

RESEARCH ARTICLE

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Knowledge, Attitudes and Practices Regarding Breast Cancer amongst Lebanese Females in Beirut

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Abstract

Objectives: Regular screening for breast cancer is associated with better survival, but compliance with guidelines depends on good knowledge and attitudes. This study aimed to assess the level of breast cancer knowledge, attitudes and screening practices in Lebanese females, and identify their socio-demographic determinants as well as barriers to mammography use. **Methods:** This cross-sectional study was conducted with 371 Lebanese females residing in Beirut aged 18-65 with no history of breast cancer. The questionnaire applied was adapted from Stager and Champion. The overall knowledge score was determined with sections on general knowledge, curability, symptoms, and screening; the overall attitude score concerned attitudes towards breast cancer, screening, and barriers; and the overall practices score was for breast self examination (BSE), clinical breast examination (CBE) and mammography. Bivariate and multivariate analyses of socioeconomic determinants were performed for each score. **Results:** The mean knowledge score was 55.5±17.1% and that for attitudes was 71.9±8.3%. For self-examination, mammography and clinical examination practices, individual means were 45.7±42.3%, 77.9±36.5% and 29.1±45.5%, respectively. Knowledge, attitudes and practices correlated positively with each other ($p<0.0001$). The highest average was the knowledge of symptoms (72.8±24.7%), and the lowest that of curability (49.6±25.7%). Most frequent barriers to mammography were fear of learning bad news, pain, costs, and staff unpleasantness. Higher education was associated with better knowledge ($p=0.002$) and smoking with lower levels ($p=0.003$). Older age ($p=0.002$), higher education ($p=0.02$), and taking exercise ($p=0.02$) were associated with better attitudes. Higher education ($p=0.02$) and having children ($p=0.003$) were associated with better practices. **Conclusion:** More emphasis should be placed on educating females on the curability of breast cancer and specific targeting of the barriers identified.

Keywords: Barriers- breast cancer- screening- mammogram- KAP

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Introduction

In 2012, 1.67 million women were newly diagnosed with breast cancer worldwide, making it the most common invasive cancer in females in both developed and developing countries (Sepandi et al., 2014). Known risk factors include advanced age, early menarche (<12 years), late menopause (>54 years), increased age at first pregnancy, and positive family history countries (Sepandi et al., 2014). Interestingly, other risk factors include geographical location (being in a developed country), diet, obesity, having a previous benign disease, and being exposed to ionizing radiation or diethylstilbestrol exposure during pregnancy (McPherson et al., 2000).

Five-year survival rates for women with breast cancer vary widely among localized (98.8%), regional (85.2%) and distant disease (26.3%) (Institute, 2016). These numbers indicate the survival benefits of earlier detection. Screening recommendations generally include

breast self-examination (BSE), mammography and clinical breast examination (CBE). Among these three modalities, only mammography was found to decrease mortality (by up to 20%) (Nelson et al., 2009). After the introduction of awareness campaigns to screening as per guidelines, a 39% reduction in mortality rates was observed in the USA, and was attributed to better compliance with guidelines (Feig, 2002). Many countries later developed breast cancer awareness campaigns (Barlow, 2005).

Lebanon has an estimated national population of 4.6 million people, and a literacy rate of 89.6%, in 2012 (UNICEF, 2013). As in western countries, breast cancer is the most frequent female cancer in Lebanon (Lebanese Ministry of Public Health, 2010). In 2010 (latest data available publically), the incidence of breast cancer was 94.5 per 100,000 females, accounting for around 38.6% percent of all cancers in females (Lebanese Ministry of Public Health, 2010).

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At presentation in Lebanon, stage II disease (59.9%) is the most common, followed by stage III (20%), stage I (14.4%) and stage IV (5.7%) (El Saghier et al., 2006). Alarming, Lebanon has one of the highest rates of breast cancer in younger age groups, with 1.5 cases per 100,000 occurring in the age group 20-24, in 2010 (Lebanese Ministry of Public Health, 2010). Lebanon has the highest reported worldwide age-specific rates for ages 35-49, second only to Israeli Jews in the age group 35-39. Almost half of the incident breast cancer cases occur in patients younger than 50 years (Lakkis et al., 2010). In 2002, the Lebanese Ministry of Public Health (MoPH) initiated breast cancer awareness campaigns leading to a slight improvement in mammography usage. However, rates remained low and deferred by region with higher rates observed in Greater Beirut area. This could be due to fear, lack of knowledge, and logistic difficulty (Adib et al., 2009).

Only one study has previously been conducted in Lebanon to assess the knowledge and attitudes of females towards breast cancer and breast cancer screening. Yet, it was limited to the Lebanese Armenian population (Arevian et al., 2011). Recently, a new nationwide study assessing the attitudes and determinants of mammography has been published (Elias et al., 2016). Nevertheless, no previous study assessed the knowledge about breast cancer, nor the correlation between knowledge, attitudes and practices. The present study aimed to assess the level of knowledge, attitudes and screening practices amongst Lebanese females living in Beirut, investigating their determinants, and discovering potential barriers to obtaining a mammography.

Materials and Methods

Study design and Sampling

A cross-sectional study, using a structured questionnaire, was carried out in February 2014 among Lebanese females residing in Beirut who were aged 18 to 65 years, with no previous or current diagnosis of breast cancer. A convenient sample of 371 participants was obtained from five areas in Beirut to represent different socio-economic standards. Participants were approached randomly on three fronts: the most populated streets, private apartments, and shops.

Data collection

Basic demographic data including age, level of education, socio-economic factors, family history and occupation of participants were collected. General awareness questions about breast cancer and its curability were assessed using Stager's questionnaire (Stager, 1993). Stager's questionnaire consists of 20 questions: 12 about general knowledge and 8 about curability. Two questions were modified from the general knowledge section because they were specific to women in the United States. Another part was added to assess the knowledge about symptoms and recommendations. Items answered correctly were counted as "1"; those that were answered incorrectly or with "I don't know" were counted as "0". Knowledge scores were determined as percent correct answers.

Overall knowledge score percentage was determined, and was divided into individual scores [general knowledge, curability, symptoms, and screening recommendations].

Attitudes and beliefs was assessed using the health belief model crafted by Champion et al., (1997), consisting of perceived susceptibility to breast cancer, perceived severity of breast cancer, perceived benefits of and perceived barriers to screening actions. The scale is in 5-point Likert format (strongly agree to strongly disagree). For calculations, statements that bore a negative attitude, the Likert score was swapped (1,2,3,4,5, to 5,4,3,2,1, respectively), to ensure a higher overall attitudes score consistently meant a more positive attitude towards breast cancer. Overall and individual attitude scores [attitude towards breast cancer, attitude towards screening, attitudes towards barriers] were then determined by adding the point Likert scale of the individual items comprising a score, and determining percentage scores.

Individual scores for BSE, CBE, and mammography practices were determined taking into consideration eligibility for screening. The eligibility criteria and frequency was determined as per the Lebanese guidelines (Adib et al., 2008). All participants older than 20 years were considered eligible for a monthly BSE. Those above 40 years or below 40 and 10 years younger than the age of breast cancer in the first degree relative were eligible for a mammogram yearly. CBE eligibility depended on age (every 3 years beginning the age of 20 years and every year after 40 years). A two-point score was given for each of the three practices (depending on the frequency and eligibility). All those not eligible for a practice were considered to be performing the correct practices (score: 2/2), regardless of their result. For those eligible, females who obtained a BSE/mammogram/CBE before got score 1 of 2; those who performed them with the correct frequency got a 2/2 score. The total practice score was then determined as a sum of the individual practices of BSE, CBE, and mammography.

Ethical considerations

Ethical approval was obtained from the American University of Beirut's Institutional Review Board (IRB). Collaborative Institutional Training Initiative (CITI) certified medical students collected data from consenting volunteers. Data collected included no identifiers, and were kept in safe places.

Statistical analyses

Data were analyzed using the Statistical Package for Social Sciences (SPSS), version 23. Categorical variables were presented as frequencies and percentages, while continuous variables were presented as means and standard deviations.

The data were divided into two groups: those above the median (good level of knowledge/ more positive attitudes/ or correct practices) versus entries scoring lower than the median (poor knowledge/ more negative attitudes/ or incomplete practices). Bivariate analysis was performed using chi-squared test for overall knowledge, overall attitudes, overall practices each above and below the median with the following variables: age, education,

marital status, number children, first degree, smoking, alcohol and exercise.

Multivariate logistic regression was then performed to identify predictors of each of the overall knowledge, overall attitudes and overall practices, while considering the variables found statistically significant on the bivariate analysis as potential predictors.

Pearson correlation test was used to assess the correlation between knowledge, attitudes and practices scores. For all statistical analyses, values with a P-value ≤ 0.05 indicated statistical significance.

Results

The average age of the sample (n=371) was 37.7 ± 13.3 years, 45.8% being between the ages of 40-65 years. Among the participants, 72.8% had a university degree, 49.5% of the participants were married, 9.4% reported a first-degree family history of breast cancer, 68.0% exercised, 43.6% were smokers and 25.3% consumed alcohol. The mean overall score for knowledge of breast cancer was $55.5 \pm 17.1\%$. The highest correct average was scored on the knowledge of symptoms ($72.8 \pm 24.7\%$), and the lowest on the knowledge of curability ($49.6 \pm 25.7\%$). On the general knowledge of breast cancer $49.7 \pm 18.8\%$ answered correctly, while $58.6 \pm 29.57\%$ identified the correct frequency of screening recommendations. The overall mean score for attitude and beliefs was $71.9 \pm 8.3\%$. The mean for the attitudes and beliefs towards breast cancer was $65.5 \pm 16.03\%$; towards the importance of screening for the prognosis was $79.0 \pm 13.5\%$; and towards barriers was $69.9 \pm 12.4\%$. The mean overall score for the practices was $55.3 \pm 27.1\%$. Individual means were $45.7 \pm 42.3\%$, $77.9 \pm 36.5\%$ and $29.1 \pm 45.5\%$ for the BSE, mammography and CBE scores, respectively Table 1.

Table 1. Descriptive Statistics of Study Participants

			n=371
Socio demographic	Age	≥ 40	169 (45.8)
		Mean(\pm SD)	37.7 \pm 13.3
	Education	School	97 (27.2)
		University	259 (72.8)
Marital status	Single	159 (43.2)	
	Married	182 (49.5)	
	Other	27 (7.3)	
	Number of children	Any	181 (48.8)
Lifestyle	Smoking		158 (43.6)
	Alcohol		91 (25.3)
	Exercise		246 (68.0)
Cancer history	First degree FH		35 (9.4)
		Mean (\pm SD)	
Knowledge	General knowledge score percent		49.7 \pm 18.8
	Recommendations knowledge score percent		58.6 \pm 29.6
	Symptoms knowledge score percent		72.8 \pm 24.7
	Curability knowledge score percent		49.6 \pm 25.7
	Overall knowledge score percent		55.5 \pm 17.1
Beliefs and attitudes	Attitude towards screening score percent		79.0 \pm 13.5
	Attitude towards cancer score percent		65.5 \pm 16.0
	Attitude towards barriers score percent		69.9 \pm 12.4
	Overall attitude and beliefs score percent		71.9 \pm 8.3
Practice	Clinical breast exam practice score percent		29.1 \pm 45.5
	Mammography practice score percent		77.9 \pm 36.5
	Breast self-exam practice score percent		45.7 \pm 42.3
	Overall practice score percent		55.3 \pm 27.1

Bivariate analysis revealed university level education was associated with better overall breast cancer knowledge

Table 2. Association Between Socio Demographics, History, Lifestyle Variables and the Overall Knowledge Score Percent and a Multivariate Analysis of Overall Knowledge

			Overall Knowledge		P-value
			≤ 56.67	> 56.67	
			N=204	N=167	
Socio-demographic	Age	≥ 40	90 (44.3)	79 (47.6)	0.53
		Education	School	69 (35.2)	28 (17.5)
		University	127 (64.8)	132 (82.5)	
	Marital status	Single	88 (43.8)	71 (42.5)	0.36
		Married	95 (47.3)	87 (52.1)	
		Other	18 (9.0)	9 (5.4)	
	Number of children	Any	99 (48.5)	82 (49.1)	0.91
Lifestyle	Smoking		103 (52.3)	55 (33.3)	0.0003
	Alcohol		51 (26.0)	40 (24.4)	0.72
	Exercise		124 (62.6)	122 (74.4)	0.02
Cancer history	First degree FH		19 (9.3)	16 (9.6)	0.93
Multivariate analysis, high vs low					
			OR (95%CI)		
	Education		2.2 (1.3–3.6)		0.002
	Smoking		0.5 (0.3–0.8)		0.003

Variables included in the model were: Age (reference : < 40); Education (reference: School education); Marital status (reference: single); number children (reference: any); First degree; Smoking; Alcohol; Exercise

Table 3. Association Between Socio Demographics, History, Lifestyle Variables and the Overall Attitudes Score Percent and a Multivariate Analysis of Overall Attitude

			Overall attitudes		P-value
			≤48.00	>48.00	
			N=190	N=181	
Socio-demographic	Age	≥40	71 (39.2)	98 (52.1)	0.01
	Education	School	57 (32.8)	40 (22.0)	0.02
		University	117 (67.2)	142 (78.0)	
	Marital status	Single	84 (46.7)	98 (52.1)	0.52
		Married	15 (8.3)	12 (6.4)	
		Other	81 (45.0)	78 (41.5)	
	Number of children	Any	88 (48.4)	93 (49.2)	0.87
lifestyle	Smoking		82 (46.6)	76 (40.9)	0.27
	Alcohol		39 (22.2)	52 (28.3)	0.18
	Exercise		110 (61.8)	136 (73.9)	0.01
Cancer history	First degree FH		19 (10.4)	16 (8.5)	0.52
Multivariate analysis, high vs low					
			OR (95%CI)		
	Age		2.0 (1.3–3.0)		0.002
	Education		1.8 (1.1–2.9)		0.02
	Exercise		1.7 (1.1–2.8)		0.02

Variables included in the model were: Age (reference : <40); Education (reference: School education); Marital status (reference: single); number children (reference: any); First degree; Smoking; Alcohol; Exercise

($p=0.0002$), while smoking ($p=0.0003$) and exercise ($p=0.02$) were associated with lower levels of knowledge. Multivariate analysis revealed only higher education (OR=2.2; 95%CI=1.3–3.6; $p=0.002$) to be associated with higher knowledge. Smoking ($p=0.003$) was shown to be associated with lower levels of knowledge (OR= 0.5; 95%CI=0.3-0.8; $p=0.003$) Table 2.

Participants 40 years or older of age (OR=2.0; 95%CI=1.3–3.0; $p=0.002$), with a university level education (OR=1.96; 95%CI= 1.27–3.01; $p=0.02$) and who exercise (OR=1.7; 95%CI=1.1–2.8; $p=0.02$) were associated with better overall attitudes towards breast cancer, screening and barriers on bivariate analysis (lower scores). After multivariate analysis, these

Table 4. Association Between Socio Demographics, History, Lifestyle Variables and the Overall Practices Score Percent and a Multivariate Analysis of Overall Practice

			Overall Practices		P-value
			<60.00	≥60.00	
			N=182	N=189	
Socio-demographic	Age	≥40	76 (42.2)	93(49.2)	0.18
	Education	School	55 (31.8)	42(23.0)	0.06
		University	118 (68.2)	141(77.0)	
	Marital status	Single	82 (45.8)	100(52.9)	0.04
		Married	9 (5.0)	18(9.5)	
		Other	88 (49.2)	71(37.6)	
	Number of children	Any	76 (41.8)	105(55.6)	0.008
Lifestyle	Smoking		71 (39.9)	87(47.3)	0.16
	Alcohol		42 (23.6)	49(26.9)	0.47
	Exercise		116 (64.4)	130(71.4)	0.15
Cancer history	Firstdegree FH		15 (8.2)	20(10.6)	0.44
Multivariate analysis, high vs low					
			OR (95%CI)		
	Education		1.8 (1.1–2.9)		0.02
	Number of children		1.9 (1.2–2.9)		0.003

Variables included in the model were: Age (reference : <40); Education (reference: School education); Marital status (reference: single); number children (reference: any); First degree; Smoking; Alcohol; Exercise

Table 5. Association Between Knowledge, Attitudes and Practices

	Overall knowledge		Overall attitude		Overall practice	
	r-coefficient	P-value	r-coefficient	P-value	r-coefficient	P-value
Overall knowledge	-		0.32	<0.0001	0.30	<0.0001
Overall attitude	0.32	<0.0001	-		0.27	<0.0001
Overall practice	0.30	<0.0001	0.27	<0.0001	-	

Table 6. Frequencies of Reported Barriers to Obtaining a Mammogram

Barriers to Obtaining a Mammogram	n (%)
Afraid to find out something wrong	303 (81.7)
Painful	218 (58.8)
Too costly	198 (53.4)
People doing the mammogram are not nice to women	190 (51.2)
Exposure to unnecessary radiation	181 (48.8)
Too time consuming	162 (43.7)
Cannot remember to schedule mammogram	150 (40.4)
Have more important problems	146 (39.4)
Don't know how to schedule a mammogram	143 (38.5)
Embarrassing	139 (37.5)
Lack of childcare while away	90 (24.3)
Lack of transportation	82 (22.1)

three variables remained unchanged; age ($p=0.002$), education ($p=0.02$), and exercise ($p=0.02$) Table 3.

For the practices, bivariate analysis revealed being single/married had better practices compared to others ($p=0.04$), and those with at least one child ($p=0.008$) had better overall practices. After multivariate analysis, higher education ($p=0.02$) and having at least one child ($p=0.003$) were associated with better practices Table 4. Furthermore, 69.4% of women aged above 40 reported having done at least one mammogram previously, with 59.1% reporting having regular yearly or biennial mammograms (data not shown).

Results indicated that better knowledge was correlated significantly with better practices ($r=0.30$; $p<0.0001$). Better practices also correlated with more positive attitudes ($r=0.27$; $p<0.0001$). Overall knowledge was similarly found to be correlated to positive attitudes ($r=0.32$; $p<0.0001$) Table 5.

The majority of participants (81.7%) were fearful of learning something wrong on obtaining a mammogram. By comparison, lack of transportation was the least frequently identified barrier to obtaining a mammogram (22.1%). Other variables included pain (58.8%), cost (53.4%), unpleasant staff (51.2%), exposure to unnecessary radiation (48.8%), time-consumption (43.7%), forgetting to schedule (40.4%), having more important issues (39.4%), lack of knowledge of how to obtain a mammogram (38.5%), embarrassment (37.5%), and lack of childcare while away (22.1%) Table 6.

Discussion

The present cross sectional study was carried out on Lebanese females aged 18-65 years residing in Beirut,

with no previous diagnosis of breast cancer, to assess the level of knowledge, attitudes and practices regarding the disease and their determinants and barriers to screening. Of the 371 Lebanese females interviewed, almost three quarters had positive beliefs and attitudes towards breast cancer, and almost half had good overall knowledge of the disease. Knowledge about symptoms was highest, in contrast to that of curability of the disease. Nevertheless, results of practices were found to be less homogenous, with most females having proper mammography practices, as per age guidelines, but less than a quarter conducting clinical breast examination as per guidelines. The most frequently identified barrier to mammography was fear of bad news.

Previous studies suggested that better knowledge of breast cancer, and better attitudes towards the disease are correlated with better screening (Adebamowo and Ajayi, 1999). Frequent screening was associated with better survival and earlier detection. The present study revealed that knowledge, attitudes and practices positively correlated with each other. Nevertheless, their correlation, although significant, was only weak, as indicated by their correlation coefficients.

Results from the current study suggest better mammography practices than either BSE or CBE. Despite being the cheapest non-invasive method, screening through BSE was not found to decrease mortality from breast cancer in randomized controlled trials, yet lead to increased rate of biopsies of benign lesions (Institute, 2016). A systematic review conducted by the U.S. Preventive Services Task Force (USPSTF) of randomized control trials to determine the efficacy and harms of screening modalities found mammography to decrease mortality by around 15% for the age group 39-59 and 32% in women aged 60-69% (Nelson et al., 2009). Results showed that despite detecting higher numbers of breast cancers using BSE, there was no change in mortality. As for CBE, there was insufficient data to support it. Thus the current USPSTF guidelines recommend against BSE screening, and have insufficient evidence for CBE screening.

Recently, some guideline-issuing bodies changed the recommendations from annual mammography after the age of 40 years to less frequent imaging starting at older ages. The Lebanese Guidelines still recommend annual screening beginning at age 40 for women without first degree family history. This is greatly due to the different Lebanese demographic, where the median age of diagnosis in 2004 was 52.5 (Lakkis et al., 2010), with 47% cases diagnosed below the age of 40 years in 2010 (Lebanese Ministry of Public Health, 2010). So, if screening were changed to begin at the age of 50, half the cases of breast cancer would be missed. This study revealed a percentage

of women above 40 performing regular annual/biannual mammograms in Beirut (59.1%) compared to results in Qatar (26.9%) 28, Jordan (8.6%) Malaysia (8%) (Al-Naggar and Bobryshev, 2012) and China (24%) (Gang et al., 2013). Interestingly, the present data is significantly higher than that reported in previous nationwide studies in Lebanon. A nationwide study published in 2009, revealed that the utilization of mammography increased yearly between 2002-2006, following the introduction of screening campaign by the government. During 2006, 25.5% of women in the greater Beirut area were reported to have received a mammogram (Adib et al., 2009). A follow up nation-wide study revealed that in 2013, 44% of women above 40 had performed at least one mammogram previously. Furthermore, they noted that the rate of increase in utilization had accelerated in between 2009-2013 (Haddad et al., 2015). The higher percentage found in the present study may be in part due to the higher proportion of educated females included in the sample.

After controlling for other variables, those who had a higher degree of education or were non-smokers appeared to have knowledge about breast cancer. Previous studies in the UK (Linsell et al., 2008), Nepal (Sathian et al., 2014), Kuwait (Saeed et al., 2013), and the Lebanese Armenian population (Arevian et al., 2011), similarly showed better knowledge about breast cancer with higher education. Although some studies previously showed a positive (Dandash and Al-Mohaimed, 2007) or negative (Suarez et al., 1996; Dolan et al., 1997; Chamot and Perneger, 2002) relationship between knowledge of the disease and age, no such association was made in the current study. Although no studies relating smoking status to knowledge of breast cancer were found, we propose that smokers may be less concerned with their health, and so more educated about breast cancer among other diseases.

Participants that exercise, had higher education, and those who are of an older age were found to have more positive attitudes towards breast cancer. A study in U.S. college students, similarly found that females aged above 40 years had significantly more positive attitudes towards breast cancer and mammography than their younger counterparts (Early et al., 2011).

Present study on Lebanese women found that educated women had 78% better practices than those with school level education ($p=0.002$). This is in concordance with previously published data in Lebanon that found education to be a significant determinant of ever-repeating a mammography, although only husband's encouragement was found to be associated with regular repetition on multivariate analysis (Elias et al., 2016). In Jordan, women holding at least a Bachelor's degree were found to undergo regular mammography screening than those without a degree. Interestingly, this trend similarly correlated to the husband's level of education (Abu-Helalah et al., 2014). Remarkably, after controlling for age and other demographic factors, our study revealed that females with kids had better practices than those without. This may be due to more frequent visits to gynecologists who would encourage screening. In fact, physician recommendations were shown to be significant influencers in mammography utilization

in a meta-analysis (Schueler et al., 2008), more so than socioeconomic factors. Likewise, physician advice was found to be important to breast cancer screening in Jordan (Abu-Helalah et al., 2014) and Qatar (Donnelly et al., 2014). Furthermore, in Saudi Arabia, married women were found to have better knowledge on breast cancer warning signs, which may be attributed to the same reason (Radi, 2013).

Present study revealed that 54.3% of participants found mammography to be costly, which may serve as a barrier. In a non-governmental organization (NGO) initiative in Lebanon, free mammography screening was provided to eligible women. A follow-up study revealed that only 44% of participants women had repeat mammography, a number significantly lower than that in western countries (Sidaoui et al., 2016). Nevertheless, another study found low-perceived cost to be associated with recent repetition of screening in Lebanese females (Elias et al., 2016).

Participants were most knowledgeable about the symptoms of breast cancer, yet less so about its curability or risk factors. These results may be due to campaigns focusing more on detecting cancers through its symptoms rather than focusing on its curability. However, the fear of having an abnormality was cited as the number one barrier towards obtaining a mammogram in our study (88.1%) and in others (Tejeda et al., 2009; Feldstein et al., 2011). Thus, better knowledge of curability may result in better attitudes and therefore better practices. As such, we recommend future campaigns focus more on the curability and risk factors for breast cancer.

This was the first study assessing the correlation between knowledge, attitudes and practices in the Lebanese population residing in Beirut. Previous studies on the frequency of mammography screening on the national scale indicated that levels in Beirut were higher than those in rural areas, which the authors attributed to a difference in availability of screening tests, and more concentrated awareness campaigns, among other factors (Adib et al., 2009; Haddad et al., 2015). Differences between urban and rural utilization of breast cancer screening tools have been observed in multiple studies (Spaczyński et al., 2009; Im Kim et al., 2011; Abu-Helalah et al., 2014). These differences were attributed to decreased accessibility and differences in perceptions (Im Kim et al., 2011). As such, present results, which focused on Beirut, will not adequately reflect those at the national scale. Furthermore, choosing a convenient sample for conducting the study, as reflected by a high proportion of university graduates (72.8% had university degrees), may pose another limitation to the generalizability of these results.

In conclusion, the level of knowledge, attitudes and practices were positively correlated with each other. Knowledge about symptoms was adequate, yet that about curability was lower, indicating a need to target this aspect in future campaigns. Significant barriers identified include fear of discovering bad news, unpleasantness of staff, and costs of screening. Results from this study, highlighting the gaps in knowledge (mainly about curability), the most significant barriers to obtaining a mammogram, could prove to be useful to campaign developers. Furthermore,

by targeting populations with the identified worse predictors of knowledge, attitudes and practices, such as lower education, the impact of awareness campaigns can be increased.

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