhealthy lifestyle after diagnosis. This may be partly due to the educational background of the participants, economic status and age (45% of the participants were older than or equal to 50 years old). Similar finding was reported in a study among Malaysian breast cancer survivors (Redhwan et al., 2008).

Food choices are also influenced by limited economic resources among low-income groups which in turn lead to fat-rich and energy-dense dietary options, which are inexpensive and have better taste (Darmon et al., 2002; Drewnowski and Darmon, 2005; Rezazadeh et al., 2010). This may explain the high consumption of foods rich in fat such as meat and dairy products among Iranians with very low incomes (Koochek et al., 2011). The present

study also found frying to be the most frequent method of cooking. One study attests to this result (Esmaillzadeh and Azadbakht, 2008). In a study among Iranians from rural and urban areas, no difference was found in respect to the types of oil consumed. However, among individuals with lower education, consumption of animal oil and fat as well as hard margarine was higher among the rural population. It was concluded that geographical location and educational level influence the pattern of oil and fat consumption. Unhealthy lifestyle habits were more prevalent among the rural population with low level of education (Saiedi et al., 2006).

Despite strong evidence suggesting that regular physical activity can protect against breast cancer (Thune et al., 2001; Kellen et al., 2008), only 23% and 12% of the subjects of this study had moderate and high physical activity levels respectively. Majority of the women (65%) had low level of physical activity and reported lack of exercise. These observations are supported by numerous studies (Meyerhardt et al., 2006; Holick et al., 2008; Irwin, 2008; Wang and Chung, 2012).

A study among breast cancer survivors in Bahrain revealed similar levels of physical activity in which 74.6% had low-intensity physical activity and only 25.4% had moderate and high intensity physical activity (Abdul-Samad et al., 2009). It was further indicated that breast cancer survivors in the HEAL Study were significantly less physically active in their first year after diagnosis than the year before diagnosis. Obese women reported greater decline in physical activity after diagnosis than lean women. The majority of obese breast cancer survivors did not increase their physical activity levels (Irwin et al., 2003).

The clues to the interpretation of low level of physical activity among breast cancer survivors was revealed in a study among American breast cancer survivors in which a curvilinear pattern of change in physical activity was evident over the 5-year follow-up. Physical activity increased gradually during the first 18 months and then declined steadily over the subsequent 42 months. Poor physical health, depressive symptoms and lower emotional HRQL (emotional health related quality of life) were associated with less physical activity. Good family support was associated with a slower decline in physical activity in the latter 42 months of the study. It was concluded that (HRQL) following diagnosis of breast cancer appeared to be important for sustaining physical activity in the first 1–2 years following diagnosis (Emery et al., 2009).

In present study both long term and short term breast cancer survivors reported similar levels of QOL overall and for most of subscales. The differences was found in cognitive functioning scale which showed survivors with longer duration of survivorship had better cognitive function and also survivors reported good social functioning after breast cancer treatment while similar studies (Ganz et al., 2002; Schou et al., 2005) have found that breast cancer survivors suffer from poor social functioning.

In this study, levels of all symptoms among women after two years survivorship had increased compared with women who survived less than two years except for diarrhoea, arm symptoms and upset over hair loss, Sexual functioning and sexual enjoyment were lower among those with longer survivorship. Similarly, a study among Iranian breast cancer survivors showed that the levels of fatigue, pain and dyspnoea as well as arm symptoms after 18 months follow-up assessment had an increased. Except for future prospective all other breast cancer specific functioning including body image, sexual functioning and sexual enjoyment decreased after eighteen months follow-up assessment (Montazeri et al., 2008).

Significant correlation was found between healthy eating practices and social role, cognitive and emotional functioning scales, global and reduced symptoms of financial difficulties. Breast cancer survivors with healthy eating practices had better global quality of life, social, emotional, cognitive and role functions. These findings are in agreement with the results of a study conducted among breast cancer survivors in USA, in which post-diagnosis diet quality was directly associated with subsequent mental and physical functioning among breast cancer survivors (Wayne et al., 2006). It was also indicated in a study by Mosher et al. (2009) that diet quality was positively associated with physical functioning among breast cancer survivors. In a study on older breast cancer survivors, better physical functioning was associated with less fat intake and greater fruit and vegetable intake (Demark-Wahnefried et al., 2004).

Data from this study showed relationship between emotional and cognitive functioning scales with physical activity in which survivors with higher level of physical activity had better emotional and cognitive functions and better quality of life. Similarly, a study among breast cancer survivors in China showed positive association between physical activity with total QOL score, physical, psychological and social well-being scores. Compared with non-regular exercisers, women with higher exercise-MET scores (≥8.3 MET-hours/week) were more likely to have higher scores for total QOL and specific QOL domains (Chen et al., 2009).

It was also reported in a meta-analysis study that physical activity has positive effects on physiology, body composition, physical functions, psychological outcomes and also quality of life in patients following breast cancer treatment (Fong et al., 2012). These results were supported by others studies (Daley et al., 2007; Ogunleye and Holmes, 2009) which indicated physical activity improved quality of life after breast cancer. In a study among breast cancer survivors in Italy, it was also concluded that strenuous exercise is strongly correlated with QOL and low level of exercise was inversely correlated with quality of life (Valenti et al., 2008).

In conclusion, healthy eating practices and physical activity had effects on some dimensions of quality of life among breast cancer survivors in this study. It is expected that these results can offer a reference for health care professionals to encourage cancer survivors to improve their lifestyles.

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