RESEARCH ARTICLE

Awareness of Breast Cancer among Female Care Givers in Tertiary Cancer Hospital, China

Negalign Getahun Dinegde[1], Li Xuying[2]*

Abstract

Objective: Breast cancer is a worldwide public health issue and most common cancer diagnosed among women including China, where advanced stages at diagnosis appears to be increasing and an ever-rising incidence twice as fast as global rates. The study was conducted to describe the awareness of breast cancer and associated factors among care giver women in tertiary Cancer Hospital, China. **Methods:** Institutional based cross-sectional study was conducted among 261 women selected by systematic random sampling. Information provided by the participants was converted into awareness scores for analysis using SPSS version 23. Awareness scores were dichotomized in to 'good awareness and 'poor awareness' taking median score=11 as the cut-off point. Data analysis was performed using the binary logistic regression. A p-value of <0.05 was considered statistically significant. **Result:** The study showed that 46.7% of the respondents had good awareness. Breast lump was the most commonly known symptom of cancer by 61.7% of the respondents. Slightly more than half of the study participants acknowledged having a past history of breast cancer, drinking alcohol and having close relative with breast cancer as potential risk factors for breast cancer (63.6%, 58.6%, and 55.6% respectively). Nevertheless, a vast majority of the study participants were unable to appreciate modifiable risk factors of the disease. More than half of the participants had never/rarely checked their breasts and all of the participants wrongly answered breast cancer knowledge age related risk. Awareness level was significantly associated with entertainment preference (OR=3.57; 95%CI=1.71, 7.44) and residence setting areas (OR=2.4; 95%CI=1.04, 5.69). **Conclusion:** The study indicated suboptimal awareness while entertainment preference and residence setting were significantly associated with awareness level. Public awareness campaigns should be made by dissemination of information about breast cancer through health education and printed Medias with great emphases on women living in rural areas.

Keywords: Awareness- breast cancer- female care givers

Asian Pac J Cancer Prev, **18 (7)**, 1977-1983

Introduction

Breast cancer is a worldwide public health issue malignant tumor that starts in the cells of the breast, and the most common cancer diagnosed among women in the world, regardless of race or ethnicity, with incidence appears to be increasing (Boyle, 2005; CDC. Cfdcap, 2016). According to GLOBOCAN estimates, more than half (52.9%) of 1.67 million new breast cancer cases were diagnosed in developing countries in 2012, while the corresponding figure for 1980s was only 35% (Hossain MS et al., 2014; Ferlay et al., 2015).

In China, the health burden of breast cancer is increasing, with 248,620 breast cancer patients newly diagnosed in 2011, accounting for 17.1% of all female cancers (Chen et al., 2013). According to the Chinese National Central Cancer Registry, the disease is the most common cancer among urban women and the fourth most common cancer in rural areas with an estimated incidence of 25.89 cases per 100,000 women (Fan Lei et al., 2014; Ferlay et al., 2015; Wang et al., 2016). In the past two decades, China experienced an ever-increasing incidence of breast cancer, twice as fast as global rates (Wang and Yu, 2015). Zheng et al., (2016) found that women breast cancer prevalence estimates in China for 5 years was 1.02 million. Unless this trend is slowed, incidence of breast cancer in China is expected to rise from less than 60 cases per 100, 000 women aged 55–69 years to more than 100 cases per 100,000 women by 2021, reaching 2.5 million cases overall by 2021. The mean age at diagnosis of breast cancer in China is 45-55 years, much younger than 65 years in the United States and as well as other western countries (WHO, 2011).

Early diagnosis of breast cancer has been clearly shown to reduce mortality and improve survival (Berry et al., 2005; Guvenc et al., 2012). China has no nationwide screening program for breast cancer at present, however, National Health and Family Planning commission of China began to carry out the relevant screening program since 2010 in rural Chinese women, which is

*[1]Xiang Ya School of Nursing, Central South University, [2]Vice Director of Nursing Department, Hunan Cancer Hospital, Changsha, China. *For Correspondence: 1259734926@qq.com*

called "Two-cancer" (cervical cancer and breast cancer) screening (Federations. TMoHaWs, 2010; Fan et al., 2014). Findings from a multicenter nationwide study in China showed that 15·7% of patients were diagnosed at stage I, 44·9% at stage II, 18·7% at stage III, and 2·4% at stage IV disease (Wang and Yu, 2015). Increasing comprehensive knowledge and awareness of breast cancer could facilitate its early detection. It can be more effectively treated in an earlier stage than when clinical signs and symptoms present, justifying early detection efforts (Lannin et al., 1998; Karayurt et al., 2008; Olajide et al., 2014).

The percentages of females who had experienced breast cancer early detection test was low, and more in advanced stage at diagnosis among those tested for the case. In addition, there is a marked underutilization of existing public screening services for breast cancer (Bao et al., 2014; Fan et al., 2014; Liu et al., 2014). The same study indicated an inadequate awareness of and misconceptions about breast cancer were identified as barriers that affect the utilization of the existing public screening services. Breast cancer awareness and effective screening program improve cognitive level and health behaviors of women for the prevention and treatment of breast cancer thereby reducing the incidence and mortality of breast cancer. Planning these interventions effectively requires knowledge about the prevalent awareness about breast cancer and women's health-seeking behavior. However, a few studies were done to evaluate comprehensive awareness levels about risk factors, early warning signs, and therapeutic and screening modalities as well as the predictive factors. This study aimed to determine breast cancer related knowledge, awareness, risk factors and screening behaviors among Chinese female care givers in order to introduce the best intervention plans.

Materials and Methods

The descriptive cross-sectional study design was conducted in tertiary cancer hospital to describe awareness of breast cancer and determine whether sociodemographic and potential determinant factors were predictive of breast cancer awareness level. The source population of the study was all from 18 to 65 years old female caregivers in the hospital from September 5, 2016 through October 20, 2016. Care givers were family, friend, or relative person who help and protect patient with activities of daily living throughout the admission period. Ethical permission to conduct the study was granted by Central South University institutional review board (2017008). Verbal consent was taken and participants who freely agreed to participate were enrolled in this study. A total of 261 volunteered and successfully completed the questionnaire.

Data collection methods and tools

The Breast-Cancer Awareness Measure developed by Cancer Research UK, King's College London and University College London in 2009 and validated with the support of Breast Cancer Care and Breakthrough Breast Cancer was adopted as data collection tool. Breast Cancer Awareness Measure (Breast CAM) Toolkit was updated in February 09, 2011 (Cancer Research UK KsCLaUCL, 2011). The questionnaire used in this study had a total of 27 knowledge questions, of which 11 assessed knowledge about symptoms of breast cancer, 9 assessed knowledge related to breast cancer risk factors, 2 assessed about confidence, skills and behavior in relation to breast changes, 3 assessed breast cancer detection methods, treatment and prevention, and 2 assessed about knowledge of age related and lifetime risk.

The Brislin double scale localization and translation method was used to adopt the scale to the current study setting. Six experts evaluated the content validity of the questionnaire and content validity index (CVI) was 0.93. The result of internal consistency was analyzed using Cronbach 's alpha coefficient, which was 0.964. The revised Chinese version had Pearson correlation coefficient of 0.782 ($P < 0.01$), suggesting the revised Chinese Breast - CAM scale has good validity. The whole scale Guttman binary coefficient was 0.867 and retest reliability was 0.763 which found within the acceptable range. A cross-sectional survey used structured questionnaires with randomly selected sample of 261 and self-administered questionnaires were used, and in case where participants were unable to fill the questionnaire (due to illiteracy) an interviewer assisted the respondent in filling the questionnaire.

Data processing and analysis

Data double entered in to Epidata 3.1 and analyzed using the statistical package of social sciences (SPSS) version-23. Descriptive statistics and logistic regression were used. The 95% confidence interval (CI) was estimated and the P-value < 0.05 was considered as significant level. Each correct answer on the knowledge domain questionnaire was assigned a score of 1 (aware), while an incorrect answer was awarded a score of 0 (not aware). A total score for each participant was computed by summing the number of correct answers. The knowledge domain has a total of 27 questions and median of awareness score (11) was used as a cut-off point. Based on cut-off points participants were categorized in good awareness (scores above 11) and poor awareness (scores of 11 and less). Also, for each response the proportion of women who have known the right answer was calculated to give the prevalence of awareness.

Results

Sociodemographic characteristics

A total of 261 women participated in the study with 100% response rate. The mean age was 35.93 years. The sample was fairly educated with 86.2% of the respondents attended at least secondary school and about half of the respondents (51%) were house wife and farmer by occupation. Participants were mostly nonreligious (81.5%) and married (75.9%). Table 1 summarizes sociodemographic characteristics of respondents of the study.

Awareness of breast cancer and recall of its warning signs and risk factors

In this study, 122 (46.7%) women had good awareness about breast cancer and 139 (53.3%) poor awareness. Breast lump or thickening in breast' was the most commonly known symptom of cancer (61.7%), whereas recall of none lamp warning signs was poor. Only one in four women (24.1%) know a nipple rash sign. The percentage of participants who had scores indicating correct knowledge regarding warning signs shown in Figure 1.

More than half of the study participants acknowledged having a past history of breast cancer, drinking alcohol and having close relative with breast cancer as potential risk factors for breast cancer (63.6%, 58.6%, and 55.6% respectively). A vast majority of the study participants were unable to recognize moderate physical activity (71.6%), late menopause (68.2%), and starting period at early age (67.4%) as potential risk factors (see Figure 2).

History and information source of breast cancer

Around four in five (82.4%) study participants had ever heard of information about breast cancer. Media was the most common information source (73%) followed by family/friend 74 (34.4%), health care worker 68 (31.6%), and NGO campaigns 10 (4.7%). Half of 120 (48.6%) the respondents reported that they had positive families' and/or friends' history of breast cancer among which family history occupies 59 (49.1%) while friends' history was 61 (50.9%).

Insurance access and entertainment preference

The vast majority of the participants have access to insurance 195 (78.9%) and few of them have personal history of chronic disease 22 (8.4%). Mass media was the most common entertainment preference 190 (72.81%) followed by physical activity 137 (52.5%), music and parties 113 (43.3%), and reading 81 (31%).

Table 1. Sociodemographic Characteristics of Study Participants in Hunan Cancer Hospital, Changsha, China, April, 2017 (N=261)

Category	Answer	n	%
Age group(years)	≤33	114	43.7
	34-49	117	44.8
	≥50	30	11.5
	Mean(SD)	35.93 (10.29)	
Educational status	Primary school and below	36	13.8
	Secondary school	117	44.8
	College and above	108	41.4
Marital status	Without partner	63	24.1
	With partner	198	75.9
Occupation	Students	28	10.9
	Employed	96	37.4
	Farmer	50	19.5
	House wife	83	32.3
Income(annual)	<15,000	108	46.2
	≥15,000	126	53.8
Residence setting	Urban	135	52.1
	Rural	125	47.9

Religion not reported by 13 participants; Occupation not reported by 4 participants; Income not reported by 27 participants

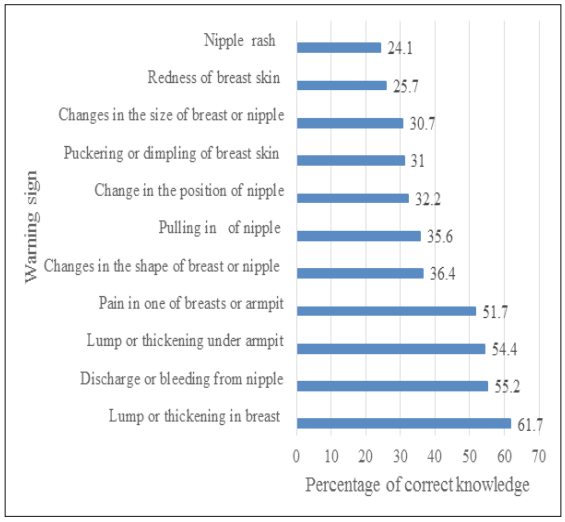

Figure 1. The Percentage of Correct Answers Among Participants Regarding Breast Cancer Warning Signs in Tertiary Cancer Hospital, Changsha, China, April, 2017 (N=261)

Breast checkups and knowledge of age related risk

Of 261 participants asked about frequency of breast checkups, 159 (60.9%) had never/rarely checked their breasts, 46 (17.6%) checked their breasts at least once every 6 months, 23 (8.8%) checked their breasts at least once a month, 33 (12.7%) don't have knowhow about. All (100%) of the participants wrongly answered breast cancer knowledge age related risk and only 53 (20.3%) correctly recognized the estimated lifetime risk of developing breast cancer to be 1 in 8 for a woman.

Screening, management and campaigns of breast cancer

The most widely used methods for the early detection were breast self-examination (60.5%), mammography (42.5%) and ultrasound (41.4%). Around 125 (47.9%) of

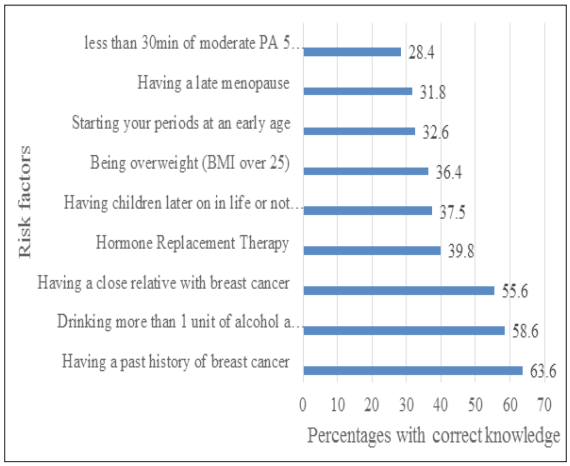

Figure 2. The Percentage of Correct Answers Among Participants Regarding Breast Cancer Risk Factors in Tertiary Cancer Hospital, Changsha, China, April, 2017 (N=261)

Table 2. Factors associated with Awareness of Breast Cancer among Care Giver Women Attending Hunan Cancer Hospital, Changsha, China, 2017 (N=261)

Characteristics	Awareness level n (%)		COR (95%CI)	AOR (95%CI)
	Good	Poor		
Respondents' educational status				
Primary and less	10 (27.8%)	26 (72.2%)	0.21 (0.09-0.48) *	0.9 (0.19-4.38)
Secondary school	42 (35.9%)	75 (64.1%)	0.3 (0.18-0.53) *	0.55 (0.23-1.34)
College and above	70 (64.8%)	38 (35.2%)	1	1
Cohabitation				
Living alone	37 (58.7%)	26 (41.3%)	1.2 (1.06-3.36) *	1.25 (0.42-3.77)
Living with partner	85 (42.9%)	113 (57.1%)	1	1
Income status				
<15,000RMB	50 (46.3%)	58 (53.7%)	0.98 (0.59-1.64)	1.57 (0.71-3.46)
≥15,000RMB	59 (46.8%)	67 (53.2%)	1	1
Occupation				
Students	17 (60.7%)	11 (39.3%)	2.46 (1.02-5.93) *	0.48 (0.1-2.36)
Employed	53 (55.2%)	43 (44.8%)	1.96 (1.08-3.57) *	0.96 (0.36-2.58)
Farmer	17 (34%)	33 (66%)	0.82 (0.39-1.71)	1.43 (0.43-4.74)
House wife	32 (38.6%)	51 (61.4%)	1	1
Reading as entertainment				
Yes	57 (70.4%)	24 (29.6%)	4.2 (1.06-3.36) *	3.57 (1.71-7.44) *
No	65 (36.1%)	115 (63.9%)	1	1
Residence				
Urban	77 (56.6%)	59 (43.4%)	2.32 ((1.41-3.82) *	2.4 (1.04-5.69) *
Rural	45 (36%)	80 (64%)	1	1
Age				
18-33	67 (58.8%)	47 (41.2%)	2.12 (0.94-4.86)	1.72 (0.43-6.82)
34-49	74 (36.8%)	43 (63.2%)	0.87 (0.38-1.98)	1.1 (0.33-3.67)
50-65	12 (40%)	18 (60%)	1	1
Health worker as information source				
Yes	41 (60.3%)	27 (39.7%)	1.81 (1.01-3.25) *	0.9 (0.41-1.99)
No	67 (45.6%)	80 (54.4%)	1	1

* Significant at $p<0.05$; AOR, adjusted odds ratio; OR, Odds ratio; CI, Confidence intervals.

the respondents believed that breast cancer could be cured after early detection, about 103 (39.5%) believed that it is always curable, 27 (10.4%) don't know and 6 (2.3%) of the respondents believed that breast cancer is none curable. The finding showed that only 70 (26.8%) of the respondents had heard campaign about breast Screening Programme. Among 70 (26.8%) of the respondents who had heard campaign about breast Screening Programme, 41 (15.7%) have been invited for screening; however only 26 (10%) of the respondents have ever screened for breast cancer. As many as 179 (68.6%) of the respondents believed that breast cancer is preventable.

Associations between awareness, sociodemographic factors and entertainment preferences

Table 2 portrays factors that can predict and impose impact on acquiring good awareness about breast cancer using binary logistic regression. Among these variables, reading as an entertainment preference was significant and participants preferred reading as entertainment method were more aware than the others (OR=3.57, CI=1.71-7.44). In addition, Women living in urban setup showed better awareness level than those living in rural setting (OR=2.4, CI=1.04-5.69). Other variables; showed no significant association with awareness level.

Discussion

It is known that grounds for high breast cancer mortality comprise suboptimal information about the disease warning signs, risk factors, diagnosis and treatment. An increase in awareness about risk factors and risk-reducing strategies are important for the primary prevention of breast cancer and awareness-based early detection as an intervention for improving breast cancer survival as well. This study indicated that the level of awareness of breast cancer is poor among care giver women at a tertiary cancer hospital, Changsha. While most subjects (82.4%) had heard of breast cancer, only 46.7% had good awareness of it. A similar study done in eastern part of China reported that only 18.6% of women showed good breast cancer awareness (Liu et al., 2014).

Even though both studies indicated suboptimal awareness level, observed percentage variation could be due to, in the eastern China study, 75% of the women attended less than high school and 72.2% of them were residents of rural setting. In addition, studies from other developing countries showed inadequate knowledge and awareness of breast cancer (Mahfouz et al., 2013; Radi, 2013; Al-Sharbatti et al., 2014; Karadag et al., 2014; Sathian et al., 2014; Tazhibi and Feizi, 2014; Grosomanidis et al., 2015; Dey et al., 2016; Islam et al., 2016; Terzioğlu et al., 2016). The similarity may be partially due to, in China and other developing countries there are no organized national or regional breast cancer programs.

Contrary to this finding, in study done in Turkey and Saudi Arabia there was sufficient breast cancer awareness, this might be due to their sample was drawn from patients who visited private clinic with medical consultation and a breast health clinic and, the subjects were likely to be motivated by concerns about breast health, as a result they might be expected to be more knowledgeable than other women (Aydogan et al., 2015; Almutairi et al., 2016). In addition, this result is inconsistent with the study done in Nigeria as it revealed that 71.3% of the participants had sufficient knowledge of breast cancer, the reason might be the participants were women in Obafemi Awolowo University community comprising of students, academic and nonacademic staff, which could make them in more consciousness about breast cancer than others (Adebimpe and Oladimeji, 2014).

The most cheering finding from the study was that most of the participants (61.7%) were aware that breast lump is a symptom of breast cancer. However, the none lamp breast cancer symptoms were answered by less than half the respondents. These results were in line with other studies conducted in UK, Pakistan, Iran and Nepal, which also showed poor awareness of breast cancer symptoms (Linsell et al., 2008; Maqsood et al., 2009; Robb et al., 2009; Radi, 2013; Sathian et al., 2014).

Several factors affect an individual's risk of developing breast cancer, some of which are modifiable and largely related to lifestyle, social, economic and environmental factors. It is essential for women to know about these factors early in life so they can make the right lifestyle choices concerning these risk factors, since an increase in women's awareness can change their risk perceptions and behaviors. In this study, more than half of participants correctly identified that a personal and family history of breast cancer was a risk factor, which correlates with other researchers' findings conducted in UAE, Saudi Arabia and Eastern China (Radi, 2013; Al-Sharbatti et al., 2014; Liu et al., 2014; Almutairi et al., 2016). However, vast majority of the respondents were not well-informed about the risk possessed by hormone replacement therapy, having children latter on in life or not at all, body overweight, starting period at early stage and late menopause. These results were in line with other studies conducted in India and eastern part of China, which also showed poor awareness of breast cancer risk factors (Liu et al., 2014; Gupta et al., 2015). As the mean age of the participants are in the age range of making reproductive choices; they should, therefore, be aware about the risks linked with oral contraceptive use. Most of the biological risk factors are non-modifiable, however, behaviors like use of oral contraceptive, physical exercise, breastfeeding and initiation of regular BSE at an early age can reduce the risk of developing breast cancer.

There were also a substantial number of women who rarely or never checked their breasts and had a lack of confidence in being able to detect a breast change. This is in agreement with the studies conducted in UK by (Linsell et al., 2008) which found out that 31% of women reported low levels of confidence to detect a breast change and 19% rarely or never checked their breasts. It is shocking that the study revealed all of the participants not aware of the increased risk of breast cancer with age. This is also consistent with (Linsell et al., 2008) study which found out that 75% were not aware as age is a risk factor.

In this study, 158(60.5%) participants correctly identified early detection of breast cancer by BSE which is similar to the finding of a study done among Iranian adult women as 79% of the participants answered correctly (Radi, 2013). Similarly, Almutairi et al., (2016) study consistently indicated breast self-examination (BSE) awareness as 81.6% among Saudi women. Several studies suggest that BSE practice on a regular basis influences treatment, prognosis and survival rates. Furthermore, the majority of the participants were unaware that mammography is a useful method for the early detection of breast cancer which correlates with other researchers' findings (Al-Sharbatti et al., 2014; Sathian et al., 2014). A greater emphasis is required to address this poor awareness in future educational campaigns.

This study showed that only 70 (26.8%) of the respondents had heard about breast Screening Programme, among which only 26 (10%) of the respondents have ever screened for breast cancer. The finding might have originated from the fact that in China there is no organized national or regional breast cancer screening programs. Breast cancer screening awareness in China as presently organized is ad-hoc, by many NGOs using public service programs, the media and campaigns in the form of lectures and demonstration.

In this study, reading as entertainment preference was found to be a significant determinant of breast cancer awareness. It was found that participants those used reading as entertainment preference had significantly higher awareness in comparison to other participants. This finding is similar to a study of (Hall et al., 2015) which indicated that print media was effective in increasing mammogram uptake in Savannah among low-income, African American women. Similarly, Siero et al., (1984) found out that after reading the pamphlet women showed greater intention to perform BSE regularly. This could be attributed to a higher estimation of the chance of recovery through early detection of lumps (efficacy) after reading the pamphlet. The health messages also appeared to have a positive influence on compliance with recommended behavior: women examined their breasts more in the prescribed way. Furthermore, several studies suggest that reading influence awareness of breast cancer (de Oliveira et al., 2012; Melnyk and Shepperd, 2012).

The residence setting is also another effective

predictor about breast cancer awareness level in this study. Accordingly, women living in urban area had significantly higher awareness level in comparison to those living in rural areas. This result was consistent with the study done in eastern part of China and Turkey (Liu et al., 2014; Aydogan et al., 2015). This might be due to residents of rural areas tend to have completed fewer years of education, face greater socioeconomic disadvantage and live farther from health care resources than their urban counterparts.

This study showed no significant correlation between the level of awareness and educational background. The study done by Gupta et al., (2015) is in line with this study which revealed low cancer literacy of breast cancer risk factors among Indian women, irrespective of their socio-economic and educational background. On the other hand, Grosomanidis et al., (2015) showed that Low breast cancer awareness was associated with low education. This might be due to the vast majority of participants lived in urban areas (83.4%), and as to the educational level, 71% were university graduates (or above), 26% were high school graduates and only 3% had graduated from elementary. In addition, several previous studies (Linsell et al., 2008; Karadag et al., 2014; Grosomanidis et al., 2015; Gupta et al., 2015; Dey et al., 2016) indicated that educational status positively correlated with awareness level of breast cancer. The effect of health professionals' exclusion in this study should be noted and also holding high educational qualification may not be related to the effect of the awareness level; especially as majority (73%) of the women considered the media to be the main source of their information.

In conclusion, the study revealed suboptimal awareness of breast cancer with reading as entertainment and residence setting are reported to be significantly associated with the awareness level. The study found out that majority of the respondents answered the most common symptom of breast cancer. while one fifth of the participants rarely or never checked their breasts, significant number of the participants were unaware that mammography is useful methods for the early detection of breast cancer. Vast majority of the respondents were not well-informed about the modifiable risk factors. Developing of public screening and educational program through health care system more emphasis on rural areas and less educated women. Promoting breast cancer awareness would lead to early detection and reduce the stage at diagnosis, potentially improving the odds of survival and cure with simpler and more cost-effective treatment.

Funding Statement

This work was supported by the Central South University and ministry of commerce, people's republic of China (grant number: CSC No 2015MPA503).

Statement conflict of Interest

We have NO affiliations with or involvement in any organization or entity with any financial interest and non-financial interest in the subject matter or materials discussed in this manuscript.

References

Adebimpe OA, Oladimeji BY (2014). Knowledge, attitude and awareness of breast and cervical cancer among women in Obafemi Awolowo University, Ile-Ife, Nigeria. *Gender and Behaviour*, **12**, 6238-46.

Al-Sharbatti SS, Shaikh RB, Mathew E, Al-Biate MA (2014). Assessment of breast cancer awareness among female university students in Ajman, United Arab Emirates. *Sultan Qaboos Univ Med J*, **14**, e522-9.

Almutairi KM, Ahmad M, Vinluan JM, Almutairi A (2016). Random cross-sectional determination of the level of awareness among female Saudi patients about breast cancer. *J Cancer Educ*, **31**, 131-5.

Aydogan U, Doganer YC, Kilbas Z, et al (2015). Predictors of knowledge level and awareness towards breast cancer among Turkish females. *Asian Pac J Cancer Prev*, **16**, 275-82.

Bao PP, Wang CF, Xu JY, et al (2014). Survey on knowledge and behavior of early detection for breast cancer among female residents in Shanghai. *Zhong liu fang zhi za zhi*, **21**, 570-4.

Berry DA, Cronin KA, Plevritis SK, et al (2005). Effect of screening and adjuvant therapy on mortality from breast cancer. *N Engl J Med*, **353**, 1784-92.

Boyle P (2005). Breast cancer control: Signs of progress, but more work required. *Breast J*, **14**, 429-38.

Cancer Research UK KsCLaUCL. (2011). Breast module of the cancer awareness measure (Breast-CAM) toolkit. Cancer of research UK, from https://www.cancerresearchuk.org/sites/default/files/health_professional_breast_cam_toolkit_09.02.11.pdf.

CDC. Cfdcap (2016). Breast cancer statistics. [EB/OL].

Chen W, Zheng R, Zhang S, et al (2013). Report of incidence and mortality in China cancer registries, 2009. *Chung-kuo yen cheng yen chiu*, **25**, 10-21.

de Oliveira MS, Santos MC, de Almeida PC, Panobianco MS, Fernandes AF (2012). Evaluation of an educational handbook as a knowledge-acquisition strategy for mastectomized women. *Rev Lat Am Enfermagem*, **20**, 668-76.

Dey S, Sharma S, Mishra A, et al (2016). Breast cancer awareness and prevention behavior among women of Delhi, India: Identifying barriers to early detection. *Breast Cancer (Auckl)*, **10**, 147-56.

Fan L, Strasser-Weippl K, Li J-J, et al (2014). Breast cancer in China. *Lancet Oncol*, **15**, e279-e89.

Federations. TMoHaWs. (2010). Rural women "two cancer" inspection project management program, from http://www.nhfpc.gov.cn/fys/s3581/201007/02a20b251ac646f2896dbc0b71a2cf92.shtml.

Ferlay J, Soerjomataram I, Dikshit R, et al (2015). Cancer incidence and mortality worldwide: sources, methods and major patterns in GLOBOCAN 2012. *Int J Cancer*, **136**, 359-86.

Grosomanidis D, Charitidou E, Foka A, et al (2015). Breast cancer awareness among Greek women and potential determinants. *Hellenic J Surg*, **87**, 289-97.

Gupta A, Shridhar K, Dhillon PK (2015). A review of breast cancer awareness among women in India: Cancer literate or awareness deficit?. *Eur J Cancer*, **51**, 2058-66.

Guvenc I, Guvenc G, Tastan S, Akyuz A (2012). Identifying women's knowledge about risk factors of breast cancer and reasons for having mammography. *Asian Pac J Cancer Preve*, **13**, 4191-7.

Hall IJ, Johnson-Turbes A, Berkowitz Z, Zavahir Y (2015). The African American women and mass media (AAMM) campaign in Georgia: quantifying community response to a CDC pilot campaign. *Cancer Causes Control*, **26**, 787-94.

Hossain MS, Ferdous S, Karim-Kos HE (2014). Breast cancer in

South Asia: a Bangladeshi perspective. *Cancer Epidemiol*, **38**, 465-70.
Islam RM, Bell RJ, Billah B, Hossain MB, Davis SR (2016). Authors' response to Letter to the Editor on awareness of breast cancer and barriers to breast screening uptake in Bangladesh: A population-based survey. *Maturitas*, **88**, 58.
Karadag G, Gungormus Z, Surucu R, Savas E, Bicer F (2014). Awareness and practices regarding breast and cervical cancer among Turkish women in Gazientep. *Asian Pac J Cancer Prev*, **15**, 1093-8.
Karayurt O, Ozmen D, Cetinkaya AC (2008). Awareness of breast cancer risk factors and practice of breast self examination among high school students in Turkey. *BMC Public Health*, **8**, 359.
Lannin DR, Mathews HF, Mitchell J, et al (1998). Influence of socioeconomic and cultural factors on racial differences in late-stage presentation of breast cancer. *JAMA*, **279**, 1801-7.
Linsell L, Burgess CC, Ramirez AJ (2008). Breast cancer awareness among older women. *Br J Cancer*, **99**, 1221-5.
Liu L-Y, Wang F, Yu L-X, et al (2014). Breast cancer awareness among women in Eastern China: a cross-sectional study. *BMC Public Health*, **14**, 1004.
Mahfouz AA, Hassanein MHA, Nahar S, et al (2013). Breast cancer knowledge and related behaviors among women in Abha city, Southwestern Saudi Arabia. *J Cancer Educ*, **28**, 516-20.
Maqsood B, Zeeshan MM, Rehman F, et al (2009). Breast cancer screening practices and awareness in women admitted to a tertiary care hospital of Lahore, Pakistan. *J Pak Med Assoc*, **59**, 418-21.
Melnyk D, Shepperd JA (2012). Avoiding risk information about breast cancer. *Ann Behav Med*, **44**, 216-24.
Olajide TO, Ugburo AO, Habeebu MO, et al (2014). Awareness and practice of breast screening and its impact on early detection and presentation among breast cancer patients attending a clinic in Lagos, Nigeria. *Niger J Clin Pract*, **17**, 802-7.
Radi SM (2013). Breast cancer awareness among Saudi females in Jeddah. *Asian Pac J Cancer Prev*, **14**, 4307-12.
Robb K, Stubbings S, Ramirez A, et al (2009). Public awareness of cancer in Britain: a population-based survey of adults. *Br J Cancer*, **101**, 18-23.
Sathian B, Nagaraja SB, Banerjee I, et al (2014). Awareness of breast cancer warning signs and screening methods among female residents of Pokhara valley, Nepal. Asian Pac J Cancer Prev, **15**, 4723-6.
Siero S, Kok G, Pruyn J (1984). Effects of public education about breast cancer and breast self-examination. *Soc Sci Med*, **18**, 881-8.
Tazhibi M, Feizi A (2014). Awareness levels about breast cancer risk factors, early warning signs, and screening and therapeutic approaches among Iranian adult women: a large population based study using latent class analysis. *Biomed Res Int*, **2014**, 306352.
Terzioğlu G, Özgü E, Kılıç MÖ, Yıldız Y, Güngör T (2016). Evaluation of breast cancer knowledge and awareness among hospital staff in a women heath hospital in Turkey. *J Cancer Educ*, **25**, 1-6.
Wang F, Yu Z-G (2015). Current status of breast cancer prevention in China. *Chronic Dis Transl Med*, **1**, 2-8.
Wang L, Zhang Y, Shi JF, Dai M (2016). Disease burden of famale breast cancer in China. *Zhonghua liuxingbingxue zazhi*, **37**, 970-6.
WHO (2011). China country profile, from http://www.wpro.who.int/countries/chn/5CHNpro2011_fi.
Zheng R, Zeng H, Zhang S, Chen T, Chen W (2016). National estimates of cancer prevalence in China, 2011. *Cancer Lett*, **370**, 33-8.