Original paper

Determination of Contributing Environmental Factors to Breast Cancer in women: A Retrospective Study in Babylon Governorate

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Abstract

Background: Environmental factors are believed to explain a large proportion of breast cancer incidence. Known risk factors for breast cancer, which are related to women's reproductive life, and other factors, such as inheritance, chemicals and ionizing radiation is an established environmental risk factor for breast cancer. In order to better understand how environmental factors affect breast cancer in women the researcher study this subject.

Objectives: 1.To determine the effect of environmental factors on breast cancer occurrence. 2. To find out the relationship between breast cancer occurrence and the environmental factors.

Methodology: A Retrospective Study, a purposive sample of (400) women; (200) women diagnosed with breast cancer were 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 was comprised of Demographic Data, Reproductive Data, and Information of environmental life factors consist of (11) items of 10 years previous breast cancer occurrence divided to two periods (previous 1-5 years) and (previous 6-10 years). Physical measurements (Height and weight) for measuring (BMI) of samples. 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 (50-54) years in comparison with the other age groups for both of study and control groups. There are a significant different at $P<0.05$ between the environmental factors and breast cancer.

Recommendations: The study recommended about further study on large population and 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 such as chemical products and radiation hazards .

Key word: Environmental factors, Breast Cancer**,** Women, Retrospective Study

Introduction

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 [1]. A conference on breast cancer and the

environment convened by the National Breast Cancer Coalition in Washington DC in 1998 proposed a working definition of the "environment" to include "voluntary exposures as well as involuntary exposures, social class, and urban/ rural differences, and exposures that occur outside the body as well as those that modify the internal milieu." A summit on breast cancer and the environment held in Santa Cruz, California in 2002 defined the environment as "the totality of living and working conditions as well as the physical, biological, social, and cultural responses to those conditions." The latter summit emphasized that "environmental exposures are often influenced by social, economic, and cultural factors such as employment, income, and housing" and includes exposures related to occupation or residence, as well as industrial emissions, pollution, and hazardous chemicals. For the purposes of this paper, environment will be taken in the broadest sense, as proposed by these two conferences. Another way to categorize environmental factors in this context is "everything except for genes," recognizing that genes and environment often interact [2]. The strongest known environmental risk factor for breast cancer is exposure to ionizing radiation. A strong association has been observed between high dose exposure in atomic bomb survivors and persons undergoing prolonged radiation treatment. But few studies have been conducted of low dose occupational exposures or common medical procedures [3]. Difficulties in measuring exposure, particularly passive exposure early in life and disentangling the effects of the complex mixture of compounds within tobacco smoke are a few of the problems encountered. Cigarette smoke may increase breast cancer risk by raising levels of oxidative DNA damage. Exposure to ionizing radiation also increases levels of oxidative damage, so it is possible that hormones, alcohol, smoking, radiation, and many other

environmental factors share oxidative damage and perhaps other biochemical pathways as common mechanisms of action in breast carcinogenesis [4]. A variety of factors have been identified as suspected environmental risk factors for breast cancer. These include: light at night (disruptions in melatonin secretion), hormone disruptors (including an extensive list of widespread compounds such as phthalates), and environmental pollutants (hydrocarbons, organ chlorines), and occupational exposures (chemical, radiation). The role of electromagnetic fields has been given less attention recently, with more emphasis on light at night as a source of melatonin disruption. Epidemiologic studies have shown fairly consistent associations between shift work and other sources of exposure to light at night and increased risk of breast cancer [2].

Methodology

A retrospective design (a case control study) was conducted on determination of contributing environmental factors to breast cancer in women: A retrospective study in Babylon Governorate. A purposive sample of (400) women; (200) women diagnosed with breast cancer as a study group and (200) women for the control group were free from breast cancer or any other type of cancer past and present, they collected from different districts within Babylon Governorate and looks back retrospectively for two period (previous1-5 years) and (previous 6-10 years). The questionnaire was designed for the purpose of the study, it was comprised of 3 parts: demographic data such as (mother's age, weight, length for measuring BMI, educational level), reproductive data such as (number of live children, date of menarche, date of first pregnancy, pregnancy interval, menopausal age, date of last menstrual period, regulatory of menstrual cycle, reproductive age, breast

feeding, contraceptive pills history and duration, history of infertility), and information related environmental stressors which consist of (11) items. These items rated according to scale (Yes, No) for two periods (previous 1- 5 years) and (previous 6- 10 years). Body mass index 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/m^2; Normal weight = 18.5-24.9 kg/m^2; Overweight = 25-29.9 kg/m^2; Obesity = 30 kg/m^2 or greater. Statistical data analysis approaches were used in order to analyze 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 demographical characteristics variable's (Age Groups, Educational Level) reported a non-significant differences at P>0.05, between the observed frequency's distributions compared with expected at the two groups, which indicated that they were corresponding proportionally /or whether the two independent groups are seems to be drown from the same population. In addition to that, Body Mass Index was reported a highly significant different at P<0.01, with bad assessment at the study group compared with the control. The age group (50-54) years shown to be the larger group (39.5%) in comparison with the other age groups for both of study and control groups. The highest percentage (44.5%) of study group were overweight, while (48.5%) for the control group had normal weight. The highest percentage (39.5%) of study.
Table (2) shows that the highest percentage of study and control group (35%) respectively were having (1-2) and

(3-4) living babies in study group, while (37%) of control group had (3-4) child. The highest percentage of both study and control groups (73.5%) (81%) respectively were having regular menstrual periods, (81.5%)(80%) of study and control group respectively were in post-reproductive age, 62.5%), (75.5%) respectively were breast feed their babies for those who were married and having babies. Regarding the use of contraceptive the highest percentage of study and control group were using different types of contraceptives, and the highest percentage of the users (33.5%) (23%) respectively were using pills, only (6.5%) (6%) respectively for both study and control group were having infertility.
Table (3): demonstrates the means of some reproductive variables. The mean age at menarche for study sample was (12.48 ±0.81) years which was lower than the age at menarche for control group (12.59±0.83) years. The mean age at first pregnancy (27.01±11.81) years for study sample, while (23.53±11.52) years for the control. Pregnancy interval means (1.32±0.72) years for study sample, and (1.20±0.69) years for control. Regarding age at menopause (52.90±1.97) years for study sample, and (52.54±1.92) years for control. The mean age at last menstrual cycle (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) showed the results of testing coincidence's responding between different of the studied groups according to reproductive characteristics variables through equality of variances and equality of mean value's parameters. The results of testing indicating that there are no significant different at P>0.05 were obtained, which indicated that they were corresponding proportionally /or whether the two independent groups are seems to be drown from the same population.

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

Demographical Characteristics	Samples	Groups	No.	Percent	Cum. Percent	Asymp. Sig. [*] (2-tailed)
Age Groups	Study	20 – 24	2	1.0	1.0	Z =0.000 P=1.000 NS
		25 – 29	1	0.5	1.5	
		30 – 34	3	1.5	3.0	
		35 – 39	4	2.0	5.0	
		40 – 44	9	4.5	9.5	
		45 – 49	30	15.0	24.5	
		50 – 54	79	39.5	64.0	
		55 -59	59	29.5	93.5	
		60 ≥	13	6.5	100.0	
	Control	20 – 24	2	1.0	1.0	
		25 – 29	1	0.5	1.5	
		30 – 34	3	1.5	3.0	
		35 – 39	4	2.0	5.0	
		40 – 44	9	4.5	9.5	
		45 – 49	30	15.0	24.5	
		50 – 54	79	39.5	64.0	
		55 -59	59	29.5	93.5	
		60 ≥	13	6.5	100.0	
BMI (Kg/m²)	Study	Underweight	35	17.5	17.5	Z =2.611 P=0.009 HS
		Normal weight	68	34	51.5	
		Over weight	89	44.5	96	
		Obesity	8	4	100	
	Control	Underweight	40	20	20	
		Normal weight	97	48.5	68.5	
		Over weight	53	26.5	95	
		Obesity	10	5	100	
Educational Level	Study	Illiterate	8	4	4	Z =0.161 P=0.872 NS
		Read and write	17	8.5	12.5	
		Primary school	21	10.5	23	
		Intermediate school	37	18.5	41.5	
		Secondary school	79	39.5	81	
		Institute graduate	22	11	92	
		Collage and post graduate	16	8	100	
	Control	Illiterate	9	4.5	4.5	
		Read and write	14	7	11.5	
		Primary school	23	11.5	23	
		Intermediate school	40	20	43	
		Secondary school	77	38.5	81.5	
		Institute graduate	20	10	91.5	
		Collage and post graduate	17	8.5	100	

[*] **C.S. (NS: Non Sig. at P>0.05, HS: Highly Sig. at P<0.01)**

Table 2. Distribution of the studied reproductive & medical characteristics variables in the (Study and control) samples with comparisons significant

Reproductive Characteristics	Samples	Groups	No.	Percent	Cum. Percent	C.S P-value
No. of living babies	Study	0	30	15	15	χ^2 = 2.380 P = 0.882 NS
		1-2	70	35	50	
		3-4	70	35	85	
		5-6	28	14	99	
		7 and more	2	1	100	
	Control	0	32	16	16	
		1-2	58	29	45	
		3-4	74	37	82	
		5-6	33	16.5	98.5	
		7 and more	3	1.5	100	
Regulation of menstrual cycle	Study	Regular	147	73.5	73.5	FEPT P =0.047 S
		Irregular	53	26.5	100	
	Control	Regular	162	81	81	
		Irregular	38	19	100	
The women in reproductive age	Study	Rep. age	37	18.5	18.5	FEPT P =0.704 NS
		Post-Rep. age	163	81.5	100	
	Control	Rep. age	40	20	20	
		Post-Rep. age	160	80	100	
Breast feeding	Study	Yes	125	62.5	62.5	FEPT P =0.000 HS
		No	45	22.5	100	
	Control	Yes	151	75.5	75.5	
		No	17	8.5	100	
The use of contraception	Study	Not use	73	36.5	36.5	χ^2 = 7.179 P = 0.066 NS
		Pills	67	33.5	70	
		Helix	28	14	84	
		Surgery	20	10	94	
		Condom	12	6	100	
	Control	Not use	76	38	38	
		Pills	46	23	61	
		Helix	41	20.5	81.5	
		Surgery	20	10	91.5	
		Condom	17	8.5	100	
Infertility	Study	Yes	13	6.5	6.5	FEPT P =0.858 NS
		No	170	85	100	
	Control	Yes	12	6	6	
		No	169	84.5	100	

Table (5): The table shows that the means of environmental factors in study group was higher than that of control group.

Table (6): shows the observed frequencies of respondents with respect to the environmental factors items distributed in the two categories responding (1-5) years and (6-10) years as well as, total numbers, their percentages out of the studied individuals group, study to control ratio score, and overall assessment (grand weight mean of score). The result indicated that the study group's individuals were reported low assessment grade (40.63%) than control group's individuals concerning with the environmental factors items.

Discussion

The result of the environmental factors items, indicated that the study group's individuals were reported low assessment grade (40.63%) than control group's individuals concerning with the environmental factors items (Table 6)

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Bay Area Breast Cancer and the environment research center investigators think of "the environment" in this broader sense. Studies are looking at the role of environmental chemicals, in particular at female hormone or estrogen-like compounds found in personal care and household products. Environmental factors comes from epidemiological studies that have looked at the relationship between radiation exposure and breast cancer [1].

A number of chemicals used in the home, garden and workplace have been identified as possible carcinogens which can contribute to the development of cancers, including breast cancer. Some household chemicals have the ability to mimic female hormones, such as estrogen and progesterone, once they have entered the body [5]. In one study, conducted in 1992 at Hartford Hospital in Connecticut and published in the Archives of Environmental Health, women with breast cancer had 50 to 60 percent higher concentrations of pesticides in their breast tissue than women who did not have breast cancer.

Table 3. Descriptive statistics related to some reproductive characteristics (study and control) 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 contraception	Study	130	7.44	1.70	0.15
	Control	125	7.03	2.00	0.18

Table 4. Comparisons significant for some reproductive characteristics variables between the two groups

Reproductive characteristics	Levine's Test for Equality of Variances		t-test for Equality of Means			C.S.
	(F) Statistic	Sig.	(t) Statistic	d.f.	Sig. (2-tailed)	
Age at menarche	0.591	0.442	1.345	398	0.179	NS
Age at first pregnancy	0.416	0.519	0.561	338	0.575	NS
Pregnancy interval	9.12	0.003	1.17	166	0.241	NS
Age at menopause	0.041	0.841	1.408	222	0.160	NS
Age at last menstrual cycle	0.000	0.998	0.049	222	0.961	NS
Duration of contraception	2.173	0.142	1.750	253	0.081	NS

Table 5. Descriptive statistics for the studied factors domains with percentile transformed scoring for the two different groups

Factors Domain	Groups	No.	Mean	Std. Dev.	Std. Error	95% C. I. for Mean		Min.	Max.
						L. B.	U. B.		
Environmental	Study	200	5.92	6.35	0.45	5.04	6.81	0	30.8
	Control	200	4.62	5.67	0.40	3.83	5.41	0	23.1

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Table 6. Distribution of applicable respondent's frequencies for the questionnaire's items of (environmental domain) in the two groups with their study to control ratio score and grand weighted mean of percent

Items	Study			Control			SCR %
	(1-5) Yrs.	(6-10) Yrs.	Total	(1-5) Yrs.	(6-10) Yrs.	Total	
Exposure to gases and vapors and dust	5	3	10	5	5	10	0
Exposure to pesticides	-	-	-	-	-	-	-
Re-use plastic bottles of water or soft drinks more than once	50	9	59	45	4	49	21
Odor of the glue, paints in the laboratory	-	-	-	-	-	-	-
The work at radiation field	-	-	-	-	-	-	-
Exposure to x-rays for medical purposes	7	5	12	4	2	6	100
Exposure to high doses of ionizing radiation for the treatment of a breast cancer last	-	-	-	-	-	-	-
Exposure to radiation wars	34	5	39	13	6	19	100
Antisudorific	25	6	31	19	12	31	0
Body slimming products	0	5	5	0	5	5	0
To deal with chemicals at work	-	-	-	-	-	-	-
Dealing with anesthetics work	-	-	-	-	-	-	-
Other reminders	-	-	-	-	-	-	-
Overall Assessment (Grand Weight Mean of Score)	-	-	26	-	-	20	40.63

These chemicals can increase estrogenic activity and suppress immune function. Some studies have suggested women with the genetic mutations could be more sensitive to radiation because the genes are involved in fixing DNA problems. If those genes are damaged by radiation, they may not be able to repair DNA properly, raising the cancer risk. Women at hereditary risk for breast cancer who receive mammograms or chest X-rays before age 30 may be at higher risk for the disease, European research suggests [6].

American Academy of Family Physicians [7], Breast Cancer and the Environment: A Life Course Approach suggests that "women may be able to reduce their risk for breast cancer by avoiding unnecessary medical radiation; forgoing use of combination estrogen-progestin menopausal hormone therapy, if possible, limiting alcohol consumption, maintaining a healthy weight, exercising regularly, and avoiding tobacco use. Food and beverage containers, disposable plates, and toiletry bottles are all plastic and all are made from chemicals [8]. In 2010, the President's Cancer Panel reported that "the true burden of environmentally induced cancer has been grossly underestimated. A growing body of evidence from experimental, body burden and ecological research indicates that there is a connection between environmental factors and breast cancer. There are over 85,000 synthetic chemicals on the market today, from preservatives in our lipstick to flame retardants in our sofas, from plasticizers in our water bottles to pesticides on our fruits and vegetables.[9] By identifying significant environmental factors that are caused by chemical and physical hazards in air, water, and foods, environmental policy can be potentially manipulated to reduce prevalence rates of cancer.[10]

Conclusions

The present study shows the observed frequencies of respondents with respect to the environmental, distributed in the two categories responding (1-5) years and (6-10) years, the result indicated that the study group's individuals were reported low assessment grade (40.63%) than control group's individuals concerning with the environmental stressors items. The study also shows that the means of psychological and social stressors in study

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group was higher than that of control group. The results of testing indicating that there are a significant different at $P<0.05$ were obtained at the environmental factors. No relationship with their demographical characteristics variables and as well as of their reproductive characteristics variables with an overall assessments at the study group except with (Age and No. of living babies) only and we can concluded that the studied questionnaire can be amend for all individuals of the population concerning with Breast Cancer of women whatever a differences with their (Demographical and Reproductive) characteristics variables.

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 :
1. Monthly breast self-examination and regular mammography for age ≥ 40 years are the recommended methods of breast cancer early detection.
2. Encourage the breast feeding and maintaining a healthy weight.
3. Increasing the awareness about chemical products and radiation hazards.
4. Further study on large population.

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