Iranian Women Diagnosed with Breast Cancer a Decade Earlier than British Women?

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ABSTRACT

Background: Breast cancer is one of the most prevalent female cancers in developing countries. It seems that breast cancer affects Iranian women a decade earlier than women from developed countries, however, there is not enough evidence for this hypothesis.

Methods: This repeated cross-sectional study was carried out on 6057 Iranian women, living in Isfahan province, using historical data from 2001 to 2013 and 506,095 British women in the same period. The UK breast cancer data came from the ONS website (www.ons.gov.uk) on request for the period of 2001 to 2013. The weighted mean age of women with breast cancer was compared between Iran and the UK by the independent t-test using STATA 14 at a 5% significance level.

Results: The age-standardized incidence rate (ASR) in Iran (Isfahan) increased from 22.0 to 68.0 per 100,000 populations from 2001 to 2013. The corresponding ASR in the UK increased from 152.4 to 169.8 per 100,000 population. The standardized mean age of breast cancer was 50.5 years (SD=12.6) and 63.6 years (SD=14.0) in Iranian and British women, respectively.

Conclusion: These findings imply that Iranian women were, on average, diagnosed with breast cancer a decade earlier than English women. Therefore, screening for breast cancer should begin at lower ages for Iranian women.

Keywords: Breast Cancer, Mean Age, Women, Incidence, Diagnosis, Iran, UK

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Introduction

Breast cancer is the most commonly diagnosed cancer among women. Worldwide statistics show that the annual incidence of breast cancer is increasing, particularly among countries with low incidence rates of breast cance (1,2). According to Sung et. al. 11.7% of new cases of globally diagnosed cancer in women are breast cancer (3). The worldwide age-standardized incidence rate (ASR) of breast cancer is 47.8 per 100,000 population. Breast cancer is also the leading cause of death from cancer in women (15.0% of the total cancer deaths). According to statistical reports, the ASR in Eastern Asia, Western Asia, Northern America, Western Europe, Northern Europe are 39.2, 45.3, 84.8, 92.6, and 90.1 per 100,000 population, respectively (3). In Iran, breast cancer appears as 24.4% of all cancers with an ASR of 23.1 per 100,000 population (4).

Several studies conducted in the Asian and Western countries have shown that despite significant similarities in the breast cancer area in these communities, there is a significant difference in the age of breast cancer incidence. While most cases of breast cancer in Asian countries occur at the age of 40 to 50 years, in Western societies, it is seen at the age of 60 to 70 years. The incidence rate of breast cancer and, in turn, the mortality rate of this cancer are increasing in Asian countries. In Western countries, although the incidence rate of breast cancer is rising, the mortality rate is significantly decreasing (5).

Breast cancer has the first rank of all cancer types' incidence among Iranian women with an ASR of 23.1 per 100,000 population, which is higher than reported colorectal cancer (6,7). In comparison with Western countries, it seems that breast cancer occurs a decade earlier among Iranian women and the neighboring countries of the Persian Gulf (including Kuwait, Jordan, and Oman) and Egypt. This is probably because Asian women are currently undergoing a rapid transition in their lifestyle and reproductive patterns (5, 7-9). In Iran, the mean age of female breast cancer at diagnosis was reported between 47.1 and 48.8 years, and 36% of cases have occurred at ages below 40 years (5). For example, the females' cancer in East Azebayejan, Iran, on average, occurred at 53 years (95% CI: 52.2-53.8) (8). It was also shown a relationship between the 5-year risk of breast cancer and age (9).

The Iranian Cancer Registry (2009) reported the highest ASR as 39.67 per 100,000 women for Isfahan province (6).

Above-mentioned information indicates that the average age at female breast cancer diagnosis in Iran is different from developed countries. The main question is whether Iranian women are diagnosed with breast cancer at lower ages than British women are. Awareness of breast cancer detection age is necessary for prevention and providing healthcare services. This study aimed to compare female breast cancer standardize mean age based on the Europe standard population between Iranian and British women.

Methods

This repeated cross-sectional study was conducted on 6143 Iranian women, living in Isfahan province, using historical data from 2001 to 2013 and 506,095 British women in the same period.

The UK breast cancer data came from the ONS website (www.ons.gov.uk) on request for the period of 2001 to 2013.

Isfahan province's breast cancer data were collected from the local Cancer Registry (excluding Kashan city), confirmed by the Cancer Registry Office of the Ministry of Health and Medical Education. The inclusion criteria were the definitive diagnosis of breast cancer based on the Cancer Registry Office protocol and Classification of Oncology Diseases (ICD-O-3) and being a resident of Isfahan province. The cancer registry data contained pathologic and personal information including age, gender, and place of residence for the past 10 years. The pathologic data included the history of pathologic diagnosis, topographic characteristics (type of tumor), and morphology (location of the lesion) of cancer. The male breast cancer data were excluded.

To describe the mean age at diagnosis of breast cancer, mean ± standard deviation, and 95% confidence interval were used. To control the difference in the age distribution of two populations on the mean age at breast cancer diagnosis, the standard population of Europe in 2013 was applied to both Iran and the UK data. Standardized mean age at breast cancer diagnosis was calculated by applying the direct method of standardization (10). The standardized mean age was computed by the following phases: a) the crude mean age at breast cancer diagnosis for each age group was calculated, b) the crude mean age group was

multiplied by the number of standard population in that age group, to compute expected sum of age group, c) the expected sum of age group was added together across all age groups for each year, d) finally, standardized mean age was calculated by dividing the expected sum of age of all age groups at that year by total standard population (11). In addition, the standardized mean age, its standard deviation, and 95% confidence interval were calculated across all years. The weighted mean age was compared between Iran and the UK using the independent t-test.

Results

The findings showed the standardized incidence rate (ASR) increased from 22.0 to 68.0 and from 152.4 to 169.8 per 100,000 women in Iran and the UK, respectively, from 2001 to 2013.

The unstandardized mean age at diagnosis of breast cancer was 50.1 ± 12.5 and 62.7 ± 13.4 years, for Iran and the UK, respectively. The standardized mean age was 50.5 ± 12.6 and 63.6 ± 14.0 years, for Iran and the UK, respectively (Table 1). The highest standardized mean age in Iran was by 52.2 ± 11.8 years in 2003 and the lowest one was by 49.4 ± 12.6 years in 2001 and 2002. In the UK, the average age range was 62.4 to 63.8 years (Table 1).

Table 1. Crude and standardized mean age at breast cancer diagnosis in Iran and the UK

| Year | Iran | | | UK | | |
| | Observed Number of Breast Cancer | Mean Age (SD) | | Observed Number of Breast Cancer | Mean Age (SD) | |
		Crude	Standardized Mean (SD)		Crude	Standardized Mean (SD)
2001	263	48.9(12.5)	49.4(12.7)	34312	63.4(14.3)	62.4(13.7)
2002	161	48.9(12.7)	49.4(12.6)	34319	63.3(14.1)	62.4(13.5)
2003	164	51.8(12.0)	52.2(11.8)	36509	63.4(14.0)	62.5(13.4)
2004	78	49.8(13.6)	50.5(14.0)	36939	63.4(14.0)	62.5(13.3)
2005	120	49.2(12.0)	49.8(11.6)	38212	63.3(14.0)	62.7(13.4)
2006	468	50.8(12.8)	51.3(13.0)	38004	62.7(13.3)	63.6(14.0)
2007	453	49.5(12.5)	50.0(12.7)	38048	62.8(13.3)	63.7(13.9)
2008	508	49.9(12.5)	50.3(12.4)	39681	62.8(13.2)	63.7(13.9)
2009	528	50.3(13.0)	50.6(12.7)	40260	62.7(13.4)	63.7(14.0)
2010	647	50.5(12.7)	51.8(12.5)	41259	62.6(13.4)	63.6(14.0)
2011	925	49.5(12.1)	50.0(12.1)	41523	62.7(13.3)	63.7(13.9)
2012	828	50.4(12.4)	50.8(12.3)	42489	62.9(13.3)	63.8(13.9)
2013	1000	50.4(12.8)	50.7(12.6)	44540	62.9(13.3)	63.8(13.9)
Overall Years	6,143	50.1(12.5) 95% CI: 49.8-50.4	50.5(12.6) 95% CI: 50.4-50.5	506,095	62.7(13.4) 95% CI: 62.7-62.8	63.6(14.0) 95% CI: 63.6-63.7

on SE1 8UG, UK. (https://academic.oup.com/ije/article/49/1/16/5476570).

Overall years, the difference in the standardized average age at breast cancer diagnosis between Iran and the UK was strongly significant (P<0.0001), indicating that the mean age at breast cancer diagnosis in Iran was about 12 years lower than that in the UK.

Discussion

This study was conducted on 6,057 women with breast cancer registered at the local Cancer Registry Center of Iran from 2001 to 2013, and 506,095 female breast cancer registered in Britain in the same period. The ASR in Iran and the UK increased from 22.0 to 68 and 152.4 to 169.8 per 100,000 women, respectively. The crude mean age of women diagnosed with breast cancer in Iran and the UK were 50.1 ± 12.5 and 62.7 ± 13.4 years, respectively. The standardized mean ages were 50.5 ± 12.6 and 63.6 ± 14.0 years in Iran and the UK, respectively. The highest incidence rate of breast cancer was reported to be in the age groups of 45-49 and 60-64 in Iran and the UK.

The findings of this study seem to be valid and reliable enough to generalize them to similar populations. Isfahan province is a multicultural and an industrail zone with different industries which attracted people across the whole country. Furthermore, the sample size of 6057 is large enough to estimate the mean age at breast cancer diagnosis precisely for Iran. The ASR in Iran was much lower than that in the UK, although, this rate is increasing. Kim et al. (12) discussed and compared the breast cancer epidemiology characteristics between the Asian and Western countries. They reported breastfeeding and childbirth as the reasons for the lower incidence rates of breast cancer in the Asian countries. They also discussed that adaptation of a more westernized lifestyle, including delayed childbirth, reduced parity and breastfeeding, weight gain, and increased consumption of animal fat are the main reasons for the recent increase in the breast cancer incidence rate among Asian women. Moreover, as gold standard diagnostic method of breat cancer in both countries is biopsy, therefore, the data are comparable. Standardizing the mean age at breast cancer diagnosis, looking at the trend for a long period of time (2001 to 2013), the large number of cases particularly in the UK, and having data quality control procedures in place for both cancer registries, especially the UK cancer registry with a long history, are the reasons for claiming such validity and reliability of the findings. The study's coverage of the Iranian cancer registry, on the other hand, should be viewed as a flaw. Despite the lack of cancer registry coverage, data from previous studies support the findings of the current study, which reveal a lower mean age at breast cancer diagnosis in Iran. In a similar study by Hashemzadeh et al. (13), on 902 new cases of breast cancer in Northwestern of Iran in 2012, the mean age of female patients was 48.3 ± 12.8 years with 34.5% of cases reported being in women aged 40 to 44 years. In another study by Mousavi et al. (8) on 7098 patients registered in 2008, the mean age of patients was 51.3 ± 12.5 years with 31.4% of patients under 40 years.

Montazeri et al. conducted a study on 1402 female patients in 2008, which showed a mean age of 43.4 ± 14.4 years and reported that 24.2% of the cases were in the age group of 49-59 (11). Leong et al. reported the highest incidence rate of female breast cancer in the Asian and Western countries in the age group of 45-50 and 55-60, respectively (5).

Sadjadi et al. (14) compared the median age at breast cancer diagnosis between Iran (Ardabil province) and Canada (15). The median age in Canadian women was 44 years (ranged 21-86 years) and in Iranian women (Ardabil province) was 61 years (ranged 24-104 years). They also reported that Canada and Iran (Ardabil), respectively, had 23% and 64% of breast cancer incidence under the age of 50.

Najjar et al. (16) reviewed 28 studies which consisted of 7455 patients and reported the average age at breast cancer diagnosis of 48.00 years (SD = 2.80). They also reported that the average age at presentation of breast cancer in Arab countries appears to be a decade earlier than that in the West. They concluded that the mean age at breast cancer diagnosis in the Arab world and Iran are close together and a decade earlier than that in Western countries.

A study by Eiseman et al. (17) in Germany showed that almost 72,000 women (171.1 per 100,000 population) suffered from invasive breast cancer whose cancers were, on average, diagnosed at age of 65 years.

The results of this study are consistent with the findings of the above-mentioned study, which confirmed the significant difference between the mean age at breast cancer diagnosis in Iran and developed countries, including the UK, Canada, the United States, and Norway.

The incidence of breast cancer is related to different factors including predisposing factors, such as age, sex, specific genetic traits, and family history; lifestyle factors including the type of diet, alcohol consumption, smoking, contraceptive pills, and alternative hormone replacement therapy; and cultural and environmental factors including reproductive factors (history of breastfeeding, childbirth, age of menarche and menopause), health care access, and the extent to which the various populations take part in mass screening programs using mammography. As a result, the ten-year difference in the mean age at breast cancer onset between Iran and the United Kingdom may be related mostly to the cultural and environmental variations noted earlier. One of the environmental factors for this difference of age distribution of breast cancer patients between developed and developing countries is cancer registries with high coverage. The age distribution of coverage of the UK cancer registry is much higher than that of Iran. One of the criteria of proper cancer registry coverage is having a tiny proportion of registrations based

solely on death certificates information. In the UK, more than 8% of cancers registered in the 1980s were based on death certificates, however, due to the increasing availability of source documents to cancer registration staff, this number has been reduced to less than 1% in 2016 (17). On the other hand, in Iran, working on the cancer registry program and breast cancer screening plan has just been started. Therefore, it is not expected to cover a high percentage of cancer cases by the cancer registry and diagnose breast cancer at an early stage via the screening program. Accordingly, the cancer registry may miss stage 3 and 4 breast cancer cases that occurred at higher ages and led to death before diagnosis. In that case, the mean age at diagnosis of breast cancer may be underestimated.

The American Cancer Society recommends that women begin mammography screening at the age of 40 years (18). The starting age of mammography screening is 50 years in Europe and Canada. Currently, in the United Kingdom, women in the age group of 50 to 70 years are invited for screening mammography every 3 years (19) and Swedish women at 50 years (20). It is seriously recommended that women with a family history of breast cancer start screening at an early age (21).

One of the limitations of this study may be low coverage of the cancer registry and missing cases, not having access to more individual data including the risk factors of breast cancer and data on cohort studies.

Conclusion

The findings of this study confirmed that Iranian women were diagnosed with breast cancer at lower ages (a decade earlier) compared with British women (age of 50.5 vs. 63.6 years).

Therefore, women are recommended to start screening mammography, at least, at the age of 40 years. Iranian women should be trained and encouraged to do breast self-examinations and attend clinics for medical examinations at a regular time interval.

Authors' contributions

G.Y. conceived the research and wrote the paper. M.K.N. set up the analytical strategy. M.H.A. was in charge of the database and formatted the datasets. G.Y., M.Y., and M.K.N. contributed to the discussion and the manuscript.

Compliance with ethical standards
Conflict of interests

The authors declare that there is no conflict of interests.

Informed consent

As an anonymous secondary data project, there was no need for informed consent.

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