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ORIGINAL: An Epidemiological Study of Female Breast Cancer in Sulaymaniyah City, Iraqi Kurdistan

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ABSTRACT

Introduction: The present study was aimed at describing the epidemiological characteristics of female breast cancer and explore its main risk factors in Sulaymaniyah city, the Kurdistan region of Iraq.

Material and Methods: The present case-control study was conducted in Sulaymaniyah, the Kurdistan region of Iraq from 2012-2014 in two hospitals. The study sample consisted of 150 women with breast cancer and 150 healthy women. Required data including sociodemographic and lifestyle factors, medical history, and reproductive factors were collected using a questionnaire through face-to-face interviews.

Results: The mean age of the cases and controls was 47.89±10.98 and 47.38±10.87 years respectively. Low level of education was a risk factor for breast cancer, such that breast cancer was significantly less prevalent among women with university education than those with lower education (P=0.001). The likelihood of developing breast cancer in women with a positive family history of cancer was significantly higher (P=0.003). Also, women with rural residency, unemployment, low income, early age of menopause, multigravida, history of abortion, duration of feeding the first and second babies, and obesity were at a significantly higher risk of developing breast cancer (P<0.05).

Conclusion: The Kurdish women in Iraq, develop breast cancer at age range of 40-50 years. Women with low level of education, a positive family history of cancer, rural residency, unemployment, low income, multigravida (+3), history of abortion, and obesity need to be taken into special consideration in order to diagnose breast cancer early and adopt appropriate interventions.

Introduction

Breast cancer (BC) has been defined as a disease in which breast cells alter and grow out of control (1). Globally, BC accounts for approximately one-third of all cancers, such that 1.67 million new BC cases were diagnosed in 2012 (25% of all

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cancers) (2). Although recent technology has led to its earlier diagnosis and better treatment, BC is still the second leading cause of cancer-induced death in women (3). Breast cancer is one of the most prevalent female cancer in high- and middle-income, but its incidence rate is increasing in low-income countries (4).

breast cancer deaths in low-, low/middle-, middle/high- countries, and high-income countries, respectively (5,6). The lowest rates of BC have been reported in the Middle East, sub-Saharan Africa, and Asian countries; however, the past two decades have witnessed a rapid increase in BC incidence. It is believed that hormonal and reproductive factors, access to early detection services, lifestyle, and environmental exposure are responsible for the international variation in incidence rates (4,5,7).

According to the Iraqi Cancer Registry, Ministry of Health, BC is the most prevalent female cancer in Iraq and there has recently been a rise in the incidence of female BC in all age groups, with a median age at diagnosis of 49 years. Moreover, older Iraqi women do not show the bimodal shift toward higher rates of luminal A breast cancers seen in the West. Moreover, the increase in the age-standardized incidence of breast cancer in Iraq particularly in older women might be because of a trend for care in urban cancer centers rather than changing tumor characteristics (8).

In their study carried out in the Kurdistan region of Iraq, Runnak et al. (2009) pointed out that pre-menopausal women having multiple pregnancies are more prone to develop breast cancer (9). Research has indicated that BC incidence among younger patients in the Kurdish region of Iraq is similar to the West but probably higher than many countries in the Middle East; however, the elderly in Kurdistan have been reported with remarkably lower rates than the West. In Sulaymaniyah city, BC is the most prevalent female cancer, accounting for 22% of all cancer cases from 2008 to 2013 (10,11).

BC etiology is not known yet. However, it is stated that both genetic and non-genetic factors play a role in BC development. In addition, there are several established risk factors including age, race, and family history. However, these established risk factors do not lead to BC. There are also some modifiable risk factors such as body weight, physical activity, smoking, and alcohol consumption (12,13). Also, there are some reproductive risk factors like age at menarche, abortion, menopause, breastfeeding, and parity which increase the risk of BC development (14).

According to epidemiological studies, women with a positive family history of BC in their first-degree relatives (mother, sister, and daughter) are significantly two or more likely to develop BC (15). Moreover, levels of estrogen circulation rise due to high fat intake (i.e. high BMI), which in turn raises the risk of BC. In addition, increased alcohol consumption is believed to be associated with BC development (16). As indicated by epidemiologic research, breastfeeding has some significant health benefits for mothers in a way that shows that women with longer breastfeeding duration are more protected against BC (17). The present study was carried out in order to describe the epidemiological characteristics of female breast cancer and explore its main risk factors in Sulaymaniyah city, the Kurdistan region of Iraq.

Methods

Study design and setting

Utilizing a case-control, the present study was carried out in Hiwa Hospital for cancer patients and Breast Center and Maternity Hospital located in Sulaymaniyah, the Kurdistan region of Iraq from 2012-14.

Participants

The study sample consisted of 150 women diagnosed with breast cancer registered at Hiwa Hospital and 150 age-matched women confirmed to be free from breast cancer at Sulaymaniyah Maternity Hospital. The subjects were selected using a randomized sampling method.

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Data collection

Using a researcher-designed questionnaire, the required data were collected through face-to-face interviews. The questionnaire had three sections. The first section aimed to collect sociodemographic and lifestyle factors. The second section collected data on the subjects' medical history. The last section gathered data on reproductive factors. The validity of the questionnaire was examined by conducting a pilot study, and necessary modifications were made. Its reliability was examined through Cronbach's alpha which was 0.87.

Statistical analysis

The collected data were analyzed through descriptive statistics including median, mean, and frequency. Moreover, X^2 for linear trend, Mann-Whitney test, and regression coefficient were used. For this purpose, SPSS version 20 was used. The level of statistical significance was set at $P<0.05$.

Ethical considerations

The researcher obtained the conduction approval of the Ethics Committee of the High Institute of Public Health. Moreover, the research protocol complied with the International Ethical Research Guidelines for research. In addition, informed consent was obtained from the subjects, and confidentiality was assessed.

Results

Analyzing the demographic characteristics indicated that the mean age of the cases and controls was 47.89±10.98 and 47.38±10.87 years respectively. The two groups were not significantly different in this regard. The two groups were significantly different regarding

Table 1. Distribution of cases and controls regarding their socio-demographic characteristics

Sociodemographic characteristics	Group				X^2 (P)	OR (95% CI)
	Controls (n=150)		Cases (n=150)			
	No	%	No	%		
Age						
20-	4	2.7	4	2.7		
30-	30	20.0	30	20.0		
40-	53	35.3	53	35.3	0.0 (1.000)	Matched variable
50-	37	24.7	37	24.7		
60-76	26	17.3	26	17.3		
Residence						
Urban	125	83.3	68	45.3	47.0	1
Rural	25	16.7	82	54.7	(0.001)	6.0 (3.5-10.3)
Education						
Illiterate	1	0.7	41	27.3		110.7 (13.4-215.1)
Read & Write	5	3.3	23	15.3		12.4 (3.7-41.6)
Primary	21	14.0	32	21.3		4.1 (1.7-10.2)
Secondary	19	12.7	20	13.3	81.5 (0.001)*	2.8 (1.1-7.4)
Preparatory	31	20.7	13	8.7		1.1 (0.43-2.9)
Institute	46	30.7	11	7.3		0.65 (0.43-2.9)
University / more	27	18.0	10	6.7		1
Work						
No	59	39.3	105	70.0	28.5	3.5 (2.2-5.8)
Yes	91	60.7	45	30.0	(0.001)	1
Income						
Sufficient	42	28.0	16	10.7		1
Just sufficient	88	58.7	73	48.7	32.6 (0.001)*	2.2 (1.1-4.2)
Insufficient	20	13.3	61	40.7		8.0 (3.7-17.2)
Family history						
No	135	90.0	116	77.3	8.8 (0.003)	1
Yes	15	10.0	34	22.7		2.6 (1.4-5.1)

OR: Odds ratio, *: X^2 for linear trend, CI: Confidence interval,

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Table 2. Shows the distribution of cases and controls regarding their reproductive characteristics

Reproductive characteristics	Group				X^2 (P)	OR (95% CI)
	Controls (n=141)		Cases (n=133)			
	No	%	No	%		
Number of pregnancies						
>3	56	39.7	35	26.3	(0.019)	1
3+	85	60.3	98	73.7		1.84 (1.105-3.080)
History of Abortions						
No	111	78.7	73	54.9	17.6 (0.001)	1
Yes	30	21.3	60	45.1		3.0 (1.8-5.2)
Number of live births						
No	5	3.5	15	11.3		1
1-2	33	23.4	33	24.8		0.33 (0.11-1.1)
3-4	62	44.0	44	33.1	1.2 (0.273)*	0.24 (0.08-0.69)
5-6	34	24.1	32	24.1		0.31 (0.10-0.96)
7+	7	5.0	9	6.8		0.43 (0.10-1.8)

OR: Odds ratio, *: X^2 for linear trend CI: Confidence interval

their residence status (P=0.001), such that women living in rural areas were 6 times more likely to develop breast cancer than those living in urban areas. There was also a significant difference between the two groups in terms of their education level (P=0.001). Low level of education was a risk factor for breast cancer, such that illiterate women, those with reading and writing, primary, secondary, and preparatory education levels were 110.7, 12.4, 4.1, 2.8, and 1.1 times more likely to develop breast cancer than those with university education respectively. The two groups were also significantly different in terms of their work (P=0.001). Non-working women were more likely to develop breast cancer than working women. A significant difference was also found between the cases and control regarding their income (P=0.001). Women with just sufficient and insufficient income were 2.2 and 8 times more prone to developing breast cancer respectively. The results also revealed that the two groups were significantly different regarding their family history of breast cancer (P=0.003). The likelihood of developing breast cancer in women with a positive family history of cancer was 2.6 times more than those without it (***Table 1***).

The results also showed that the breast cancer women and the controls were significantly different in terms of number of pregnancies (i.e. multigravida) (P=0.019) and history of abortions (P=0.001). Women with 3 or more pregnancies were 1.84 times more prone to developing breast cancer than those with less than 3 pregnancies, and those with a history of abortion were 3 times more likely to have breast cancer. However, the two groups were not significantly different regarding the number of live births (P=0.273) (***Table 2***).

The results also showed that the cases and control were significantly different regarding their menopausal status (P=0.001). Menopausal women were 3.9 times more prone to developing breast cancer. They were also significantly different regarding their menopause age (P=0.001). Women with their

Table 3. Distribution of cases and controls regarding their menopausal status

Menopausal status	Group				X^2 (P)	OR (95% CI)
	Controls (n=150)		Cases (n=150)			
	No	%	No	%		
Menopause						
No	71	47.3	28	18.7	27.8 (0.001)	1
Yes	79	52.7	122	81.3		3.9 (2.3-6.6)
Age of menopause	(n=79)		(n=122)			
30-	0	0.0	18	14.8		135.1 (0.82-265.7)
40-	26	32.9	64	52.5	29.6 (0.001)*	12.3 (1.3-25.9)
45-	48	60.8	39	32.0		4.1 (0.86-36.2)
50+	5	6.3	1	0.8		1

OR: Odds ratio, *: X^2 for linear trend, CI: Confidence interval

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Table 4. Distribution of cases and controls regarding their breastfeeding duration

Feeding duration	Group		Z (P)
	Controls (n=141)	Cases (n=133)	
	Median (inter quartile range)	Median (inter quartile range)	
First baby	12 (2-24)	17(1-24)	3.1 (0.001)
Second baby	12 (3-24)	12(1-24)	2.0 (0.043)
Third baby	12(6-24)	12(1-24)	0.91 (0.361)
Fourth baby	10(5-20)	11(2-24)	0.53 (0.598)
Fifth baby/more	9(6-24)	12(2-24)	0.92 (0.358)

Z: Mann-Whitney test

Table 5. Distribution of cases and controls regarding the Body Mass Index

Body Mass Index	Group				X^2 (P)	OR (95% CI)
	Controls (n=150)		Cases (n=150)			
	No	%	No	%		
BMI						
Normal	85	56.7	70	46.7	23.1 (0.001)*	1
Overweight	64	42.7	56	37.3		1.1 (0.66-1.7)
Obese	1	0.7	24	16.0		29.1 (3.8-109.6)

OR: Odds ratio, *: X^2 for linear trend, CI: Confidence interval

menopause from 30 to 40, 40 to 45, and 45 to 50 years were 135.1, 12.3, and 4.1 times more likely to develop breast cancer respectively (***Table 3***).

Women with breast cancer and those without it were significantly different in terms of breastfeeding duration of their first and second babies (P=0.001 and P=0.043, respectively). However, there was no significant difference between them in terms of feeding duration of other babies (***Table 4***).

The cases and control were significantly different in terms of their BMI (P=0.001). Overweight and obese women were respectively 1.1 and 29.1 times more likely to develop breast cancer than those with normal weight (***Table 5***).

For better analysis of the effect of the risk factors, multiple logistic regression analysis was carried out. The results indicated that the most important factors effective breast cancer development were rural residence (OR=3.42), education (illiteracy and read and write level with OR of 31.9 and 3.08 respectively), low income (just sufficient and insufficient with OR of 2.56 and 4.51 respectively), positive family history of breast cancer (OR=3.11), multigravida of 3 and more (OR=0.39), early menopause (OR=5.68), and obesity (OR=15.86) (***Table 6***).

Discussion

Breast cancer continues to be the leading cause of cancer-induced female morbidity and mortality. Different geographic areas have been reported with significant variations in breast cancer prevalence rates (18). Similar to other countries in the Middle East, Iraq has been reported to have a high prevalence rate of breast cancer which is steadily increasing. Improved screening practices and education are referred to as factors that have a role in early its detection (19).

According to the studies which examined different epidemiological profiles with respect to risk factors in Iraq and presented in the current study, the established risk factors such as race, family history, and age cannot be modified; however, other risk factors such as lifestyle choices including alcohol consumption, smoking, physical activity, BMI which are significant determinants for the breast cancer risk can be modified (20).

As revealed by the results, similar to women in other Middle Eastern countries, Iraqi women develop breast cancer at a younger mean age than industrialized nation (21,22).

This difference can be attributed to environmental exposure because there has

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Table 6. Predictors of BC development (Logistic regression analysis)

Risk factor	B	S.E.	P	OR	95% CI	
					Lower	Upper
Rural residence	1.23	0.44	0.006	3.42	1.43	8.14
Education			0.033			
Illiterate	3.46	1.25	0.006	31.90	2.75	369.96
Read & write	1.13	0.94	0.051	3.08	1.0	19.34
Monthly income			0.045			
Just sufficient	0.94	0.50	0.053	2.56	0.99	6.80
Insufficient	1.51	0.61	0.013	4.51	1.37	14.83
Family history	1.14	0.49	0.021	3.11	1.19	8.15
Multigravida (3+)	-0.94	0.45	0.035	0.39	0.16	0.94
Menopause	1.74	0.44	0.000	5.68	2.38	13.54
BMI			0.021			
Obese	2.76	1.14	0.016	15.86	1.68	149.35
Constant	-6.68	1.19	0.000	0.00		
Model significance				0.001		
Model Pseudo R2				0.60		
Classification accuracy				82.5%		

B: Regression coefficient, CI: Confidence interval, S.E.: Standard error, OR: Odds ratio

been a great deal of environmental calamity in Iraq including uranium poisoning and other carcinogenic hazards as a result of heavy fighting in the Gulf Wars in that region (23,24). The reduced mean age of breast cancer incidence can also be related to remarkable differences in care and delayed diagnosis in most vulnerable populations (25).

According to the results, about one-fifth of the cases had a positive family history. Women with sisters or mothers suffering from breast cancer had higher percentages of BC. However, those with their aunts suffering from BC had the lowest incidence rate. Similarly, Majid et al. (2009) carried out a study in Kurdistan and reported an increased risk of breast cancer among Kurdish patients with a positive family history (25,26).

Moreover, it was concluded that rural residency (living in villages), low level of education (illiterate, read and write, primary, secondary, and high school levels), unemployment, and low income were found as risk factors for developing breast cancer. These findings are in good agreement with those of the study carried out by Fei et al. (2015) (27). It was also seen that women with three or more children were more likely to get BC; however, research has indicated full-term delivery of children, regardless of the total numbers of deliveries, has a protective effect against BC (28).

According to some studies, increased parity results in a decrease in breast cancer risk in both premenopausal and postmenopausal women (29). Moreover, first full-term pregnancy before age 30 and higher parity were found to be protective factors for BC, while age 35 years or more at first birth increases breast cancer risk. In addition, multigravida of over 3 (having 3 and more pregnancies) and a positive history of abortion were risk factors for developing breast cancer (30,31).

Based on the results of the present study, there was also an increase in the risk of breast cancer for those who had abortions. This finding is in line with the study conducted by Sezer et al. (2011) (31). However, the results of the study conducted by Ye et al. (2002) did not show an increased risk of BC as a result of induced abortions in women either under or over the age of 50 years (32). Moreover, according to the study by Paoletti et al. (2003), a history of spontaneous abortion was not accompanied by BC risk although repeated miscarriages lead to slight increase in the risk (33). They also showed that spontaneous abortion was associated with decreased risk of premenopausal breast cancer followed by an increased risk of postmenopausal breast cancer (33). As indicated by the results, breast cancer risk was 3.9 times higher in early menopausal women than non-menopausal women.

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Similar to this finding, menopausal status and early age of menopause were found to be risk factors for breast cancer (34).
The results showed a significant difference between the cases and control in cases of breastfeeding one or two children, while they were not significantly different in case of breastfeeding 3rd, 4th, or 5th babies. While breastfeeding more than one child is beneficial to lowering the risk of breast cancer, having three, four, or even five children has no additive effect. It is also interesting to note that women in the Middle East breastfeed their infants for a longer time period than Western women (35).
In the present study, all factors affecting the risk of breast cancer development were analyzed, and it was concluded that that breastfeeding was the strongest indicator of breast cancer risk, such that breastfeeding ability is one of the best ways to lower breast cancer risk. This might suggest that hormones that change during the reproductive cycle can play a protective role in fighting breast cancer (36). Women with a history of breastfeeding had a lower risk of developing breast cancer, and a prolonged lactation period reduced the risk more (35). That is why most studies have referred to breastfeeding as a protective factor against breast cancer. It is hypothesized that breastfeeding reduces breast cancer risk through two mechanisms: differentiation of breast tissue and reduction of the number of ovulatory cycles in a lifetime (30). Examination of the body mass index led to the conclusion that women who were obese had a much higher risk of breast cancer. Similar studies have referred to obesity and overweight as risk factors for breast cancer (37,38).

Conclusion

Most of the women developed breast cancer at the age of 40-50 years. Illiteracy, obesity, abortion, positive family history, multigravida of over 3, and rural residence were found as risk factors for breast cancer. On the other hand, long duration of lactation and early menopause had protective effects.

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Conflicts of interest

The authors declare that there is no conflict of interest regarding the publication of this article.

Authors' contributions

Study design: J.J.R.S., Z.M.G., S.S.A.E.
Data collection: S.S., B.G.M.A.T., D.A.T., M.I.M.G., F.H.R.F.
Writing: S.R.A. D.D.A. K.A.H.G.
Final revision: All authors

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