Introduction

Breast cancer is the most frequent cancer in women worldwide, 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 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<0.0001). 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
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 ≤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 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)

<table>
<thead>
<tr>
<th>Age range</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>15–39</td>
<td>4910</td>
<td>20.63</td>
</tr>
<tr>
<td>40–49</td>
<td>7681</td>
<td>32.28</td>
</tr>
<tr>
<td>&lt;50</td>
<td>12591</td>
<td>52.92</td>
</tr>
<tr>
<td>50–59</td>
<td>6335</td>
<td>26.62</td>
</tr>
<tr>
<td>60–69</td>
<td>3400</td>
<td>14.3</td>
</tr>
<tr>
<td>70+</td>
<td>1466</td>
<td>6.16</td>
</tr>
<tr>
<td>&gt;50</td>
<td>11201</td>
<td>47.07</td>
</tr>
</tbody>
</table>

### 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)

<table>
<thead>
<tr>
<th>Histology type</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Infiltrating duct carcinoma</td>
<td>17287</td>
<td>72.66</td>
</tr>
<tr>
<td>Lobular carcinoma, NOS</td>
<td>1070</td>
<td>4.5</td>
</tr>
<tr>
<td>Adenocarcinoma, NOS</td>
<td>882</td>
<td>3.71</td>
</tr>
<tr>
<td>Epithelia tumor</td>
<td>371</td>
<td>1.56</td>
</tr>
<tr>
<td>Intraductal papil. Adenocarcinoma</td>
<td>340</td>
<td>1.43</td>
</tr>
<tr>
<td>Medullary carcinoma, NOS</td>
<td>181</td>
<td>0.76</td>
</tr>
<tr>
<td>Infiltrating duct and lobular carcinoma</td>
<td>119</td>
<td>0.5</td>
</tr>
<tr>
<td>Squamous cell carcinoma, NOS</td>
<td>71</td>
<td>0.3</td>
</tr>
<tr>
<td>Mucinous adenocarcinoma</td>
<td>55</td>
<td>0.23</td>
</tr>
<tr>
<td>Papillary carcinoma, NOS</td>
<td>48</td>
<td>0.2</td>
</tr>
<tr>
<td>Unspecified and other breast carcinoma</td>
<td>3368</td>
<td>14.15</td>
</tr>
</tbody>
</table>
Trends in Age-Dependent Incidence of Breast Cancer in Iraq, 2000-2009

Figure 4. Proportion of Breast Cancer in Females 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 2005 (APC=5.00%, p=0.0106), increased to 29.61 in 2008 (APC=-6.12%, p=0.021), increased to 29.81 in 2009 (APC=0.89%, p=0.11). For age group (40-49), the incidence rates increased significantly between 2000 to 2001 (APC=34.49%, p=0.0036) and declined significantly between 2004 to 2009 (APC=0.89%, p=0.11). For age group (50-59), the incidence rates increased significantly between 2000 to 2003 (APC=7.8522%, p<0.0001), increased significantly between 2003 to 2004 (APC=22.3825%, p<0.0001), declined significantly between 2004 to 2005 (APC=-11.52%, p<0.0001), increased significantly between 2005 to 2006 (APC=17.11%, p=0.0036) and stable between 2006 to 2009 (APC=0.89%, p=0.11). 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<0.0001), 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 (70+), the incidence rates increased significantly between 2000 to 2002 (APC=29.5054%, p<0.0001), declined significantly between 2002 to 2003 (APC=-33.8305%, p<0.0001), 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 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), Libya (46 years) (Boder et al., 2011), Iran (43.4-49.3 years) (Montazeri et al., 2008), (Asadzadeh et al., 2012), (Kooshiyar 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), (Alnazi 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 breast feeding 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% (Dabois et al., 2011), England 20% (Office for National Statistics, 2013), Australia 23.6% ).Australian Institute of Health, 2012(, 40% Lebanon (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 Saghir, et al., 2007).
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References

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Iraqi national cancer research center, Brief historical introduction, establishing the breast & cervical cancer research unit and the Iraqi National Cancer Research Center/Program.


United Nation, Department of Economic and Social Affairs, Population Division, Population Estimates and Projections Section.