Effect of life style (exercise and nutrition) on occurrence of breast cancer in women: A retrospective study in Babylon governorate

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Objective To identify the effect of exercise and nutrition on breast cancer occurrence and to find the relationship between life style and some demographic and reproductive variables.

Methods A retrospective study (case control study) of a purposive sample of 400 women; 200 women diagnosed with breast cancer visited the Merjan Teaching Hospital Oncology Cancer Center in Babylon Governorate as a study group and 200 women free of breast cancer as a control group. An assessment tool was constructed for the purpose of the study. It comprised of socio-demographic data, reproductive data, information related to breast cancer (stage, side, period, family history) and information related to their life style: exercise (5 items) and nutrition (14 items) of 10 years previous breast cancer occurrence, physical measurements for measuring obesity and overweight (BMI) as well as medical records to explain in the stage of breast cancer and other details which may be assisting this study Data were collected from 4 May 2013 to 4 July 2013. Analysis of data was performed through the application of descriptive and inferential statistical data analysis approach.

Results The study demonstrates that the highest percentage (39.5%) of study sample was in age group 50–54 years in comparison with the other age groups for both the study and control groups. There was a high significant difference at $P < 0.01$ between the life aspects (exercise and nutrition) and breast cancer in women while no relationship between life aspects and demographical and reproductive variables except with interval between pregnancies and duration of contraception of study group was noted.

Conclusion Establishing an activation media and Ministry of Health role for guiding women and their families about the importance of exercise and healthy nutrition which contributes to reducing the incidence of breast cancer occurrence and the importance of early detection of breast cancer.

Keywords life style, breast cancer, women, retrospective study

Introduction

The two most important parts of physical health involve exercise and nutrition. These two go hand-in-hand. Not fueling the body with proper nutrition negates many of the benefits of exercise and vice versa.[1] Diet and exercise have a direct impact on the quality of life of people in their later years. According to the National Institute on Ageing, regular physical exercise and proper nutrition can help people remain independent for long. This healthy lifestyle can keep a variety of age-related conditions and diseases at bay permanently. While genes play a significant role in the life span of people, proper nutrition and regular exercise directly affects how well they live. According to the American Geriatrics Society, a lifetime of healthy living may be the most beneficial to healthy ageing, but it is never too late to begin eating well and exercising regularly. Eat foods of a variety of colors and those rich in omega-3 fatty acids to remain strong. Stay physically fit with regular exercise and reduce the risk of falling.[2] Cancer is a disease that is caused by both genetic and environmental factors. Some women are born with a genetic mutation that dramatically increases their risk of developing breast cancer. But for all women, including women with a genetic mutation, environmental factors such as diet, exercise and chemical exposures affect genes in ways that determine whether cancer actually develops.[3] Researchers found more than 3000 women with and without breast cancer, those who exercised during their childbearing years were less likely to develop cancer after menopause. The effects of physical activity were strong among postmenopausal women. Women may significantly reduce their risk for breast cancer by exercising a couple hours each day. A new study found that even mild physical activity like walking reduced risk for the disease that strikes 227 000 new women each year.[4] Diet is thought to be partly responsible for about 30%–40% of all cancers. But diet alone is unlikely to be the "cause" or "cure" of cancer. Although more research needs to be done on diet and breast cancer, findings suggest that physical activity, a healthy diet (particularly one low in fat and high in vegetables and fiber) and a healthy weight can help reduce the risk of breast cancer or its reoccurrence.[5]

Materials and Methods

A retrospective study (a case control study) was conducted on the effect of life style on occurrence of breast cancer in women. A purposive sample of 400 women; 200 diagnosed with breast cancer as a study group and 200 the control group which was free from breast cancer or any other types of cancer past and present, were collected from different districts within Babylon Governorate and looks back retrospectively for previous 10 years. The questionnaire was designed for the purpose of the study. It comprised of four parts: socio-demographic data such as mother's age, body mass index (BMI), marital status, family income through previous 10 years; reproductive data such as gravidity, parity, age at menarche, age at first pregnancy, pregnancy interval, menopausal age, age at last menstrual period, reproductive age, breast feeding, duration of contraceptive pills;

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information related to woman's healthy life style exercise which includes 5 items, and the nutrition aspect includes 14 items. These items were rated according to scale (always, sometimes and never), and information related to breast cancer were rated based on stage, side, period and family history of breast cancer (previous 1–10 years). BMI was indicated for measuring obesity and overweight. The investigator measures the current BMI according to WHO categories of BMI in 2002 which are: underweight = <18.5 kg/m²; normal weight = 18.5–24.9 kg/m²; overweight = 25–29.9 kg/m²; obesity = 30 kg/m² or greater. Medical records explain in which stage of breast cancer they are in and other details which may assist this study. For pilot study and reliability of the questionnaire a convenient sample of 20 breast cancer women who attended Merjan Teaching Hospital Oncology Cancer Center in Babylon Governorate for this preliminary study was conducted from 4 May 2013 to 10 July 2013.

The reliability coefficients of the pilot study are 0.973. The time required for each interview ranged from 20 to 30 min for each women and 5–10 min for measuring the weight and height to estimate the BMI. Statistical data analysis approaches were used in order to analyse and assess the results of the study depended on descriptive data analysis, and inferential data analysis.

Results

Table 1 shows the distribution of the two samples (study and control) according to their demographic characteristics variables (age groups, marital status, family income) it reported a non significant difference at P > 0.05, which indicates that the two independent groups seems from the same population. In addition, BMI reported a highly significant difference at P < 0.01, with bad assessment at the study group compared with the control. The age group, 50–54 years, was shown to be the larger group (39.5%) in comparison with the other age groups for both the study and control groups. The highest percentages (44.5%) of study group were overweight, while (48.5%) the control group had normal weight. About 70.5% of study and 66.5% of control group were married, 42.5% and 47%, respectively, in both groups had sufficient family income.

Table 2 shows that the highest percentage of study and control group 38% and 39%, respectively, were having 3–4 gravida. Regarding parity, 39% of study group were having 1–2 para, while for control group 33% of them were having 3–4 para. The highest percentage of both groups were in post-rep. age.

A 62.5% and 75.5% of study group and the highest percentage of the users, 33.5% and 23%, respectively, were using pills.

Table 3 demonstrates the mean of some reproductive variables. The mean age at menarche for study sample was 12.48 ± 0.81 years which was lower than

Table 1. Distribution of the studied demographical characteristics variables in the study and control samples with comparisons significant

Demographical characteristics	Samples	Groups	No.	%	Asymp. Sig. (*) (2-tailed)
Age groups	Study	20–24	2	1.0	Z = 0.000 P = 1.000 NS
		25–29	1	0.5	
		30–34	3	1.5	
		35–39	4	2.0	
		40–44	9	4.5	
		45–49	30	15.0	
		50–54	79	39.5	
		55–59	59	29.5	
		60 ≥	13	6.5	
	Control	20–24	2	1.0	
		25–29	1	0.5	
		30–34	3	1.5	
		35–39	4	2.0	
		40–44	9	4.5	
		45–49	30	15.0	
		50–54	79	39.5	
		55–59	59	29.5	
		60 ≥	13	6.5	
BMI (kg/m²)	Study	Underweight	35	17.5	Z = 2.611 P = 0.009 HS
		Normal weight	68	34	
		Over weight	89	44.5	
		Obesity	8	4	
	Control	Underweight	40	20	
		Normal weight	97	48.5	
		Over weight	53	26.5	
		Obesity	10	5	
Marital status	Study	Married	141	70.5	Z = 0.900 P = 0.368 NS
		Single	16	8	
		Widow	27	13.5	
		Divorced	14	7	
		Separated	2	1	
	Control	Married	133	66.5	
		Single	18	9	
		Widow	29	14.5	
		Divorced	16	8	
		Separated	4	2	
Family income	Study	Sufficient	85	42.5	Z = 0.984 P = 0.325 NS
		Barely sufficient	48	24	
		Not sufficient	67	33.5	
	Control	Sufficient	94	47	
		Barely sufficient	47	23.5	
		Not sufficient	59	29.5	

* C.S.: comparisons significant; NS: non sig. at P > 0.05; HS: highly sig. at P < 0.01.

Table 2. **Distribution of the studied reproductive variables in the study and control samples with comparisons significant**

Reproductive characteristics	Samples	Groups	No.	Percent	C.S P–value
Gravidity	Study	0	30	15	$\chi^2 = 1.985$ P = 0.921 NS
		1–2	54	27	
		3–4	76	38	
		5–6	37	17.5	
		7 and more	3	1.5	
	Control	0	32	16	
		1–2	44	22	
		3–4	78	39	
		5–6	41	20.5	
		7 and more	5	2.5	
Parity	Study	0	30	15	$\chi^2 = 2.588$ P = 0.858 NS
		1–2	78	39	
		3–4	62	31	
		5–6	28	14	
		7 and more	2	1	
	Control	0	32	16	
		1–2	64	32	
		3–4	66	33	
		5–6	34	17	
		7 and more	4	2	
Reproductive age	Study	Rep. age	37	18.5	FEPT(**) P = 0.704 NS
		Post-rep. age	163	81.5	
	Control	Rep. age	40	20	
		Post-rep. age	160	80	
Breast feeding	Study	Yes	125	62.5	FEPT P = 0.000 HS
		No	45	22.5	
	Control	Yes	151	75.5	
		No	17	8.5	
The use of contraception	Study	Not use	76	38	$\chi^2 = 7.179$ P = 0.066 NS
		Pills	67	33.5	
		Helix	28	14	
		Surgery	20	10	
	Control	Not use	93	46.5	
		Pills	46	23	
		Helix	41	20.5	
		Surgery	20	10	

C.S.: comparisons significant; FEPT: Fisher exact probability test.

Table 3. **Descriptive statistics related to some reproductive characteristics in both groups**

Reproductive characteristics	Groups	No.	M.S.	Std. dev.	Std. error mean
Age at menarche	Study	200	12.48	0.81	0.06
	Control	200	12.59	0.83	0.06
Age at first pregnancy	Study	170	27.01	11.81	0.08
	Control	168	23.53	11.52	0.08
Pregnancy interval	Study	170	1.32	0.72	5.10
	Control	168	1.20	0.69	4.92
Age at menopause	Study	112	52.90	1.97	0.19
	Control	112	52.54	1.92	0.18
Age at last menstrual cycle	Study	112	56.81	42.30	4.00
	Control	112	56.54	42.32	4.00
Duration of pills contraception	Study	130	7.44	1.70	0.15
	Control	125	7.03	2.00	0.18

C.S.: comparisons significant; M.S.: mean of score.

the age at menarche for control group, 12.59 ± 0.83 years. The mean age at first pregnancy 27.01 ± 11.81 years was noted for study sample, while 23.53 ± 11.52 years for the control group. Pregnancy interval mean was 1.32 ± 0.72 years for study sample, and 1.20 ± 0.69 years for control. Age at menopause was 52.90 ± 1.97 years for study sample and 52.54 ± 1.92 years for control. The mean age at last menstrual cycle was 56.81 ± 42.30 years for study sample and 56.54 ± 42.32 years for control, and regarding the duration of contraception use, 7.44 ± 1.70 years for the study group and 7.03 ± 2.00 years for the control.

Table 4 shows that the majority (60%) of cases had third stage of breast cancer, 52% of cases had left breast cancer, 93% of cases had no family history, and 51% of cases had 3–4 years period of breast cancer. High significant differences were found between breast cancer stages, breast cancer side and period of breast cancer, while no significant differences were found in family history.

Table 5 shows the results of testing coincidence's responding between the difference of the studied groups according to sub and main domains of "Life style to Breast Cancer in Women" through equality of variances and equality of mean value parameters. The results of testing indicated that highly significant differences at P < 0.001 were obtained (Fig. 1).

Table 6 shows significant differences between study and control group in items (Do Exercise at least 20 sec or more 3 times weekly, and I walk whenever possible). Regarding nutritional aspects the results shows low mean scores in majority of items and low RS and assessed failure for both study and control groups, except items 3, 4 ,5, 6 and 12 for study group, and the items 3, 4, 5, 6, 11 & 12 for control group with high RS, and assessed pass. There are significant differences between the study and control group in items 1, 5, 6, 7 and 11.

The results from Table 7 has reported that the distribution of the life style to breast cancer in women through the two dichotomous of responding had no relationship with their demographical characteristics variables and as well as of some related variables (reproductive characteristics) with the overall assessments at the study group except with interval between pregnancies and duration of contraception only and we can

Table 4. **Distribution of the study sample according to breast cancer history**

About breast cancer	Stage	Freq.	Percent	Cum. percent	C.S.
Breast cancer stage	Stage 1	8	4	4	$\chi^2 = 187.36$ P = 0.000 HS
	Stage 2	70	35	39	
	Stage 3	120	60	99	
	Stage 4	2	1	100	
Breast cancer side	Right	94	47	47	$\chi^2 = 94.840$ P = 0.000 HS
	Left	104	52	99	
	Both of them	2	1	100	
Family history	Non applicable	186	93	93	$\chi^2 = 3.143$ P = 0.534 NS
	Mother	5	2.5	95.5	
	Sister	3	1.5	97	
	Daughter	1	0.5	97.5	
	Aunt	3	1.5	99	
	Grandma	2	1	100	
Period of disease in years	1–2	45	22.5	22.5	$\chi^2 = 94.070$ P = 0.000 HS
	3–4	102	51	73.5	
	5–6	51	25.5	99	
	7 and more	2	1	100	

C.S.: comparisons significant; NS: non sig. at P > 0.05; HS: highly sig. at P < 0.01.

Table 5. **Comparisons significant for the studied sub and main domains of "life style to breast cancer in women" between study and control groups**

Sub and main domains	Levene's test for equality of variances		t-test for equality of means			C.S.
	(F) Statistic	Sig.	(t) Statistic	d.f.	Sig. (2-tailed)	
Exercise	4.385	0.037	−4.878	390.5	0.000	HS
Nutrition	0.161	0.688	−4.272	398.0	0.000	HS
Life style for exercise and nutrition	0.692	0.406	−6.405	398.0	0.000	HS

C.S.: comparisons significant; NS: non sig. at P > 0.05; HS: highly sig. at P < 0.01.

conclude that the studied questionnaire can be amended for all individuals of the population concerning with breast cancer irrespective of the differences in their demographic and reproductive characteristic variables.

Discussion

The age group, 50–54 years, was the larger group (39.5%) in comparison with the other age groups for both study and control groups. Their ages ranged between 22 and 83 years with mean ± SD of 53.19 ± 6.48 years for study group, while the mean ± SD of control group was 50.99 ± 9.05 years. This study was in agreement with study conducted by Benz 2009[6] who stated that up to 80% of breast cancers occur after 50 years. The National Cancer Institute (2010)[7] reports that more than three-quarters of breast cancer cases occur in women over age 50 years and stated that the risk of getting breast cancer increases with age. Regarding BMI, the majority (44.5%) of study had overweight (25–29.9 kg/m²), while 48.5% of control group had normal weight (18.5–24.9 kg/m²). In addition to that, BMI reported a highly significant difference at P < 0.01, with bad assessment at the study group compared with the control. Buist and Adiana (2003)[8] have indicated that their study looked at the relationship between tumor growth and BMI, an indicator of obesity that is based on a person's height and weight. Understanding how BMI is related to tumor growth could provide
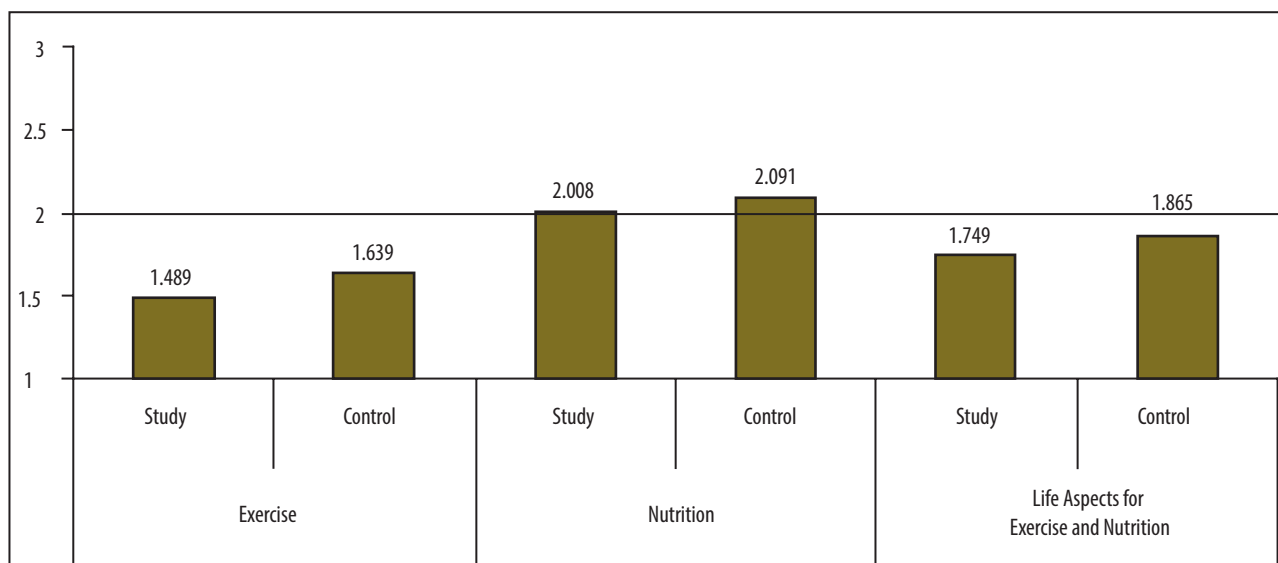

Fig. 1 **Bar chart for mean of score at the sub and main domain of life aspects (exercise and nutrition) at the study and control groups.**

Table 6. **Descriptive statistics (mean of score, standard deviation, relative sufficiency and assessment of items according to the scale's cutoff point) for the studied questionnaire's life style to breast cancer in women in the two groups**

Items	Study			Control			P value	C.S.(*)
	M.S.	Std. Dev.	R.S. %	M.S.	Std. Dev.	R.S. %		
Exercise								
1. Do exercise at least 20 sec or more, 3 times weekly	1.06	0.23	35	1.14	0.40	38	0.029	S
2. Stop exercise when you feel fatigue	1.11	0.46	37	1.18	0.54	39	0.055	NS
3. My job needs for walking	1.31	0.70	44	1.34	0.71	45	0.563	NS
4. My work is to exercise inside the house	2.42	0.76	81	2.56	0.71	85	0.052	NS
5. I walk wherever possible	1.55	0.69	52	1.98	0.87	66	0.000	HS
Nutrition								
1. When I choose animal protein I choose fish	1.72	0.80	57	1.95	0.88	65	0.010	S
2. I eat the chest of a chicken without skin	1.73	0.87	58	1.79	0.88	60	0.391	NS
3. I eat red meat free of fat once a week	2.00	0.73	67	2.05	0.72	68	0.494	NS
4. Decreasing the use of solid animal fats or butter when cooking	2.24	0.73	75	2.24	0.68	75	0.829	NS
5. Use vegetable oils such as corn oil, olive oil, etc.	2.50	0.62	83	2.64	0.53	88	0.019	S
6. When I choose vegetarian protein I choose legumes	3.00	0.00	100	2.98	0.14	99	0.045	S
7. I eat non-cooked vegetables, 2.5 cups a day	1.32	0.53	44	1.47	0.61	49	0.007	HS
8. I eat 5 pieces of fresh fruit per day	1.20	0.43	40	1.27	0.50	42	0.166	NS
9. I eat sweets and sugars per day	1.96	0.91	65	1.88	0.87	63	0.392	NS
10. I drink adequate fluids (8 glasses of water or 2.5 litres per day)	1.86	0.77	62	1.93	0.81	64	0.401	NS
11. I use yogurts low or free in fat	1.89	0.85	63	2.08	0.88	69	0.029	S
12. Refrained from eating irregular meals	2.17	0.90	72	2.10	0.92	70	0.458	NS
13. Eating a daily multivitamin	1.87	0.88	62	1.97	0.91	66	0.230	NS
14. I adopted canned foods	1.40	0.69	47	1.31	0.59	44	0.313	NS

C.S.: comparisons significant; NS: non sig. at P > 0.05; HS: highly sig. at P < 0.01.

Table 7. **Association among demographical and reproductive variables with overall assessments in life style among women with breast cancer**

Predicted variables	Study			Control		
	C.C.	P value		C.C.	P value	
Age	0.135	0.881	NS	0.251	0.098	NS
BMI: kg/m^2	0.155	0.176	NS	0.111	0.475	NS
Marital status	0.078	0.873	NS	0.210	0.056	NS
Family income	0.147	0.111	NS	0.201	0.015	S
Gravidity	0.164	0.583	NS	0.281	0.025	S
Parity	0.128	0.831	NS	0.266	0.047	S
Age at menarche	0.075	0.887	NS	0.170	0.204	NS
Age at first pregnancy	0.132	0.698	NS	0.158	0.507	NS
Interval between pregnancies	0.169	0.025	S	0.025	0.744	NS
Age at menopause	0.328	0.096	NS	0.280	0.393	NS
Age at last menstrual cycle	0.326	0.205	NS	0.265	0.582	NS
Reproductive age	0.021	0.765	NS	0.079	0.263	NS
Breast feeding	0.076	0.317	NS	0.038	0.620	NS
The use of contraception	0.081	0.838	NS	0.157	0.369	NS
Duration of contraception use	0.355	0.028	S	0.360	0.029	S

critical tools to assist clinicians with pre- and post-diagnostic breast cancer surveillance and would help clarify the role BMI plays as a predictor of recurrence and death from breast cancer. The findings of the current study was in agreement with the findings of Perez (2010)[9] who indicated that a mid-life increase in BMI may substantially increase postmenopausal breast cancer risk, according to research by investigators from NCI and Columbia University's Mailman School of Public Health. In a recent analysis, women who reported a gain in BMI of five points (5 kg/m^2) or more between age 20 and postmenopausal age (55–74 years) had nearly twice the risk of developing postmenopausal breast cancer compared to women who maintained their BMI during the same time period. In addition, researchers found independent positive associations between postmenopausal breast cancer and BMI gain both before and after age 50 years. Regarding marital status, 70.5% of study and 66.5% of control group were married. Khan et al. (2002)[10] said that the previous studies have found that married women are more likely to be diagnosed at an earlier stage of cancer than those who are unmarried. But Randi et al. (2004)[11] said that our study suggests that marital status is not materially associated with cancer risk. Thus, the evidence that married subjects are at lower risk of several other major diseases may not be applicable to cancer. Regarding family income, 42.5% and 47%, respectively for both groups have sufficient income, while the highest proportion was with their insufficient income. This result refers to the fact that the sample is from the low- and

middle-income class. March (2002)[12] said that a new study adds to mounting evidence that women with lower incomes and less education are more likely to be diagnosed with advanced breast cancer than women with higher socioeconomic standard. Curado and others (2007)[13] stated that the recent media reports have highlighted the increasing incidence of breast cancer in low- and middle-income countries. The relative risk of breast cancer diagnosis associated with current and recent use of hormonal contraceptives did not appear to vary with family history of breast cancer.[14] Some studies have suggested that women who began using hormonal contraceptives before the age of 20 or before their first full-term pregnancy are at increased risk for breast cancer, but it is not clear how much of the risk stems from early age at first use, and how much stems from use before the first full-term pregnancy.[15]

Regarding the effect of exercise and nutrition on breast cancer occurrence the results of testing indicated that highly significant differences at P < 0.001 were obtained. American Cancer Society stated that many studies have shown that moderate to vigorous physical activity is linked with lower breast cancer risk.[16] A diet that is rich in vegetables, fruits, poultry, fish and low-fat dairy products has also been linked with a lower risk of breast cancer in some studies. But it is not clear if specific vegetables, fruits or other foods can lower risk. Research has shown that poor diet and not being active are two key factors that can increase a person's cancer risk.[17]

Conclusion

The present study shows the highest percentage of women having breast cancer was of age group 50–54 years, overweight 25–29.9 kg/m^2, secondary school graduated, married and having sufficient family income. The results indicated that the individuals of the study groups reported no significant differences were found in family history while highly significant differences of women were breast feeding their babies. The study also showed that the sub and main domain of life style for exercise and nutrition reported a highly significant difference at P < 0.01. The results of testing indicated that a significant difference at P < 0.05 was obtained at the related variables (reproductive characteristics) with the overall assessments at the study group except with interval between pregnancies and duration of contraception only.

Recommendations

1. Activation of media and Ministry of Health role for increasing the awareness of women and their families about the importance of reducing the risk factors which contributing on breast cancer occurrence through.
   a. Monthly breast self-examination and regular mammography for age ≥ 40 years are the recommended methods of early detection of breast cancer.
   b. At least 8 hours sleep daily.
   c. Exercising regularly for least 1 hour 3 times a week.
   d. Encourage the women about healthy diet and nutrition.
   e. Encourage breast feeding and maintaining a healthy weight.
2. Further study on large population. ■

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