

RESEARCH ARTICLE

Breast Cancer in Iraq, Incidence Trends from 2000-2009

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Abstract

Background: Breast cancer is the most frequent malignancy of women worldwide. In Iraq, breast cancer ranks first among cancers diagnosed in women but no studies have been conducted on incidence trends. The present study of breast cancer in the country during 2000-2009 was therefore performed. **Materials and Methods:** The registered data for breast cancer cases were collected from the Iraqi Cancer Registry/Ministry of Health. The significance of incidence rate trends during 2000-2009 was tested using Poisson regression. Age-standardized rates (ASR), and age-specific rates per 100,000 population were calculated. **Results:** A total of 23,792 incident breast cancer cases were registered among females aged ≥ 15 years, represented 33.8% of all cancers in females registered during 2000-2009. It ranked first in all the years. The median age at diagnosis was 49 and the mean age was 52 years. The incidence rate of all female breast cancer in Iraq (all ages) increased from 26.6 per 100,000 in 2000 to 31.5 per 100,000 in 2009 (APC=1.14%, $p < .0001$). The incidence in age groups (40-49), (50-59) and (70+) increased in earlier years and has recently (2005-2009) become stable. The incidence in age group (60-69) did not decline since 2003, while the incidence rates in the age group (15-39) started to decline in 2004. **Conclusions:** With the Iraqi Cancer Registry data during the period 2000-2009, the incidence of all female breast cancer in Iraq (all ages) has risen. We found rapid increase in the age specific incidence rate among age group 60-69. However, breast cancer among Iraqi women still affects younger age groups than their counterparts in developed countries. Further epidemiological research is needed to examine possible causes and prevention measures.

Keywords: Breast cancer - incidence - time trends - age-dependence - Iraq

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Introduction

Breast cancer is the most frequent cancer in women worldwide, representing 1.38 million new cancer cases diagnosed in 2008, constituting 23% of all cancer cases in women. It is now the most common cancer both in developed and developing countries (Ferlay et al., 2010). The range of mortality rates (by about 6-19 per 100,000) ranks as the fifth cause of death from cancer overall (Ferlay et al., 2010). In 2013, an estimated 232,340 women were expected to be diagnosed in the US with breast cancer, with 39,620 women were expected to die (American Cancer Society, 2013).

Incidence rates vary from 19.3 per 100,000 women in Eastern Africa to 89.7 per 100,000 women in Western Europe, and are high (greater than 80 per 100,000) in developed regions of the world (except Japan) and low (less than 40 per 100,000) in most of the developing regions (Ferlay et al., 2010). According to the International Agency for Cancer Research and GLOBOCAN 2008, the Age Standardized Incidence Rates (ASR) in Iraq was (31.1/100,000), similar as compared to the countries surrounding Iraq, Kuwait (47.7), Saudi Arabia (22.4),

Jordan (47.0), Syria (23.0), Iran (18.4), Turkey (28.3) (GLOBOCAN, 2008).

Breast cancer is the most frequent cancer among women in Iraq. According to the latest Iraqi Cancer Registry, breast cancer account for approximately one-third of the registered female cancers in Iraq, indicated that the breast cancer is the leading cancer site among females (Iraqi National Cancer Research Center, 2013).

Iraq developed national programs for early detection of breast cancer as proposed by the World Health Organization (WHO) in an effort to decrease breast cancer mortality. The work has started since 2001 in four main specialized centers (Baghdad (two), Basrah, Ninawa) and sixteen special breast clinics. The work involves: education and training on self examination of breast; ultrasound examination of breasts; mammography available in the two centers on request; aspiration of cysts and cytology and surgical excision; referral to chemotherapy and radiotherapy if available; breast cancer registration (Iraqi National Cancer Research Center, 2013).

The purpose of this article was to describe the time trends of breast cancer incidence among Iraqi women from 2000 through 2009.

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Materials and Methods

Data on breast cancer (ICD 9th, codes 50) between 1st January 2000 and 31st December 2009 were obtained from annual book series published by the Iraqi Cancer Board/Ministry of Health. The Iraqi Cancer Board is responsible for collecting the information relating to every newly diagnosed cancer patient who is registered from governmental and nongovernmental health institutions (hospitals and pathological laboratories) in Iraq provinces (Iraqi Cancer Board, 2010).

Annual female population, by 5-year age-groups, were obtained from the Central Organization for Statistics/Ministry of Planning. The estimates according to the Population Census results as in 1997 (Ministry of Planning, 2012).

We restricted our analyses to women aged ≥ 15 years, and categorized according to the age groups as 15- 39, 40-49, 50-59, 60-69 and 70+ years. We examined the overall and age group trends of breast cancer incidence in Iraq from 2000 to 2009 by using Poisson regression with the natural logarithm of the population as an offset. Annual percentage change (APC) from 2000 to 2009 are examined and the points in time when the direction of the trends changes significantly are detected.

Age-standardized incidence rates (ASR) were calculated based on World Standard Population. All statistical analyses were performed using SAS statistical software, version 9.2 (SAS Institute, Cary, NC, USA). For all analyses, the significance level was set at $p \leq 5\%$.

Results

Between 2000 and 2009, 23792 incident breast cancer were registered among females aged ≥ 15 years, represented 33.81% of all women cancer registered. It ranked the first in all the years between 2000 to 2009. The median age at diagnosis was 49, the mean age was (52+/-13.7) years, and ranges from 15 years old which is very rare to occur in this age to 70+ years. The highest percentage of cases were in the age group 40-49 years (32.28%), followed by 50-59 years (26.62%), 15-39 years (20.63%), 6.16% were in the age of 70+ years (Table 1). The age-standardized incidence rate was 29.7 per 100,000 female population. The age-specific rates were 9.11, 77.8, for the age groups (15-39), (40-49) years respectively. The highest rates were in the age groups of 50-59 and 60-69 years (98.0 and 82.7 respectively). Afterwards, the rates decline to 44.9 for the age group (70+) years (Figure 1). The Histopathological characteristics of breast cancers registered in the Iraqi cancer registry are shown in (Table 2) The vast majority of the breast cancer cases (72.66%) were diagnosed with Infiltrating duct carcinoma, followed by unspecified and other breast carcinoma (14.15%). Other subtypes of breast disease represented a small fraction of the diagnosed breast diseases.

Figure 2 shows the Poisson regression analysis resulted in the trends of incidence rates of breast cancer of all ages in Iraq between 2000 and 2009. There was a rise in the rate from 26.64 per 100,000 in 2000 to 31.50 per 100,000 in 2009 (APC=1.14%, $p < 0.0001$). The rate increased sharply

Table 1. Age of Breast Cancer, Data from Iraqi Cancer Registry for Cancers Diagnosed between 2000 and 2009 (N=23792)

Age range	No.	%
15-39	4910	20.63
40-49	7681	32.28
<50	12591	52.92
50-59	6335	26.62
60-69	3400	14.3
70+	1466	6.16
>50	11201	47.07

Table 2. Histology Type of Breast Cancer among Women in Iraq, Data from Iraqi Cancer Registry for Cancers diagnosed between 2000 and 2009 (N=23792)

Histology type	No.	%
Infiltrating duct carcinoma	17287	72.66
Lobular carcinoma, NOS	1070	4.5
Adenocarcinoma, NOS	882	3.71
Epithelia Itumor	371	1.56
Intraductal papil. Adenocarcinoma	340	1.43
Medullary carcinoma, NOS	181	0.76
Infiltrating duct and lobular carcinoma	119	0.5
Squamous cell carcinoma, NOS	71	0.3
Mucinous adenocarcinoma	55	0.23
Papillary carcinoma, NOS	48	0.2
Unspecified and other breast carcinoma	3368	14.15

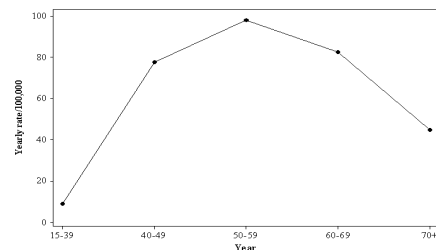


Figure 1. Age-Specific Incidence Rate of All Female Breast Cancer in Iraq Over the Period 2000-2009

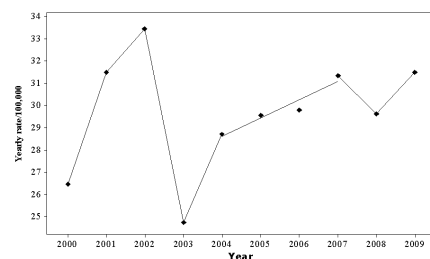


Figure 2. Trends in Annual Incidence Rate of all Female Breast Cancer in Iraq (All Ages) Over the Period 2000-2009. The Point in Time Selected where Trends Significantly Change Direction at any Given Year

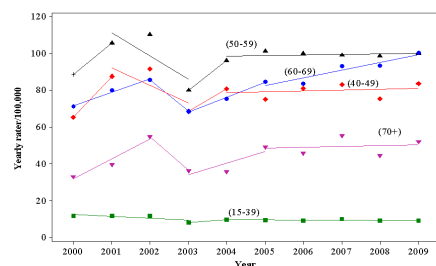


Figure 3. Trends in Annual Incidence Rate of all Female Breast Cancer in Iraq by Age Group Over the Period 2000-2009. The Point in Time Selected where Trends Significantly Change Direction at any Given Year

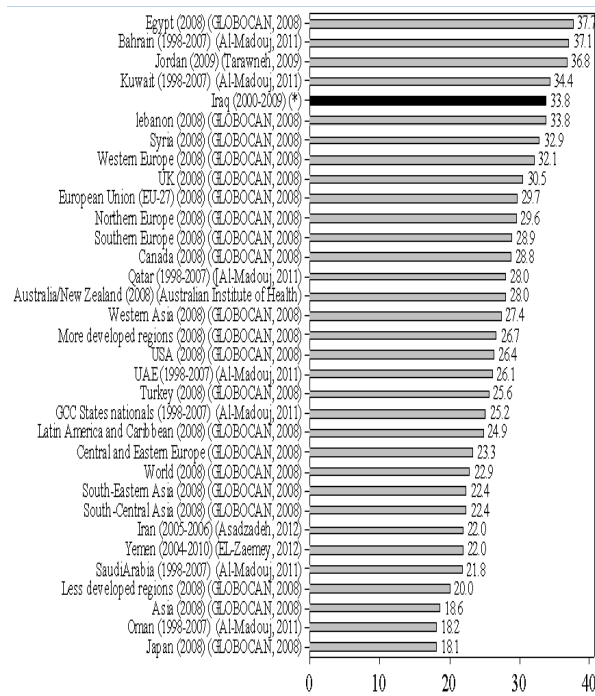


Figure 4. Proportion of Breast Cancer in Females in Iraq Compared to Other Countries

from 26.64 per 100,000 in 2000 to 31.5 per 100,000 in 2001 (APC=17.4022%, $p<0.0001$), increased again to 33.44 per 100,000 in 2002 (APC=7.3813%, $p=0.0149$), fell sharply to 24.73 per 100,000 in 2003 (APC=-26.67%, $p<0.0001$), increased sharply to 28.70 in 2004 (APC=16.90%, $p<0.0001$), increased again to 31.34 in 2007 (APC=3.51%, $p<0.0001$), decreased significantly to 29.61 in 2008 (APC=-6.12%, $p=0.021$), increased significantly to 31.50 per 100,000 in 2009 (APC=7.13%, $p=0.0106$).

Stratified by age are shown in (Figure 3). The incidence rates for age groups 15-39, 40-49, 50-59, 60-69 and 70+, all had patterns similar to that observed for all ages. For age group (15-39), the incidence rates declined significantly between 2000 to 2003 (APC=-7.8522%, $p<0.0001$), increased significantly between 2003 to 2004 (APC=22.3682%, $p=0.0029$) and declined significantly between 2004 to 2009 (APC=-0.6710%, $p=0.0036$). For age group (40-49), the incidence rates increased significantly between 2000 to 2001 (APC=34.49%, $p<0.0001$), declined significantly between 2001 to 2003 (APC=-11.25%, $p<0.0001$), increased significantly between 2003 to 2004 (APC=17.11%, $p=0.0036$) and stable between 2004 to 2009 (APC=0.89%, $p=0.11$). For age group (50-59), the incidence rates increased significantly between 2000 to 2001 (APC=21.17%, $p=0.0026$), declined significantly between 2001 to 2003 (APC=-11.24%, $p<0.0001$), increased significantly between 2003 to 2004 (APC=17.51%, $p=0.0077$) and stable between 2004 to 2009 (APC=0.87%, $p=0.1485$). For age group (60-69), the incidence rates increased significantly between 2000 to 2002 (APC=9.7623%, $p=0.0220$), declined significantly between 2002 to 2003 (APC=-19.715%, $p=0.0065$), increased significantly between 2003 to 2005 (APC=11.0638%, $p=0.0084$) and increased again between 2005 and 2009 (APC=3.9696%, $p=0.0161$). For age group

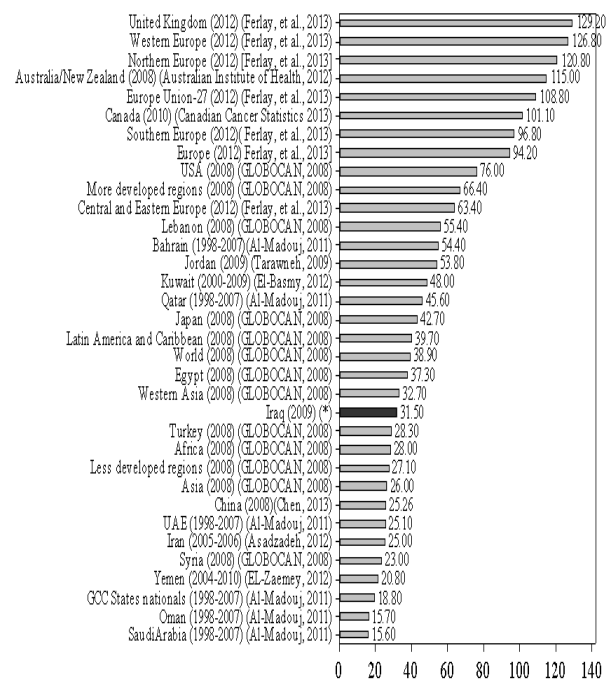


Figure 5. Age-Standardized Incidence Rate for Female Breast Cancer in Iraq Compared to Other Countries

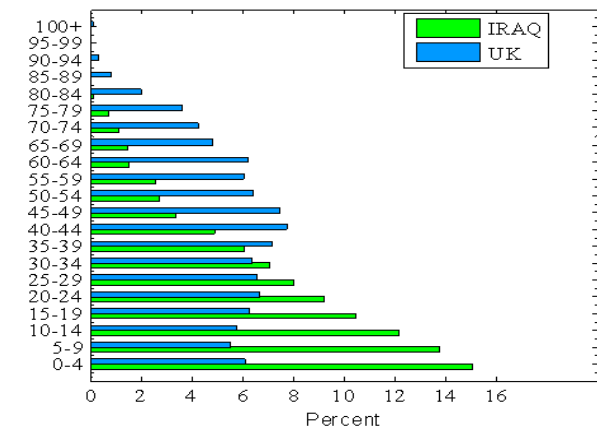


Figure 6. Comparison of the Population Pyramids of Iraq and United Kingdom in 2009

(70+), the incidence rates increased significantly between 2000 to 2002 (APC=29.5054%, $p<0.0001$), declined significantly between 2002 to 2003 (APC=-33.830%, $p=0.0006$), increased significantly between 2003 to 2005 (APC=17.3971%, $p=0.0101$) and stable between 2005 to 2009 (APC=0.9991%, $p=0.6818$).

Discussion

This is the first study of Incidence trend of female breast cancer in Iraq. The purpose of this article was to describe the time trends of breast cancer incidence among Iraqi women from 2000 through 2009.

The analysis of breast cancer incidence trends among all female breast cancer in Iraq (all ages) during the period 2000-2009 shows that, in spite of the observed variation in incidence rates across the years of observation, breast cancer incidence appears to be increasing approximately 1.14% each year (Figure 2). The incidence in age groups

(40-49), (50-59) and (70+) increased in earlier years and has recently (2005-2009) stable. The incidence in age group (60-69) did not decline since 2003, while the incidence rates in age group (15-39) has started to decline since 2004.

The decrease in breast cancer in 2003 represents a highly significant departure from the sharply increase in breast cancer in 2001 and 2002 (Figure 2 and Figure 3). This due, in part, to the Gulf War in 2003 and to the widespread looting that began in the days following the US troops invasion Iraq, led to the suspension of work in government offices as well as loss the government Records.

The present study shows that in Iraq, the proportion of breast cancer in females (33.81%), compared with very similar proportion in Lebanon, lower than that observed in several Arab countries such as, Kuwait, Jordan and Bahrain. It's higher than that observed in USA, Asia, Africa and several Arab countries such as Saudi Arabia, UAE, Qatar, Oman and in non-Arab neighboring countries such as Turkey, Iran (Figure 4).

The ASR (31.50 per 100,000 in 2009) for breast cancer in Iraq close to the rates of Turkey and Western Asia, lower than that observed in USA, UK, Australia, New Zealand Europe Union and several Arab countries such as Jordan, Kuwait, Lebanon, Qatar and Bahrain. This rate was higher than that estimated in other Arab and regional countries, such as Syria, UAE, Saudi Arabia, Iran, and in non-regional countries such as China and Africa (Figure 5).

Infiltrating duct carcinoma was the most frequent histopathology type accounted 72.66 from all breast cancers followed by lobular carcinoma as the second most common type of breast cancer in Iraq. An Iraqi articles show that majority of breast cases (60-80%) are detected in advanced stages, (Aziz, 2009), (Hussein et al., 2009), (Majid et al., 2009). (Alwan, 2010), (Al-Shawi et al., 2012), (Runnak et al., 2012), this finding similar to Arab countries (Al-Rikabi and Husain, 2012), (El-Zaemey et al., 2012), (Elgaili et al., 2010), (Eldweny et al., 2012), (Tarawneh et al., 2009) and non-Arab neighboring country Iran (Montazeri et al., 2008), (Fateh et al., 2013). An article from Arab countries show that almost 60-80% of women present with advanced disease in Arab countries. However with massive campaigns and efforts at screening, a number of patients are presenting with small lumps or abnormal mammography findings (Saadat, 2008). It is worthwhile mentioning that approximately the similar results have been reported in studies in Australia (Australian Institute of Health, 2012).

The mean age at diagnosis of our study was 52 years compared with almost similar mean age Jordan (50.1 years) (Tarawneh et al., 2009). This mean is higher to other Arab and regional countries, such as Saudi Arabia (47-48.6 years) (Amin et al., 2009), (Al-Rikabi and Husain, 2012), (Yousuf et al., 2012), Libya (46 years) (Boder et al., 2011), Iran (43.4-49.3 years) (Montazeri et al., 2008), (Asadzadeh et al., 2012), (Kooshyar et al., 2013). While the mean age at diagnosis for women in (Australia, Canada, Denmark, Norway, Sweden, and the UK, 1995-2007) was 62.5 years (range 60.6-63.9 years) (Coleman et al., 2011).

The median age at diagnosis of our study was 49 years

compared with very similar mean age in Saudi Arabia (48-49 years) (Al Mutairi et al., 2013), (Alanazi et al., 2013). While the median age at diagnosis for women in Yemen (45 years) (El-Zaemey et al., 2012), Lebanon (52.5 years) (Lakkis et al., 2010), Iran (46 years) (Taheri et al., 2012), Australia (60 years) (Australian Institute of Health, 2012). An article from Arab countries describing that the presents of breast cancer almost 10 years younger than in the USA and European countries. Median age at presentation is 48-52. (Saadat, 2008).

A marked increase in the annual number of breast cancer among Iraqi women between 2000 and 2009, this most probably due to the improvement awareness in connection with the Iraqi National Breast Cancer Research Program that began in 2000, Improvement of Iraqi national cancer research center data collection, opening of new breast cancer screening mammograms that were implemented from 2000 onward led to increased mammography screening. In a report from Arab countries, show that the rising in incidence in Arab countries and the change may be due to a westernized life style including dietary habits, lack of exercise, delay of age of marriage, first pregnancy from late teens and early 20s to the late 20s and early 30s, decrease in breastfeeding duration. Young women have their diagnosis of breast cancer delayed because of lack of awareness, social customs and most important is a low index of suspicion from primary care (Saadat, 2008).

Between 2000 and 2009, 52.92% of cases registered with breast cancer in Iraq were diagnosed under age fifty. Based on the articles from Iraq, around 52.69-58.49% of female breast cancer cases diagnosed before the age of 50. These percentages are almost similar to those observed in Bahrain 53.95%, Oman 53.17% (Al-Madouj et al., 2011), higher than those observed in USA 20.90 (Hou and Huo, 2013), France 23.35% (Daubisse et al., 2011), England 20% (Office for National Statistics, 2013), Australia 23.6%)Australian Institute of Health, 2012(. 40% lebanonm (Lakkis et al., 2010), 44.5-47.15% in Jordan (Tarawneh et al. 2009, Tarawneh et al. 2011), Kuwait 47.5% (Al-Madouj et al., 2011), and less than those observed in UAE 56.7%, Qatar 59.7%, Saudi 58.8(Al-Madouj et al., 2011), Yemen 70% (El-Zaemey et al., 2012), Libya (71%) (Boder et al., 2011), 74% Sudan (Elgaili et al., 2010), Iran 67.5% (Montazeri et al., 2008). An article from developing countries including Arab countries, show that breast cancer among women with a young age of around 50 years at presentation (El Saghri, et al., 2007).

Proportion of the younger age at diagnosis with breast cancer in our study approximately similar to other studies in developing countries including Arab countries, this is possibly due to the higher proportion of women less than 50 years old in Iraq and generally in developing countries, The proportion of women less than 50 years old in Iraq has 82% (UN, World Population Prospects: The 2012 Revision) of women aged less than 50 years compared with that of a developed country, for example United Kingdom 56% (United Nation, World Population Prospects: The 2012 Revision) in the year 2009. The median age of the Iraqi women is 29 (2000-2009) years, while its 44 in the United Kingdom among

the same period. A comparison of the rate of change of the population of women at risk for breast cancer in Iraq with that in the United Kingdom shows that whereas the population of women at risk remains stable in the United Kingdom, it is increasing steeply in Iraq. In Iraq the population of women at risk for breast cancer increased from about 6.8 million women in 2000 to about 8.8 million in 2009. In the United Kingdom on the other hand, the population of women at risk of breast cancer increased from about 24.7 million in 2000 to about 26.0 million in 2009. A report from Arab countries show that 50% of all cases are below the age of 50 years whereas only 25% of cases in developed countries are below the age of 50 years (Saadat, 2008).

Most developing countries including Iraq currently have a cone-shaped population pyramids with a smaller percentage of elderly, while the most developed countries have a cylinder shape with stationary across all age groups. (Figure 6) shows the comparison of the population pyramids of Iraq and United Kingdom in 2009. The figure reflects a high fertility rate with high percentage of youths and young adults than the elderly in the Iraqi population.

In conclusion, With the Iraqi Cancer Registry data during the period 2000-2009, the incidence of all female breast cancer in Iraq (all ages) has risen in Iraq. We found rapidly increasing in the age specific incidence rate among age group (60-69). The incidence of breast cancer among Iraqi women affected at a younger age groups than their counterparts in developed countries. Further epidemiological research are needed to examine possible causes and prevention for these finding.

There is a need to improve data access, improve the amount of data for each patient, such as: Stage of the tumor; Estrogen Receptor (ER) status; conducted therapy; mortality/survival.

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References

Alanazi M, Pathan AA, Shaik J, et al (2013). The C Allele of a Synonymous SNP (rs1805414, Ala284Ala) in PARP1 is a Risk Factor for Susceptibility to Breast Cancer in Saudi Patients. *Asian Pac J Cancer Prev*, **14**, 3051-6.

Al-Madouj A, Eldali A, Al-Zahrani AS, et al (2011). Ten year cancer incidence among Nationals of the GCC states 1998-2007, Executive Board Of Health, Ministers' Council For The Gulf, Cooperation Council State, Gulf Center for Cancer Control and Prevention, King Faisal Specialist Hospital and Research Center, Riyadh, Saudi Arabia.

Al Mutairi F, Alanazi M, Shalaby M, et al (2013). Association of XRCC1 Gene polymorphisms with Breast cancer Susceptibility in Saudi Patients. *Asian Pac J Cancer Prev*, **14**, 3809-13.

Al-Rikabi A, Husain S (2012). Increasing prevalence of breast cancer among Saudi patients attending a tertiary referral hospital: a retrospective epidemiologic study. *Croatian medical J*, **53**, 239.

Al-Shawi AA (2012). Descriptive study of breast cancer in missan (South of Iraq). *Medical J Babylon*, **9**, 419-26.

Alwan NA (2010). Breast cancer: demographic characteristics and clinico-pathological presentation of patients in Iraq. *East Mediterr Health J*, **16**, 1159-64.

Alwan NA, Al-Diwan JK, Wafa M, et al (2012). Knowledge, attitude & Practice towards breast cancer & Breast self examination in Kirkuk University, Iraq. *Asian Pac J Reprod*, **1**, 308-11.

Alwan A (2004). Health in Iraq. The Current situation, Our vision for the future and Areas of work, Ministry of health, Second Edition.

Amin TT, Al Mulhim AR, Al-Meqihwi A (2009). Breast cancer knowledge, risk factors and screening among adult Saudi women in a primary health care setting. *Asian Pac J Cancer Prev*, **10**, 133-8.

Asadzadeh VF, Broeders MJ, Mousavi SM, et al (2012). The effect of demographic and lifestyle changes on the burden of breast cancer in Iranian women: a projection to 2030. *The Breast*, **22**, 277-81.

AIHW (2012). Breast cancer in Australia: an overview. Cancer series no. 71. Cat. no. CAN 67. Canberra: AIHW.

Aziz NJ (2009). Breast cancer in Kirkuk, Iraq. A review of 170 breast cancer females. *Bas J Surg, March*, **15**, 86-8.

Boder JM, Abdalla E, Fathi B, et al (2011). Breast cancer patients in Libya: comparison with European and central African patients. *Oncology Letters*, **2**, 323-30.

Canadian Cancer Society's Advisory Committee on Cancer Statistics (2013). Canadian Cancer Statistics. Toronto, ON: Canadian Cancer Society.

Chen WQ, Zheng RS, Zeng HM, et al (2013). Incidence and mortality of breast cancer in China, 2008. *Thoracic Cancer*, **4**, 59-65.

Coleman MP, Forman D, Bryant H, et al (2011). Cancer survival in Australia, Canada, Denmark, Norway, Sweden, and the UK, 1995-2007 (the International Cancer Benchmarking Partnership): an analysis of population-based cancer registry data. *The Lancet*, **377**, 127-38.

Daubisse ML, Delafosse P, Boitard JB, et al (2011). Breast cancer incidence and time trend in France from 1990 to 2007: a population-based study from two French cancer registries. *Annals Oncol*, **22**, 329-34.

El-Basmy A, Al-Mohannadi S, Al-Awadi A (2012). Some epidemiological measures of Cancer in Kuwait: national cancer registry data from 2000 -2009. *Asian Pac J Cancer Prev*, **13**, 3113-8.

Eldweny H, Alkhalidy K, Alsaleh N, et al (2012). Predictors of non-sentinel lymph node metastasis in breast cancer patients with positive sentinel lymph node (Pilot study). *J the Egyptian National Cancer Institute*, **24**, 23-30.

Elgaili EM, Abuidris DO, Rahman M, et al (2010). Breast cancer burden in central Sudan. *Int J women's health*, **2**, 77.

El Saghir NS, Khalil MK, Eid T, et al (2007). Trends in epidemiology and management of breast cancer in developing Arab countries: a literature and registry analysis. *Int J Surg*, **5**, 225-33.

El-Zaemey S, Nagi N, Fritschi L, et al (2012). Breast cancer among Yemeni women using the National Oncology Centre Registry 2004-2010. *Cancer Epidemiol*, **36**, 249-53.

Fateh M, Emamian MH (2013). Cancer incidence and Trend analysis in Shahrud, Iran, 2000-2010. *Iranian J Cancer Prev*, **6**, 85-94.

Ferlay J, Steliarova-Foucher E, Lortet-Tieulent J, et al (2013). Cancer incidence and mortality patterns in Europe: estimates for 40 countries in 2012. *Eur J Cancer*, **49**, 1374-403.

Ferlay J, Shin HR, Bray F, et al (2010). GLOBOCAN 2008, Estimates of worldwide burden of cancer in 2008 Cancer

- Incidence and Mortality Worldwide: IARC CancerBase No. 10. **127**, 2893-917.
- Globocan (2008). Breast cancer incidence and mortality worldwide, 2008. International Agency for Research on Cancer; 2010.
- Hou N, Huo D (2013). A trend analysis of breast cancer incidence rates in the United States from 2000 to 2009 shows a recent increase. *Breast Cancer Res Treat*, **138**, 633-41.
- Hussein AH, Aziz PM (2009). The incidence rate of breast cancer in suleimani governorate in 2006: Preliminary Study. *J Zankoy Sulaimani*, **12**, 59-65.
- Iraqi Cancer Board (2010). Results of the Iraqi Cancer Registry 2010. Baghdad, Iraqi Cancer Registry Center, Ministry of Health.
- Iraqi national cancer research center, Brief historical introduction, establishing the breast & cervical cancer research unit and the Iraqi National Cancer Research Center/Program.
- Globocan (2008). Breast Cancer Incidence and Mortality Worldwide, 2008. International Agency for Research on Cancer; 2010.
- Kooshyar MM, Nassiri M, Mahdavi M, et al (2013). Identification of Germline BRCA1 Mutations among Breast Cancer Families in Northeastern Iran. *Asian Pac J Cancer Prev*, **14**, 4339-45.
- Lakkis NA, Adib SM, Osman MH, et al (2010). Breast cancer in Lebanon: incidence and comparison to regional and Western countries. *Cancer Epidemiol*, **34**, 221-5.
- Majid RA, Mohammed HA, Saeed HM, et al (2009). Breast cancer in kurdish women of northern Iraq: incidence, clinical stage, and case control analysis of parity and family risk. *BMC women's health*, **9**, 33.
- McPherson K, Steel CM, Dixon JM (2000). Breast cancer—epidemiology, risk factors, and genetics. *BMJ*, **321**, 624-8.
- Ministry of Planning, Central Organization for Statistics. (2012). Annual Abstract of Statistics, 2000-2009. Baghdad, Iraq.
- Montazeri A, Vahdaninia M, Harirchi I, et al (2008). Breast cancer in Iran: need for greater women awareness of warning signs and effective screening methods. *Asia Pac Fam Med*, **7**, 6.
- Mousavi SM, Gouya MM, Ramazani R, et al (2009). Cancer incidence and mortality in Iran. *Annals Oncol*, **20**, 556-63.
- Office for National Statistics (2013). Registrations of cancer diagnosed in 2011, England. London.
- Runnak MA, Hazha MA, Hemin HA, et al (2012). A population-based study of Kurdish breast cancer in northern Iraq: hormone receptor and HER2 status. A comparison with Arabic women and United States SEER data. *BMC Women's Health*, **12**, 16.
- Saadat S (2008). Can we prevent breast cancer?. *Int J Health Sciences*, **2**, 167.
- Taheri NS, Nosrat SB, Aarabi M, et al (2012). Epidemiological Pattern of Breast Cancer in Iranian women: is there an Ethnic Disparity?. *Asian Pac J Cancer Prev*, **13**, 4517-20.
- Tarawneh M, Arqoub K, Sharkas G (2011). Epidemiology and Survival Analysis of Jordanian Female Breast Cancer Patients Diagnosed from 1997 to 2002. *Middle East J Cancer*, **2**, 71-80.
- Tarawneh M, Nimri O, Arkoob K, et al (2009). Cancer Incidence in Jordan 2009. Non-Communicable Diseases Directorate, Jordan Cancer Registry. Ministry of Health.
- United Nation, Department of Economic and Social Affairs, Population Division, Population Estimates and Projections Section.
- Yousuf SA, Al Amoudi SM, Nicolas W, et al (2012). Do Saudi Nurses in Primary Health Care Centres have Breast Cancer Knowledge to Promote Breast Cancer Awareness?. *Asian Pac J Cancer Prev*, **13**, 4459-64.