

RESEARCH COMMUNICATION

Awareness and Knowledge of Breast Cancer and Mammography among a Group of Malaysian Women in Shah Alam

Sami Abdo Radman Al-Dubai^{1*}, Ahmad Munir Qureshi², Riyadh Saif-Ali³, Kurubaran Ganasegeran⁴, Mohanad Rahman Alwan¹, Jalal Ibrahim Shawqi Hadi¹

Abstract

Objectives: The aim of this study was to assess awareness and knowledge of breast cancer and mammography among Malaysian women in Shah Alam. **Methods:** This cross sectional study was conducted among 250 Malaysian women. Data were collected using a self administrated questionnaire which included questions on socio-demographic data, knowledge of breast cancer and awareness of mammography. **Results:** Mean age of respondents was 28 ± 9.2 with 69.2% aged 18 to 29 years. The majority had heard about breast cancer (81.2%) and indicated books, magazines and brochures as their source of information (55.2%). However, most did not know about signs and symptoms of breast cancer and many of its risk factors. On multivariate analysis, significant predictors of breast cancer knowledge were age, race, marital status, level of education, occupation, family size and family history of other cancers ($p < 0.05$). Fifty percent of women were aware of mammography, significant predictors being age, occupation, marital status and knowledge of breast cancer ($p < 0.05$). **Conclusion:** Most women were aware of breast cancer. However, the knowledge about signs and symptoms of breast cancer and awareness of mammography were inadequate. It is recommended that the level of knowledge should be raised among Malaysian women, particularly in the young and less educated women.

Keywords: awareness - breast cancer - knowledge - Malaysian women - mammography

Asian Pacific J Cancer Prev, 12, 2531-2538

Introduction

Breast cancer is one of the most frequent cancers among women in both developed and developing countries (Parkin et al., 2005). The total number of new cases of breast cancer diagnosed annually in the world exceeds one million (WHO, 2007). In Malaysia breast cancer is the most commonly diagnosed cancer among women of all ethnic groups. It accounted for 31 percent of newly diagnosed female cancer cases (Gerad & Halimah, 2003). Most of the diagnosed cases presented in the advanced stages of disease indicating negative social-cultural perception of the disease (Hisham & Yip, 2003). Inadequate knowledge, geographical isolation, and poverty might be possible reasons for the delay of breast cancer detection in Malaysia (Hisham & Yip, 2003).

Early detection of breast cancer plays the leading role in reducing mortality rates and improving the patients' prognosis (Elmore et al., 2005). The 5-year survival rate is 92% with early detection of breast cancer. However, with local invasion, the survival rate decreases to 71%, and if it is diagnosed at the latest stage, only 18.0% of patients survive (Lauver et al., 1999).

The recommended screening methods for early detection of breast cancer are mammography, clinical breast examination and breast self examination. However, mammography remains the most effective screening tool in comparison to clinical breast examination and breast self examination ((Montazeri et al., 2008).

For primary prevention of breast cancer, women need to be adequately informed about risk factors and risk reduction strategies for breast cancer. Established risk factors for breast cancer including women with family history of breast cancer, gender, age at menarche, late menopause, no breast feeding, oral contraceptive pills, hormonal replacement therapy, alcohol, smoking and obesity (Madanat & Merrill, 2002). Certain lifestyle factors are believed to be protective, including weight control, physical activity, and avoidance of smoking (Vogel, 2000). Several studies have shown inadequate levels of knowledge towards risk factors awareness and screening methods including mammography, even among educated women and health care providers (Madanat & Merrill, 2002; Ahmed et al., 2006; Parsa et al., 2008 Amin et al., 2009).

Health education and communication have been

¹Department of Community Medicine, International Medical School, Management and Science University, Shah Alam, ²Department of Community Medicine and Public Health, Cyberjaya University College of Medical Sciences, Cyberjaya, Selangor, ³Molecular Medicine, Faculty of Medicine, University Malaya, Kuala Lumpur, Malaysia *For correspondence: samidobaie@yahoo.com

found to promote health seeking behavioral change with sufficient utilization and compliance to breast cancer prevention and screening strategies (Madanat & Merrill, 2002; Dunder et al., 2006).

The awareness about breast cancer among Malaysian women is not well documented. In a community based survey conducted by the Ministry of Health Malaysia among 59,903 women in Malaysia, breast self examination and clinical breast examination were reported to be performed by 34% and 31% of women above 20 years of age, respectively. While mammography, was only carried out in 3.8% of women aged 50 years and older (Narimah, 1997). A recent study among a group of educated Malaysian women found a lack of knowledge about risk factors, sign and symptoms of breast cancer (Hadi et al., 2010). The current study is aimed at assessing breast cancer knowledge and awareness of mammography among Malaysian women in Shah Alam.

Materials and Methods

Study design and population

This cross-sectional study was conducted among 250 Malaysian women living in Shah Alam city. They were approached in a big shopping mall in the city using non-probability convenience sampling technique. Women less than 18 years old, those with language barriers and those who refused to participate were excluded from this study.

Instruments

Data was collected using a self administered questionnaire which consisted of three sections namely demographic status, knowledge about breast cancer and awareness of mammography.

Socio-demographic included questions on age, race, level of education, marital status, occupation, number of family members, age at first period, number of pregnancies, history of menopause, family history of any cancer and family history of breast cancer. The second section included questions about breast cancer knowledge, signs and symptoms and risk factors. Awareness of mammography was assessed by one question 'did you hear about mammography?' The questionnaire was distributed in both English and Bahasa Malaysia. Content and face validity of the questionnaire was established by opinion of an expert surgeon of breast cancer. In addition, the questionnaire was pretested among 20 women for checking the clarity of the items.

Data collection

Approval of the study was obtained from the research committee of MSU. The purpose of the study was explained to women, confidentiality and their right to withdraw was ensured. They also received a written description of the purpose and aims of the study along with the study questionnaires. Each participant signed a consent form.

Statistical analysis

Analysis was performed using Social Package of Social Sciences (SPSS) software, version 17.

Scores of knowledge items were summed to obtain the mean total knowledge score on breast cancer. Descriptive statistics were obtained for all the variables in the study. Knowledge scores were expressed as mean and standard deviations. Test of normality was performed for the total score of knowledge. T-test and ANOVA test were applied to compare knowledge across the socio-demographic variables. In case of ANOVA, post hoc test was used to determine where the significant difference was. Pearson Chi-Square test and simple logistic regression were used to test for the association between mammography awareness and other categorical variables. Multiple linear regression analysis was performed to obtain the significant predictors of breast cancer knowledge. Multiple logistic regression was used to obtain significant predictors of mammography awareness. The accepted level of significance was set below 0.05 ($p < 0.05$).

Results

Socio-demographic characteristics

The mean age of the respondents was 28.8 years (± 9.2). The majority were aged 18 to 29 years (69.2%), followed by 30 to 44 years (21.2%). Only 9.6% aged more than 45 years. Most of them were Malay (68.0%), followed by Indians (22.8%) and then Chinese (9.2%). The majority were singles (59.2%) and university graduates (59.6%). Regarding occupation, the majority were serving in private sector (48.8%) followed by students (30.8%) then by government servants (12.8%). Most of the respondents had more than five family members (62.8%) and the remaining had five or less family members (37.2%). Few respondents had menopausal history (4.4%) while the majority had not (95.6%). About 7.6% had a family history of breast cancer, whereas 15.6% had family history of other types of cancers (Table 1).

Breast cancer awareness and sources of information

One hundred forty three (81.2%) of the respondents had heard about breast cancer and most of them (56.7%) stated that books, brochures and magazines as their main source of information about breast cancer. Television and radio was the second source (21.7%) followed by health professionals (15.8%). The last source of information was friends and neighbors (5.9%) (Figure 1).

Knowledge of breast cancer

When respondents were quizzed about breast cancer

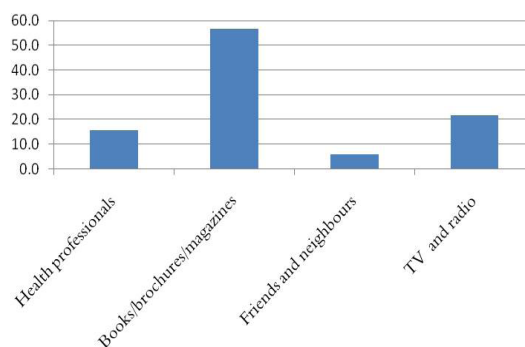


Figure 1. Sources of Information about Breast Cancer

Table 1. Socio-demographic Characteristics of the Respondents (n=250)

Characteristic	N	%
Age group (years)		
18-29	173	69.2
30-44	53	21.2
≥ 45	24	9.6
Race		
Malay	170	68.0
Chinese	23	9.2
Indian	57	22.8
Marital status		
Married	102	40.8
Single	148	59.2
Level of education		
Primary or secondary school	111	40.4
University Graduate	149	59.6
Occupation		
Housewife	20	8.0
Private job	121	48.4
Government servant	32	12.8
Student	77	30.8
Number of family members		
≤5	93	37.2
>5	157	62.8
Menopausal history		
yes	11	4.4
no	239	95.6
Family history of any cancer		
yes	39	15.6
no	211	84.4
Family history of breast cancer		
Yes	19	7.6
No	231	92.4

Table 2. General Knowledge of Breast Cancer (n=250)

Statements	Correct response N (%)
Breast cancer only develops in one breast	178 (71.2)
Breast cancer is the most common in Malaysia	200 (80.0)
Women younger than 40 years get breast cancer	199 (79.4)
Mastectomy is the only way to treat breast cancer	165 (66.0)
Common age affected by breast cancer	N %
Teenagers	14 (5.6)
25-50 years old	218 (87.2)
51-75 years old	18 (7.2)

knowledge, most of them stated that it does not only occur in one breast (71.2%) and the majority knew that this cancer is the most common cancer among Malaysian women (80.0%). Most of the respondents stated that women below 40 years old may get breast cancer (79.4%). Sixty six percent of the respondents believed that mastectomy is the only treatment for breast cancer. On questions about the age group who commonly suffers from breast cancer, the majority thought it was from 25 to 50 years (87.2%) (Table 2).

Knowledge about risk factors of breast cancer

Almost eighty eight percent of respondents linked breast cancer to genetics or family history whereas twelve percent said that it is not. Some respondents linked breast cancer with wearing of underwire bra (34.3%) but most of them (65.6%) did not. The majority did not agree that high number of pregnancy is a risk factor of breast cancer

Table 3. Knowledge about Risk Factors of Breast Cancer and its Symptoms and Signs(n=250)

	True N (%)	False N (%)
Risk factors of breast cancer		
Genetic & family history	220 (88.0)	30 (12.0)
Aging	89 (35.6)	161 (64.4)
Wearing underwire bra	86 (34.4)	164 (65.6)
Higher number of pregnancies	20 (8.0)	230 (92.0)
Nulliparity	59 (23.6)	191 (76.4)
Mammogram	29 (11.6)	221 (88.4)
First delivery after age of 30 years	60 (24.0)	190 (76.0)
Short duration of breastfeeding	95 (38.0)	155 (62.0)
Use of oral contraceptive pills	85 (34.0)	165 (66.0)
Obesity	100 (40.0)	150 (60.0)
Smoking	163 (65.2)	87 (34.8)
Large breasts	30 (12.0)	220 (88.0)
Alcohol	142 (56.8)	108 (43.2)
Radiation exposure	168 (67.2)	82 (32.8)
HRT*	114 (45.6)	136 (54.4)
Menopause after 50 years	50 (20.0)	200 (80.0)
Menarche before 11 Years	38 (15.2)	212 (84.8)
Symptoms and signs of breast cancer		
Bloody discharge from nipple	178 (71.2)	72 (28.8)
Breast lump	227 (90.8)	23 (9.2)
Enlargement of neighbouring lymph nodes	188 (75.2)	62 (24.8)
Itchiness and discoloration of nipple	104 (41.6)	146 (58.4)
Breast skin retraction	121 (48.4)	129 (51.6)
Nipple retraction	117 (46.8)	133 (53.2)
Discoloration of breast	117 (46.8)	133 (53.2)
Asymmetry of the breast	112 (44.8)	138 (55.2)

*HRT=hormone replacement therapy

(92.0%) and most of them (88.4%) did not relate breast cancer with undergoing mammography. The majority of respondents did not agree that the following are risk factors of breast cancer: aging (64.4%), nulliparity (76.4%), delivery at more than 30 years old (76%), shorter duration of breast feeding (62.0%), contraceptive pills (66.0%), obesity (60.0%), big breast (88%), hormone replacement therapy (HRT) (54.4%), menopause after the age of 50 (80%) and menarche before age 11(84.8%). However, most of the respondents agreed that the following are risk factors of breast cancer: smoking (65.2%), alcohol intake (56.8%) and exposure to radiation (67.2%) (Table 3).

Knowledge of symptoms and signs of breast cancer

The majority of respondents recognized the followings as signs and symptoms of breast cancer; bloody nipple discharge (71.2%), breast lump (90.8%), and enlargement of neighboring lymph nodes (75.2%). However, the minority recognized the following as signs and symptoms of breast cancer; itchiness and discoloration of nipple (41.6%), breast skin retraction (48.4%), asymmetrical breasts (44.8%), nipple retraction (46.8%) and discoloration of breast (46.8) (Table 4).

Knowledge of breast cancer by socio-demographic characteristics

Table 4 shows the association between socio-demographic factors and knowledge of breast cancer. There was a significant association between race and knowledge (p=0.005); post hoc test showed that Indians

Table 4. Knowledge of Breast Cancer by Socio-demographic Characteristics (n=250)

	Mean	SD	t value	F value	P value
Age					
18-29	17.1	5.3			
30-44	15.5	4.8			
≥45	17.5	5.6		2.073	0.128
Race					
Malay	16.4	4.9			
Chinese	15.3	5.3			
Indian	18.7	5.8		5.497	0.005
Marital status					
Married	15.5	5.0			
Single	17.8	5.2	3.560		>0.001
Level of education					
Primary or secondary	14.9	5.0			
University	18.2	5.0	5.096		>0.001
Occupation					
Housewife	14.9	6.1			
Private	16.2	4.8			
Government servant	15.3	4.2			
Student	18.9	5.6		6.892	>0.001
Number of family members					
≤5	16.1	5.1			
>5	17.3	5.3	1.801		0.073
History of menopause					
Yes	17.5	5.2			
No	16.8	5.3	0.409		0.691
Family history of any other cancers					
Yes	18.8	4.7			
No	16.5	5.3	2.833		0.006
Family history of breast cancer					
Yes	18.5	4.2			
No	16.7	5.3	1.731		0.097

(18.7±5.8) had higher knowledge compared to Malay (16.4±4.9) and Chinese women (15.3±5.3), (p=0.010, p= 0.023 respectively). Singles had higher knowledge (17.8±5.2) in comparison with married women (15.5±5.0), (p<0.001). Women with university level of education had higher knowledge (18.2±5.0) than those with secondary or primary level of education (14.9±5.0), (p<0.001). A significant association was found between occupation and knowledge of breast cancer (p=0.0001); post hoc test showed that students had higher knowledge (18.9±5.6) than housewives (14.9±6.1), government employers (15.3±4.2) and workers in the private sector (16.2±4.8), (p=0.011, p=0.002, p=0.004 respectively). Women with a positive family history of breast cancer had higher knowledge (18.5±4.2) in comparison with women with a negative family history of breast cancer (16.7±5.3) but this difference was not significant (p=0.097). However, a significant difference in knowledge existed between those with positive family history of other cancers (18.8±4.7) and those without such history (16.5±5.3) (p=0.006).

Predictors of breast cancer knowledge by multiple linear regression

Table 5 shows the predictors of breast cancer knowledge among Malaysian women. Women aged 18-29 years and 30-44 years on the average had 2.9 score lower in knowledge compared to women aged more than 44 years (p=0.018, p=0.013 respectively). Indians on the

Table 5. Predictors of Breast Cancer Knowledge by Multiple Linear Regression (n=250)

	B	SE	Beta	P value	95% CI	
					Lower	Upper
Age (years) (reference > 44)						
18 - 29	-2.87	1.204	-0.25	0.018	-5.246	-0.504
30 - 44	-2.92	1.168	-0.23	0.013	-5.223	-0.622
Race (reference is Chinese)						
Indian	2.17	0.729	0.17	0.003	0.732	3.603
Malay	0.883	1.086	0.08	0.417	-1.257	3.023
Marital status (reference is married)						
Single	1.831	0.785	0.17	0.021	0.284	3.378
Level of education (reference is primary or secondary)						
University	3.339	0.646	0.31	0.000	2.067	4.611
Occupation (reference is student)						
House wife	-2.740	1.395	-0.14	0.051	-5.489	0.008
Government	-1.901	.786	-0.18	0.016	-3.449	-0.353
Private	-3.198	1.029	-0.20	0.002	-5.224	-1.171
Family history of other cancers (reference is yes)						
No	-1.738	0.840	-0.12	0.040	-3.393	-0.083

average had 2.17 score higher in knowledge compared to Chinese (p=0.003). Singles on the average had 1.8 score higher in knowledge compared to married women (P=0.021). Highly educated women had 3.3 score higher in knowledge compared to less educated ones (p<0.001). Government employee and workers in the private section on the average had 1.9 and 3.2 score (respectively) lower in knowledge compared to students (p= 0.016, p=0.002 respectively). Women without any family history of cancer on the average had 1.7 score lower in knowledge compared to those with such history. Linear regression analysis was conducted using Enter technique. Multi-collinearity was checked and the analysis showed no intercorrelation among the independent variables. The total model was significant (p<0.001) and the adjusted R Square was 0.20 which means that the variables in this model explains 20% of the variance on knowledge of breast cancer.

Awareness of mammography

Half of the respondents were aware of mammography. When questioned about the right age to start mammogram screening, most of them said at the age of 25 years (53.2%), some said at 30 years (28.4%), whereas a few said at 35 years (18.4%).

Awareness of mammography by socio-demographic characteristics

Table 6 shows the association between the socio-demographic factors and mammography awareness. A significant association was found between mammography awareness and age; respondents who aged 18-29 years (45.1%) (OR= 0.2, 95% CI 0.05- 0.5, p =0.001) and those who aged 30-44 (50.9%) (OR= 0.2, 95% CI 0.06- 0.69, p=0.010) were significantly less aware about mammography compared to those who aged ≥ 45 year (83.3%). Significant difference was found between Malays (44.1%) and Indians (70.2%) (OR=0.3, 95% CI 0.1-0.89, p=0.029) and between Chinese (43.5%)

Table 6. Awareness of Mammography by Socio-demographic Characteristics (n=250)

	Did you hear about mammography		OR	95% CI		P value
	Yes n (%)	No n (%)		Lower limit	Upper limit	
Age (yrs)						
18-29	78 (45.1)	95 (54.9)	0.2	0.05	0.50	0.001
30-44	27(50.9)	26(49.1)	0.2	0.06	0.69	0.010
≥45	20(83.3)	4(16.7)	1.0			
Race *						
Malay	75(44.1)	95(55.9)	0.3	0.12	0.89	0.029
Chinese	10(43.5)	13(56.5)	0.3	0.18	0.64	0.001
Indian	40(70.2)	17(29.8)	1.0			
Marital status						
Married	58(56.9)	44(43.1)	1.6	0.96	2.65	0.072
Single	67(45.3)	81(54.7)	1.0			
Level of Education						
Primary or secondary school	43(42.6)	58(57.4)	1.0			
University graduate	82(55.0)	67(45.0)	1.6	0.36	1.0	0.053
Occupation*						
Housewife	10(50.0)	10(50.0)	0.7	0.25	1.81	0.434
Private job	55(45.5)	66(54.5)	0.6	0.32	1.0	0.051
Government servant	14(43.8)	18(56.2)	0.5	0.23	1.21	0.129
Student	46(59.7)	31(40.3)	1.0			
Number of family members						
Less than 5	52(55.9)	41(44.1)	1.5	0.87	2.44	0.150
More than 5	73(46.5)	84(53.5)	1.0			
History of menopause						
Yes	10(90.9)	1(9.1)	10.8	1.36	85.56	0.006
No	115(48.1)	124(51.9)	1.0			
Family history of any other cancers						
Yes	24(61.5)	15(38.5)				
No	101(47.9)	110 (52.1)	1.7	0.87	3.51	0.117
Family history of breast cancer						
Yes	10(52.6)	9(47.4)	1.1	0.44	2.86	0.811
No	115(49.8)	116(50.2)	1.0			

*Simple logistic regression was used to obtain the OR

Table 7. Predictors of Awareness of Mammography by Multiple Logistic Regression (n=250)

	B	OR *	95% CI		P value
			Lower	Upper	
Age (years)					
>44	1.994	7.3	1.9	28.5	0.004
30 - 44	0.377	1.5	0.6	3.4	0.386
18-29	reference	reference	reference	reference	reference
Marital status					
Married	1.004	2.7	1.3	5.9	0.011
Single	reference	reference	reference	reference	reference
Occupation					
Housewife	0.628	1.9	0.6	6.4	0.318
Private	0.694	2.0	0.5	8.4	0.342
Students	1.502	4.5	1.1	18.6	0.038
Government	reference	reference	reference	reference	reference
Knowledge score on breast cancer	0.127	1.1	1.1	1.2	<0.001

*OR, Odds Ratio

and Indians (OR= 0.3, 95% CI 0.18-0.63, p=0.001). Respondents with history of menopause were more aware about mammography (90.9%) compared to those without such history (48.1%) (OR= 10.8, 95% CI 1.36-85.56, p= 0.006).

Predictors of awareness of mammography by multiple logistic regression

Variables that were significantly associated with awareness of mammography in bivariate analysis were included in multivariate analysis. Multiple logistic

regression was performed. Enter technique was used and the highest non-significant variables were removed manually in each step until the final model was obtained. Variables which remained significant in the model were: age of more than 44 years old (p=0.004), being married (p=0.011), being student (p=0.038) and have higher knowledge on breast cancer (p<0.001). The total model was significant (p<0.005) and accounted for 29% of the variance (Table 7). All the values of the standard errors were below 5. This indicated there was no multicollinearity among variables.

Discussion

In this study, most of the respondents (81.2%) had heard about breast cancer. This rate of awareness was higher in comparison to that found in the general population in Iran (64.0%) (Montazeri et al., 2008) and similar to that found in Ireland (McMenamin et al., 2005).

This study found that books, brochures and magazines were the most common source of information on breast cancer followed by TV. This finding was not consistent with previous studies that showed that TV was the most common source of information (Sim et al., 2009). This finding indicated that either our sample was not interested in watching TV or that TV programs did not provide ample health education for women regarding the cancer status in Malaysia. It has been found that health education through media can successfully promote knowledge and recognition of screening tests for breast cancers (Jenkins et al., 1999; Im et al., 2004). In this study, the role of health professionals as providers of knowledge on breast cancer was very unsatisfying because only 13% of respondents considered them a source of information. This finding was consistent with a previous study in Singapore in which only 14% of respondents reported their family physician as source of information (Sim et al., 2009). Previous studies have suggested that raising the awareness and knowledge on breast cancer through health education by doctors and nurses may be more effective resources for women (Seow et al., 1997; Lee et al., 2000).

Most of the respondents in our study (80.0%) stated that breast cancer is the most common cancer among Malaysian women. However, our results revealed a poor understanding of the risk factors and signs of symptoms, in addition to misconceptions about treatment of breast cancer. In this study knowledge on risk factor of breast cancer was unsatisfying as most of the respondents did not know that the following are risk factors of breast cancer: Nulliparity, delivery at more than 30 years old, shorter duration of breast feeding, contraceptive pills, obesity, big breast, and hormone replacement therapy, menopause after the age of 50 and menarche before age. Inadequate knowledge about risk factors of breast cancer was also reported by previous researches, not only among the general population (Alam, 2006; Amin et al., 2009), female teachers and health providers such as nurses were found to have inadequate knowledge on breast cancer (Parsa et al., 2008; Ahmed et al., 2006). These two previous studies have found that only 55.0% of Malaysian teachers (Parsa et al., 2008) and 35.0% of Pakistani nurses had good knowledge on risk factors of breast cancer (Ahmed et al., 2006). Those studies also have found that breast feeding, age of menopause and menarche were not recognized as risk factors of breast cancer by the majority of respondents.

In this study, knowledge about signs and symptoms of breast cancer was investigated. The majority of respondents knew about few signs and symptoms of breast cancer such as bloody discharge from the nipple, breast lump, and enlargement of neighboring lymph nodes. However, other signs and symptoms like itchiness and discoloration of nipple, breast skin retraction, asymmetrical breasts,

nipple retraction and discoloration of breast were not recognized by the majority of respondents. A previous study in Malaysia also showed similar finding of high knowledge about blood discharge as a symptom of breast cancer and low knowledge about nipple retraction (Parsa et al., 2008). A recent study in Singapore found that the most frequent symptoms recognized by respondents were palpable breast lump and nipple discharge (Sim et al., 2009). Another study in Iran showed that nipple retraction and bloody discharge have been recognized as symptoms of breast cancer by only 5.0% and 6.0% of respondents respectively (Montazeri et al., 2008). The case was not different in Egypt in which only 10.6% of academic women had satisfactory knowledge about breast cancer (Seif & Aziz, 2000).

With regard to treatment, almost two-thirds of women in our study (66.0%) thought that that mastectomy was the only available treatment. Similar findings were reported by a previous study in Singapore in which 51.0% of women had similar beliefs (Sim et al., 2009). Such a low knowledge about breast cancer could be considered a barrier to seek early health care. Knowledge on breast cancer among women is important so that they can seek early care. Lack of knowledge may increase the risk of under recognition of the disease in its early stage (Horn et al., 2002). Several studies have shown that cultural beliefs and attitudes influence the stage at which breast cancer is diagnosed (Russell et al., 2007; Wong-Kim et al., 2003; Lannin et al., 2002). Women who believe that they are susceptible to breast cancer and that breast cancer is a serious condition are more likely to perform breast cancer screening (Champion, 1993). A recent study from Turkey showed that theoretical educations on breast cancer awareness and BSE training were effective even in illiterate and low-educated women (Budakoglu et al., 2007).

As indicated by the multiple logistic regression models in this study, knowledge on breast cancer was significantly predicted by several variables that include age, marital status, race, level of education, occupation and family history of other cancers.

Findings of this study show that women with higher level of education have higher knowledge on breast cancer. These findings were consistent with those found by previous researchers in Iran (Haji-Mahmoodi et al., 2002; Yavari & Pourhoseingholi, 2004), Saudi Arabia (Amin et al., 2009) and United States (Eileen, 2004). This study found that younger women had lower knowledge on breast cancer in comparison to older ones. Amin et al. (2009) reported similar findings among Saudi women.

With regard to mammography awareness, this study found that half of the respondents had heard about mammography. This figure is high in comparison to that reported in Saudi Arabia (30.0%) (Sait et al., 2010) and Iran (9.0%) (Montazeri et al., 2008) but is lower than that in Turkey (72.1%) (Dundar et al., 2006). Mammography, breast self examination and clinical breast examination are considered as screening methods for early detection breast cancer (Lam et al., 2008), and screening behavior was found to be influenced by level of knowledge and perceived risk factor among women (Vogel, 2000).

It has been suggested that the progressive decline in mortality rate for breast cancer in U.S was attributed to several factors including emphasis on early detection and education of professionals and public (Vogel, 2000).

In Malaysia, the cost of mammography is about RM 50 if an organized population based screening program is established, otherwise it is about RM100 (1US\$ = 3RM) if such a program does not exist (Parsa et al., 2008). Lack of social support and intrinsic cultural beliefs were also suggested to have negative influences on the choice of screening among women.

In addition, inadequate knowledge on breast cancer and screening methods might be one of the main reasons for the delay of breast cancer detection in Malaysia (Hisham & Yip, 2003). In our study, the multivariate analysis revealed that the most important predictor of mammography awareness was the knowledge about breast cancer.

In conclusion, this study found high awareness but unsatisfactory knowledge on breast cancer among Malaysian women. There was limited information on the risk factors and symptoms of breast cancer; some were well known while some other risk factors were not. Knowledge on breast cancer was low among young and less educated women. This study found a low awareness of mammography among women. Knowledge on breast cancer was the most important predictor of awareness of mammography. Since only few women in this study had adequate knowledge about risk factors and symptoms of breast cancer, there is a need to introduce breast cancer education on risk factors, early signs, and methods of diagnosis of breast cancer in focus on younger and less educated women.

Primary health care workers should be involved in such education program and they should be encouraged to participate in health education by provide information on breast cancer to their patients. The role of mass media, particularly television, should be stressed as it was found to play a key role in imparting health education and belief changes. Since this study is limited by its small sample size and a non probability sampling, studies with larger and representative samples are recommended to confirm the findings of the present study which will help to expand the knowledge base for healthcare providers and decision makers in Malaysia to take the appropriate action.

References

- Ahmed F, Mahmud S, Hatcher J, et al (2006). Breast cancer risk factor knowledge among nurses in teaching hospitals of Karachi, Pakistan: A cross-sectional study. *BMC Nursing*, **19**, 5-6.
- Alam AA (2006). Knowledge of breast cancer and its risk and protective factors among women in Riyadh. *Ann Saudi Med*, **26**, 272-7.
- Amin TT, Al Mulhim ARS, Al Meqihwi A (2009). Breast cancer knowledge, risk factors and screening among adult Saudi women in a primary health care setting. *Asian Pacific J Cancer Prev*, **10**, 133-8.
- Budakoglu II, Maral I, Ozdemir A, et al (2007). The effectiveness of training for breast cancer and breast self-examination in women aged 40 and over. *J Cancer Educ*, **22**, 108-11.
- Champion VL (1993). Instrument refinement for breast cancer screening behaviors. *Nursing Research*, **42**, 138-43.
- Dundar PE, Ozmen D, Ozturk B, et al (2006). The knowledge and attitudes of breast self examination and mammography in a group of women in a rural area in Western Turkey. *BMC Cancer*, **6**, 43.
- Eileen CT (2004). African American women's breast memories, cancer beliefs and screening behaviors. *Cancer Nursing*, **27**, 295-302.
- Elmore JG, Armstrong K, Lehman CD, et al (2005). Screening for breast cancer. *JAMA*, **293**, 1245-56.
- Hadi MA, Hassali MA, Shafie AA, et al (2010). Evaluation of breast cancer awareness among female university students in Malaysia. *Pharmacy Practice*, **8**, 29-34.
- 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 Family Med*, **7**, 6.
- Haji-Mahmoodi M, Montazeri A, Jarvandi S, et al (2002). Breast self-examination: Knowledge, attitudes and practices among female health care workers in Tehran, Iran. *Breast J*, **8**, 222-5.
- Hisham AN, Yip CH (2003). Spectrum of breast cancer in Malaysian women: Overview. *World J Surg*, **27**, 921-3.
- Horn-Ross PL, Hoggatt KJ, West DW (2002). Recent diet and breast cancer risk: The California Teachers Study (United States). *Cancer Cases Control*, **13**, 407-15.
- Im EO, Park YS, Lee EO, et al (2004). Korean women's attitudes toward breast cancer screening tests. *Int J Nursing Studies*, **41**, 583-9.
- Jenkins CN, McPhee SJ, Bird JA (1999). Effect of a media-led education campaign on breast and cervical cancer screening among Vietnamese-American women. *Prev Med*, **28**, 395-406.
- Lam WW, Chan CP, Chan CF, et al (2008). Factors affecting the palpability of breast lesion by self-examination. *Singapore Med J*, **49**, 228-32.
- Lauer DR, Kane J, Bodden J, et al (1999). Engagement in breast cancer screening behavior. *Oncol Nurs Forum*, **26**, 545-54.
- Lannin DR, Mathews HF, Mitchell J, et al (2002). Impacting cultural attitudes in African-American women to decrease breast cancer mortality. *Am J Surg*, **184**, 418-23.
- Lee C, Kim HS, Ham O (2000). Knowledge, practice, and risk of breast cancer among rural women in Korea. *Nursing Hlth Sci*, **2**, 225-30.
- Madanat H, Merrill RM (2002). Breast cancer risk factors and screening awareness among women nurses and teachers in Amman, Jordan. *Cancer Nursing*, **25**, 276-82.
- McMenamin M, Barry H, Lennon AM, et al (2005). A survey of breast cancer awareness and knowledge in a Western population: lots of light but little illumination. *Eur J Cancer*, **41**, 393-7.
- Narimah A (1997). Breast Examination Report of second national health and morbidity survey conference. Organized by Public Health Institute Ministry of Health Malaysia. *Hospital Kuala Lumpur*, 145-8.
- Parkin DM, Bray F, Ferlay J, et al (2005). Global Cancer Statistics 2002. *CA Cancer J Clin*, **55**, 74-108.
- Parsa P, Kandiah M, Mohd Zulkefli NA, et al (2008). Knowledge and behavior regarding breast cancer screening among female teachers in Selangor, Malaysia. *Asian Pac J Cancer Prev*, **9**, 221-7.
- Russell KM, Monahan P, Wagle A, et al (2007). Differences in health and cultural beliefs by stage of mammography screening adoption in African American women. *Cancer*, **109**, 386-95.
- Sait WA, Al-Amoudi SM, Tawtai DA, et al (2010). The knowledge of breast cancer among young Saudi females.

- Seif YN, Aziz M (2000). Effect of breast self examination training program on knowledge, attitude and practices of a group of working women. *J Egyptian Natl Cancer Inst*, **12**, 105-15.
- Seow A, Straughan PT, Ng EH, et al (1997). Factors determining acceptability of mammography in an Asian population: a study among women in Singapore. *Cancer Causes Control*, **8**, 771-9.
- Sim H L, Seah M, Tan SM (2009). Breast cancer knowledge and screening practices: a survey of 1,000 Asian women. *Singapore Med J*, **50**, 132-8.
- Vogel V (2000). Breast cancer prevention. A review of current evidence. *CA Cancer J Clin*, **50**, 156-70.
- World Health Organization (2007). The World Health Organization's Fight Against Cancer: Strategies that Prevent, Cure and Care. NLM Classification QZ 200, WHO: 9-27 Geneva, Switzerland. www.who.int/cancer/en
- Wong-Kim E, Sun A, DeMattos MC (2003). Assessing cancer beliefs in a Chinese immigrant community. *Cancer Control*, **10**, 22-8.
- Yavari P, Pourhoseingholi MA (2007). Socioeconomic factors association with knowledge and practice of breast self-examination among Iranian women. *Asian Pac J Cancer Prev*, **8**, 618-22.