

RESEARCH ARTICLE

Breast Cancer Awareness among Saudi Females in Jeddah

Sahar Mahmoud Radi

Abstract

Breast cancer is the most frequent malignancy of women worldwide. It is the leading cause of female cancer related disability and mortality. In Saudi Arabia breast cancer ranks first among cancerous diseases in females. In the Gulf region, and especially in Saudi Arabia, few studies have been conducted to address breast cancer awareness. The purpose of the current study was therefore to investigate the level of breast cancer awareness among Saudi females in Jeddah, focusing on knowledge of breast cancer warning signs, risk factors, screening programs and breast self-examination (BSE). The design of this study was an exploratory correlational analysis. The sample comprised 200 Saudi females aged 20 and older living in Jeddah. Data were collected using face-to-face interviews. Breast cancer awareness was measured using a modified Arabic version of the Breast Cancer Awareness Measure (Breast CAM) version 2. Descriptive statistical analysis, Pearson's Product Moment correlation coefficients and ANOVA test were used to answer study questions. Out of 200 participants, 50.5% were aware of breast lump as a warning sign of breast cancer, 57.5% claimed that family history was risk factor, 20.5% had undergone breast screening, 79% heard about BSE, and 47.5% knew how to perform BSE. Findings indicated that Saudi females level of awareness of breast cancer is very inadequate. Public awareness interventions are needed in order to overcome an ever-increasing burden of this disease among Saudi females.

Keywords: Breast cancer - awareness - adult females - Jeddah, Saudi Arabia

Asian Pac J Cancer Prev, 14 (7), 4307-4312

Introduction

Breast cancer is the most frequent malignancy of women worldwide. It is the leading cause of female cancer related disability and mortality. The global incidence of breast cancer is escalating (World Health Organization, 2011). There is marked geographical variation in incidence rates, being highest in the developed world and lowest in the developing countries in Asia, Middle East, and Africa. Breast cancer rates are increasing in developed as well as developing countries (International Agency for Research on Cancer, 2008).

According to the World Health Organization (WHO) each year over 1.4 million women worldwide are diagnosed with breast cancer as it accounts for 23% of all newly diagnosed cancer (WHO, 2008). In Western countries, breast cancer is the most commonly diagnosed cancer in women and the second leading cause of mortality and morbidity in women. The current estimates in the United States indicate that 226,870 women are diagnosed with breast cancer, with 39,510 deaths of the disease in the year 2012 (American Cancer Society, 2012).

According to the International Agency for Cancer Research and GLOBOCAN 2008, in the Gulf Cooperation Council (GCC) countries breast cancer incidence rates are highest in Bahrain (49.8/100,000), followed by Kuwait (47.7/100,000) and Qatar (38.1/100,000). Compared to

other Arab peninsular countries, such as Saudi Arabia (22.4/100,000) or Yemen (20.8/100,000) (International Agency for Research on Cancer, 2008).

Breast cancer (BC) is the most common type of cancer among Saudi females and accounted for more than 25% of all newly diagnosed cancer among them (Saudi Cancer Registry, 2008). In the Kingdom of Saudi Arabia breast cancer usually presents at advanced stages and more frequently in young pre-menopausal women in comparison to western countries (Chiedozi et al., 2003).

In many developed countries, the incidence and mortality of breast cancer have reached a plateau level and even decline (Jemal et al., 2009), this decline has been attributed to several factors including early detection through the use of screening mammography and appropriate use of systemic adjuvant therapy (Agarwal et al., 2007).

Early detection of breast cancer can be achieved by performed by breast self examination (BSE), clinical breast examination (CBE) and mammography (Baig et al., 2011). Arabic women currently face a significant risk of high mortality rate from breast cancer due to frequent diagnosis in the advanced stages of the disease (Azaiza and Cohen, 2006; Soskolne et al., 2007). In the Middle East and Gulf region, the incidence of breast cancer is rising and affecting a younger population compared to the West. In the Arab world, there are very few breast

cancer awareness programs (Abdel Hadi, 2000; Bener et al., 2008).

In Saudi Arabia, earlier studies conducted in different regions such as Buraidah, Riyadh, and Al Khobar, have explored female knowledge of, and attitude towards, breast cancer (Abdel Hadi, 2000; Alam, 2006; Dandash and Al-Mohaimed, 2007). Findings revealed lack of knowledge about the common risk factors for breast cancer; and lack of understanding of the importance of breast self-examination, under-utilized mammography screening.

One study was conducted to elicit the level of breast cancer awareness in older women in the United Kingdom. The results of the survey indicated that although older women demonstrate some knowledge of the symptoms and risks associated with breast cancer, there was lack of recognition of non-lump symptoms as symptoms of breast cancer and a poor understanding about other risk factors (Linsell et al., 2008).

Another study was designed to investigate about female knowledge of breast cancer and self-reported practice of breast self-examination in Iran. The findings revealed that the women awareness of breast cancer warning signs (painless lump, retraction of nipple, and bloody discharge) and effective screening methods i.e. clinical examination, and mammography were very inadequate (Montazeri et al., 2008).

In the Gulf area, the breast cancer knowledge and awareness and factors associated with the practice of breast self examination (BSE) among Kuwaiti female school teachers were assessed, the study points to the insufficient knowledge of female teachers about breast cancer and identified the negative influence of low knowledge on the practice of BSE. Also the knowledge of the use of mammography as a screening tool for early detection of breast cancer was found to be poor among study participants, only 14.3% have heard about screening mammography. Participants showed poor understanding of major breast cancer risk factors (Alharbi et al., 2012).

In Qatar, a recent study aimed to explore knowledge, attitude and practice about breast cancer and to identify potential barriers to screening procedures among women. The study findings revealed that the majority of Qatari women demonstrated an adequate knowledge about breast cancer, with a significant relation to education status. Almost three quarters were aware that breast cancer is the most common cancer in women, although Qatari women had adequate general knowledge about breast cancer, the screening rates for BSE, CBE and mammography were low, these being performed most frequently by young Qatari women with a higher level of education (Bener et al., 2009).

In Saudi Arabia, studies reported insufficient knowledge about breast cancer and its early detection measures which have a negative influence on the practice of BSE among female Saudi teachers of Buraidah (Dandash and Al-Mohaimed, 2007). Habib et al. (2010) assessed the knowledge and awareness about various aspects of breast cancer among female university students, Al Madina Al Munawara Region, study revealed that respondents showed deficient knowledge about key issues

concerning breast cancer and its early detection measures.

In other regions of Saudi Arabia; Al-Qassim it has been reported that the level of awareness of the females regarding breast cancer and BSE is not adequate and a health education program about breast cancer should be introduced in the region (Jahan et al., 2006).

A study conducted to assess knowledge of breast cancer and sources of information about breast cancer among women in Riyadh, findings revealed an imbalance between the knowledge and practice of BSE among women in Riyadh. It also showed that there is only moderate knowledge of risk and protective factors for breast cancer and that knowledge and practice of BSE vary according to marital and educational status. Frequent community-based awareness programs were recommended so that all women can know and practice BSE, which in turn helps to prevent breast cancer (Alam, 2006).

Several studies assessed the awareness of breast cancer and the practice of BSE among females of western population, as well as Arab women in the Middle East region. However in the Gulf region, specifically in Saudi Arabia earlier studies conducted in different regions such as Buraidah, Al Madina Al Munawara, Qassim, and Riyadh, to explore knowledge, and attitude towards breast cancer and the practice of BSE among female Saudi teachers, female university students, and women respectively. Few studies were conducted to address breast cancer awareness among Saudi females in Jeddah. Therefore the objective of this study is to investigate the level of breast cancer awareness among Saudi females living in Jeddah.

Purpose of the study, the purposes of the study were: *i*) To describe the levels of breast cancer awareness among Saudi females. *ii*) To correlate the levels of breast cancer awareness with demographic variables of Saudi females. and *iii*) To assess differences in the levels of breast cancer awareness by demographic variables.

Materials and Methods

Methodology

Design: An exploratory correlational. **Settings:** Shopping malls; Aziz mall, Red Sea mall, Al-Arab mall and Al-Andalus mall in Jeddah city, Saudi Arabia. **Study subjects:** A convenient sample comprised of 200 Saudi females ages 20 and older living in Jeddah was used. **Inclusion criteria:** *i*) Adults Saudi females, ages 20 and older. *ii*) Living in Jeddah city. *iii*) No personal history of any type of cancer. *iv*) Not working in the medical field. **Exclusion criteria:** Females who are not willing to participate in the study. **Sampling technique:** A non probability convenience sampling.

Data collection

The nature and purpose of the study were explained to available Saudi females in the mall. A written consent obtained from Saudi females who agreed to participate in the study. A demographic data form administered to Saudi females who agreed to participate in the study to collect information about their age, marital status, educational

level, occupation, and family history of breast cancer. A self-administered questionnaire; Arabic version of the modified Breast Cancer Awareness Measure (Breast CAM) version 2 (Cancer Research United Kingdom, King's College London and University College London, 2009) utilized to collect data from Saudi females about their knowledge of breast cancer warning signs, risk factors, screening programs and breast self-examination (BSE).

Instruments used measurements

A self-administered questionnaire; Breast Cancer Awareness Measure (Breast CAM) version 2 (Cancer Research United Kingdom, King's College London and University College London, 2009) utilized to collect data from Saudi females about their knowledge of breast cancer warning signs, risk factors, screening programs and breast self-examination (BSE).

The Breast CAM v2 was modified and translated into Arabic to fit the purpose and nature of the study. The translated modified Breast CAM comprises 4 sections; section 1 contains 11 questions about knowledge of breast cancer warning signs, section 2 contains 1 question with 9 statements about knowledge of breast cancer risk factors, section 3 contains three questions about knowledge of breast cancer screening program, section 4 contains four questions about knowledge of Breast Self-Examination (BSE).

The modified measure was tested to ensure its validity and reliability. Validity was determined by asking expert to assess the relevance to and coverage of the topic and necessary modifications were done. Test of reliability was done by using Cronbach's Alpha test, and it was 0.81. Pilot study was done by asking 15 Saudi females to complete the questionnaire and necessary modifications were done. The original measure was in English for which translation into Arabic with back translation to English was done to preserve the original construct.

Statistical analysis

Data coded and analyzed using SPSS version 18. Descriptive statistical analysis used to determine frequency distribution, M, SD of females' breast cancer awareness and demographic variables. Pearson's Product Moment correlation coefficients used to assess the relationships between females' breast cancer awareness and demographic variables. ANOVA test used to assess differences in breast cancer awareness by demographic variables (marital status, level of education, occupation, and family history of breast cancer).

Ethical considerations

Saudi females were informed about the nature of the study. A written consent obtained from Saudi females who agreed to participate in the study. All information obtained from participants was coded and kept in a locked file and no one had access to the data except the researchers to ensure confidentiality and security of participants' identification. All participants were informed that their participation in the study is voluntary. No names attached to the questionnaire. The study was presented to the

college research committee, College of Nursing Jeddah for approval and the study was conducted after approval.

Results

Demographic characteristics of the sample are included in Table 1. Saudi females were predominantly young, their mean age was 32.3 ± 10.9 , single, had college level education, unemployed and without family history of breast cancer.

Participants' knowledge of warning signs and risk factors of breast cancer are included in Table 2. Participants had poor knowledge about breast cancer warning signs and risk factors, the percentages of those who answered correctly for each item were as follow; 50.5% were aware of breast lump, 47% knew about bleeding or discharge

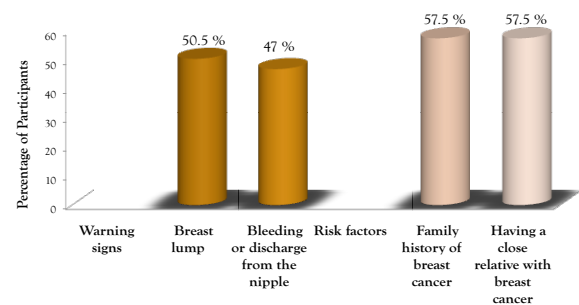


Figure 1. Percentage of Participants Having Correct Knowledge about Warning Signs and Risk Factors of Breast Cancer

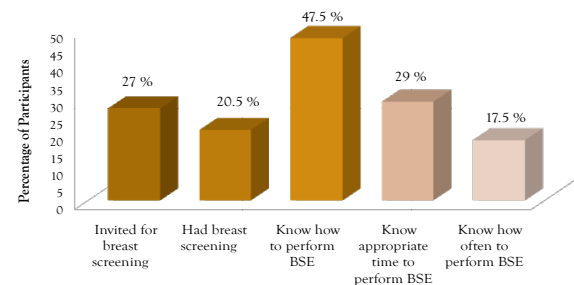


Figure 2. Participants' Knowledge About Breast Cancer Screening and Breast Self-Examination (BSE)

Table 1. Demographic Characteristics of Saudi Females (N=200)

| Variables | N | % | |
|---------------------------------|----------------|-----|------|
| Age (Mean age) | 32.3+10.9 | | |
| Marital status | Single | 91 | 45.5 |
| | Married | 85 | 42.5 |
| | Divorced | 16 | 8 |
| | Widow | 8 | 4 |
| Education | Illiterate | 3 | 1.5 |
| | Literate | 11 | 5.5 |
| | Primary school | 3 | 1.5 |
| | High school | 73 | 36.5 |
| | College | 102 | 51 |
| Job | Others | 8 | 4 |
| | Employed | 99 | 49.5 |
| Family history of breast cancer | Unemployed | 101 | 50.5 |
| | Yes | 22 | 11 |
| | No | 178 | 89 |

from the nipple, 38.5% had knowledge of dimpling of the breast skin, 37.5% were aware of changes in the size of breast or nipple, 36% knew about pulling in the nipple. Regarding breast cancer risk factors, 57.5% of participants claimed that family history and having a close relative with breast cancer were risk factors, also 41% were aware of

Table 2. Percentage of Participants having Correct Knowledge about Warning Signs and Risk Factors of Breast Cancer (N=200)

| Items | N | % |
|--|-----|------|
| Warning signs | | |
| Breast lump | 101 | 50.5 |
| Lump under armpit | 69 | 34.5 |
| Bleeding or discharge from the nipple | 94 | 47 |
| Pulling of the nipple | 72 | 36 |
| Changes in the position of the nipple | 64 | 32 |
| Nipple rash | 51 | 25.5 |
| Redness of the breast skin | 32 | 16 |
| Changes in the size of breast or nipple | 75 | 37.5 |
| Changes in the shape of breast or nipple | 70 | 35 |
| Pain in the breast or armpit | 67 | 33.5 |
| Dimpling of the breast skin | 77 | 38.5 |
| Risk factors | | |
| Family history of breast cancer | 115 | 57.5 |
| Hormone replacement therapy | 71 | 35.5 |
| Alcohol drink | 82 | 41 |
| Obesity | 57 | 28.5 |
| Having a close relative with breast cancer | 115 | 57.5 |
| Having children later on in life or not at all | 46 | 23 |
| Early menarche | 34 | 17 |
| Late menopause | 37 | 18.5 |
| Lake of physical exercise | 31 | 15.5 |
| Total | 200 | 100 |

Table 3. Participants' Knowledge about Different Aspects of Breast Cancer Screening Program and Breast Self-Examination (BSE) (N=200)

| Items | N | % |
|---|-----|------|
| Knowledge of breast cancer screening program | | |
| Aware of breast cancer screening program in Jeddah? | 143 | 71.5 |
| Invited for breast screening on any Breast Screening Program? | 54 | 27 |
| Had breast screening on any Breast Screening Program? | 41 | 20.5 |
| Knowledge of Breast Self-Examination (BSE) | | |
| Heard about BSE? | 158 | 79 |
| Know how to perform BSE? | 95 | 47.5 |
| Know how often to perform BSE? | 35 | 17.5 |
| Know appropriate time to perform BSE? | 58 | 29 |
| Total | 200 | 100 |

Table 4. Relationships among Breast Cancer Awareness and Demographic Variables

| Variables | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|-------|--------|-------|---|---|
| 1) Knowledge of breast cancer warning signs | | | | | | -0.16* | | | |
| 2) Knowledge of breast cancer risk factors | | | | | | | | | |
| 3) Knowledge of breast cancer screening program | | | | | 0.15* | | | | |
| 4) Knowledge of breast self-examination (BSE) | | | | | | | 0.17* | | |
| 5) Age | | | | | | | | | |
| 6) Marital status | | | | | | | | | |
| 7) Education | | | | | | | | | |
| 8) Job | | | | | | | | | |
| 9) Family history of breast cancer | | | | | | | | | |

*p<0.05, **p<0.01

alcohol drink and 35.5% knew that hormone replacement therapy were risk factors.

Participants' knowledge about breast cancer screening program and Breast Self-Examination is presented in Table 3. Regarding participants' knowledge about breast cancer screening program, participants showed inadequate knowledge about breast cancer screening program and BSE. The majority (71.5%) were aware of the availability of breast screening program, while only 27.0% were invited for breast screening program and 20.5% had undergone breast screening on breast screening program. As far as participants' knowledge about BSE, the majority (79%) mentioned that they heard about BSE, less than one half (47.5%) of participants reported their knowledge of how to perform BSE, while only minority (17.5%) believed that the frequency of performing BSE was monthly, also after menstruation was selected as the appropriate time to perform BSE by 29.0 % of participants.

Pearson's Product Moment correlation coefficients were calculated to assess the relationships among Saudi females' breast cancer awareness and their demographic variables. As shown in Table 4, Saudi females' age was significantly correlated with their knowledge about breast cancer screening program (r=0.15, p<0.05), marital status was significantly correlated with their knowledge

Table 5. Differences in Saudi Females' Breast Cancer Awareness by Demographic Variables

| Variables | Mean | ANOVA | |
|--|----------------|-------|-----------|
| | | F | P |
| Knowledge about breast cancer warning signs | | | |
| Education | Illiterate | 21 | 4.1 0.001 |
| | Literate | 21.3 | |
| | Primary school | 21 | |
| | High school | 20.6 | |
| | College | 26.1 | |
| | Others | 22.3 | |
| Knowledge about BSE | | | |
| Marital status | Single | 9.6 | 4.3 0.015 |
| | Divorced | 7.6 | |
| | Widow | 7.4 | |
| Education | Illiterate | 5.1 | 4.2 0.05 |
| | Literate | 5.3 | |
| | Primary school | 6.2 | |
| | High school | 6.4 | |
| | College | 9.9 | |
| Job | Others | 5.8 | 3.8 0.05 |
| | Employed | 9.2 | |
| | Unemployed | 6.3 | |

about breast cancer warning signs ($r=-0.16$, $p<0.05$), also level of education was significantly correlated with their knowledge about BSE ($r=0.17$, $p<0.05$). The strength of these correlations is at a low level. Saudi females' job and family history were not significantly correlated with their breast cancer awareness.

Table 5 presents differences in the Saudi females' breast cancer awareness by their demographic variables. Saudi females' knowledge about breast cancer warning signs differed significantly by their level of education; highly educated females had more knowledge about breast cancer warning signs than others ($F=4.1$, $p<0.00$). Knowledge about BSE differed significantly by marital status ($F=4.3$, $p<0.01$) level of education ($F=4.2$, $p<0.05$) and job ($F=3.8$, $p<0.05$); single, highly educated, employed females had better knowledge about BSE than others.

Discussion

The aim of the current study was to investigate the level of breast cancer awareness among Saudi females in Jeddah.

As regards awareness of breast cancer warning signs, breast lump was the most frequently identified symptoms of breast cancer by participants (50.5%), also they were aware of other breast cancer warning signs such as bleeding or discharge from the nipple (47.0%), dimpling of the breast skin (38.5%), changes in the size of breast or nipple (37.5%) and pulling in the nipple (36%). Knowledge of other warning signs of breast cancer was poor as only few females knew that nipple rash (25.5%) and redness of the breast skin (16.0%) are warning signs of breast cancer.

This finding is consistent with what was reported by Habib et al. (2010) in their study of awareness and knowledge of breast cancer among 247 university students in Al Madina Al Munawara region, which revealed that students were aware of painless lump in the breast, bloody or any discharge from the nipple and changes in the skin of the breast as the most common warning signs of breast cancer.

Regarding awareness of breast cancer risk factors, the majority of participants (57.5%) knew about family history and having a close relative with breast cancer as established risk factors for the disease, also 41.0% and 35.5% of participants were aware of alcohol drink and hormone replacement therapy as other risk factors of breast cancer respectively. However, knowledge of other risk factors of breast cancer was limited as only few females knew that late menopause (18.5%), early menarche (17.0%) and lack of physical exercise (15.5%) are risk factors of breast cancer.

This finding is in agreement with what was reported by Alam, (2006) in her study of knowledge of breast cancer and its risk and protective factors among 864 women in Riyadh; she reported heredity and hormone replacement therapy as common breast cancer risk factors as perceived by women in Riyadh.

In the present study, it was found that although the majority of participants (71.5%) were aware of the

availability of breast screening program in Jeddah city, only minority (27.0%) were invited for breast screening program and 20.5% had undergone breast screening on breast screening program. This finding supports previous study addressing knowledge, attitudes, and practices surrounding breast cancer and screening in female teachers of Buraidah, Saudi Arabia (Dandash and Al-Mohaimed, 2007).

As far as awareness of BSE, although 79% of participants heard about BSE, less than one half (47.5%) knew how to perform BSE, the majority of participants are neither aware of the frequency of performing BSE (82.5%) nor the appropriate time to perform BSE (71.0%). These findings are congruent with previous studies investigating awareness and knowledge of breast cancer and practices of breast self examination among women and university students in Saudi Arabia (Alam, 2006; Jahan et al., 2006; Habib et al., 2010).

This part of the discussion is devoted to discuss the study results related to the relationships among the study variables; awareness of breast cancer and demographic variables. Awareness of breast cancer was significantly correlated with age, ($r=0.15$, $p<0.05$), marital status ($r=-0.16$, $p<0.05$) and level of education ($r=0.17$, $p<0.05$). The strength of these correlations is at a low level. Similarly, Dandash and Al-Mohaimed, (2007) reported age, marital status and level of education as significant factors associated with BSE practice.

As regards differences in the awareness of breast cancer by demographic variables, females with a college level education had significantly greater knowledge about breast cancer warning signs than the women of other levels of education ($F=4.1$, $p<0.00$). Also single ($F=4.3$, $p<0.01$), highly educated ($F=4.2$, $p<0.05$), employed females ($F=3.8$, $p<0.05$) had significantly better knowledge about BSE than others. This finding is in agreement with what was reported by Alam, (2006) as her results revealed that marital status and level of education were significant predictors of knowledge and practice of BSE

In conclusion, findings indicated that Saudi females level of awareness of breast cancer i.e. knowledge of breast cancer warning signs, risk factors, screening program and breast self-examination (BSE) were very inadequate. Awareness of breast cancer differed significantly by marital status, education and job.

Acknowledgements

My appreciation and thanks for the students at the College of Nursing, King Saud Bin Abdulaziz University for Health sciences, Jeddah, Saudi Arabia who collected the data and helped in the accomplishment of this study (Lujain Momenah, Ohud Banjar, Fatimah Ba Shmail and Zahra Al Sharde).

Study findings suggest raising the level of public awareness about breast cancer to overcome an ever-increasing burden of this disease and developing a culturally appropriate, socially-acceptable, and effective education programs in Saudi Arabia to improve the knowledge about breast cancer and change misconceptions among Saudi females. It is also recommended to

encourage pre-marital medical examination, counseling and routine check-ups among Saudi females.

The information about breast cancer awareness was collected on self-administered questionnaire, so we can't rule out information bias. Also the study sample was collected only from Jeddah city, so it is difficult to generalize the study findings to all Saudi females in Saudi Arabia.

References

- Abdel Hadi M (2000). Breast cancer awareness among health professionals. *Ann Saudi Med*, **20**, 135-6.
- Agarwal G, Pradeep V, Aggarwal V, Yip H, Cheung S (2007). Spectrum of breast cancer in Asian women. *World J Sur*, **31**, 1031-41.
- Alam A (2006). Knowledge of breast cancer and its risk and protective factors among women in Riyadh. *Ann Saudi Med*, **26**, 272-7.
- Alharbi N, Alshammari M, Almutairi B, Makboul G, El-Shazly M (2012). Knowledge, awareness, and practices concerning breast cancer among Kuwaiti female school teachers. *AJM*, **48**, 75-82.
- American Cancer Society, Breast cancer facts and figures, 2012. [<http://www.cancer.org/research/cancerfactsfigures/breastcancerfactsfigures/breast-cancer-facts-and-figures-2011-2012>].
- Azaiza F, Cohen M (2006). Health beliefs and rates of breast cancer screening among Arab women. *J Women Health*, **15**, 520-30.
- Baig M, Subramaniam V, Chandrasegar A, Khan T (2011). A population based survey on knowledge and awareness of breast cancer in the suburban females of Sungai Petani, Kedah, Malaysia. *IJCRIMPH*, **3**, 670-9.
- Bener A, Ayub H, Kakil R, Ibrahim W (2008). Patterns of cancer incidence among the population of Qatar: a worldwide comparative study. *Asian Pac J Cancer Prev*, **9**, 19-24.
- Bener A, El Ayoubi H, Moore M, et al (2009). Do we need to maximize the breast cancer screening awareness?: Experience with an endogamous society with high fertility. *Asian Pac J Cancer Prev*, **10**, 599-604.
- Cancer Research United Kingdom, King's College London and University College London (2009). Breast Cancer Awareness Measure (Breast CAM) version 2.
- Chiedozi C, El-Hag A, Kollur M (2003). Breast diseases in the Northern region of Saudi Arabia. *Saudi Med J*, **24**, 623-7.
- Dandash K, Al-Mohaimed A (2007). Knowledge, attitudes, and practices surrounding breast cancer and screening in female teachers of Buraidah, Saudi Arabia. *Int J Health Sciences*, **1**, 61-71.
- Habib F, Salman S, Safwat M, Shalaby S (2010). Awareness and knowledge of breast cancer among university students in Al Madina Al Munawara region. *MEJC*, **1**, 159-66.
- International Agency for Research on Cancer, Breast cancer statistics (2008). [<http://globocan.iarc.fr/factsheet.asp>].
- Jahan S, Al-Saigul M, Abdelgadir H (2006). Breast cancer: Knowledge, attitudes and practices of breast self examination among women in Qassim region of Saudi Arabia. *Saudi Med J*, **27**, 1737-41.
- Jemal A, Siegel R, Ward E (2009). Cancer Statistics. *CA Cancer J Clin*, **54**, 225-9.
- Jemal A, Bray F, Center M, et al (2011). Global cancer statistics. *CA Cancer J Clin*, **61**, 69-80.
- Linsell L, Burgess C, Ramirez J (2008). Breast cancer awareness among older women. *BJC*, **99**, 1221-5.
- 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**, 1-7.
- Saudi Cancer Registry, Cancer incidence reports, 2008. [<http://www.scr.org.sa/reports/SCR2008>].
- Soskolne V, Marie S, Manor O (2007). Beliefs, recommendations and intentions are important explanatory factors of mammography screening behavior among Muslim Arab women in Israel. *Health Educ Res*, **22**, 666-76.
- WHO (2008). Breast cancer: Data and statistics.
- WHO (2011). Breast cancer: Prevention and control.