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Breast cancer knowledge and awareness among adolescent girls in secondary schools in Kota Bharu, Malaysia

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ABSTRACT

Background: Breast cancer is the most common cause of cancer death among women of all ethnicities in Malaysia. The adolescent period is a time when educational opportunities are provided to shape healthy behavior in a woman's life. Exposing teens to breast cancer and its screening test will create breast awareness and encourage positive behavior towards preventions later in adulthood. *Aim:* This study aimed to determine the level of knowledge and awareness of breast cancer and associated factors among secondary school adolescent girls. *Subjects and Methods:* A cross-sectional study was conducted among 16-year girls in five secondary schools in Kota Bharu. A structured, validated, and self-administered questionnaire was distributed to 359 female students who were selected using multi-stage cluster sampling. The content of the questionnaires included risk factors, symptoms, and screening tests for breast cancer. Data were analyzed by using multiple logistic regressions. *Results:* Most respondents have heard of breast cancer. The percentages of respondents who scored ≥60% in knowledge of risk factors, symptoms, and cancer screening were 32.9%, 52.6% and 69.6%, respectively. Maternal education was significantly associated with knowledge of risk factors, symptoms, and screening of breast cancer. The school was significantly associated with risk factors and family history of breast cancer was significantly associated with symptoms. *Conclusions:* This study found that there are areas for improvement in knowledge and awareness of breast cancer and mothers' education was the significantly associated factor for all types of knowledge. Breast cancer awareness campaigns and education are highly recommended at school.

Keywords: Knowledge, awareness, breast cancer, adolescents, school children

1. INTRODUCTION

Breast cancer contributed to 19% of all cancers in Malaysia for the year 2012-2016, compared to 17.7% for the year 2007-2011 (Azizah et al., 2019). The age-standardised rate of breast cancer has increased from 31.1 to 34.1 per 100,000 population (Azizah et al., 2019). It is the leading cancer in women regardless

of ethnic group and from the age of 25 years (Azizah et al., 2019). About one in 20 Malaysian women may have breast cancer in their lifetime (Yip et al., 2008). The ethnic groups' distribution of breast cancer among in Malaysia was consistent with the socio-economic status being highest among Chinese, followed by Indian and Malay (Yip et al., 2008, Azizah et al., 2019). Most breast cancer cases were above 50 years, with 61.2% (Azizah et al., 2019). Meanwhile, according to the 2020 census, there were 1.3 million adolescent girls between the ages of 15 - 19 years, who made up about 10% of the female population (Department of Statistics Malaysia, 2022). Although teenage breast cancer is rare, several cases have been reported in Malaysia (Azizah et al., 2019).

Breast cancer survival in Malaysia was poor due to partly late presentation (National Cancer Registry, 2018), which was related to the lack of knowledge and awareness of the signs and symptoms of breast cancer (Norsa'adah et al., 2011). Adequate knowledge and correct information regarding breast cancer could encourage women to adopt behaviors that would minimize the threat of breast cancer (Alghamd & Hobani, 2022; Tsegaye et al., 2021). The current lifestyles of adolescents play an essential role in the patterns of health and disease that will be observed in the future. This is a crucial strategy for influencing their decisions about future participation in cancer prevention programs. The adolescent years are the key point for developing personal skills in adulthood. The most important elements for improving personal skills are to enlighten adolescent's about their health. Health education initiation regarding breast cancer awareness among school children has been recognized for more than a decade in developed countries (Rogers et al., 2002). Education about breast cancer and its screening test in adolescence can encourage positive behavior towards breast examination, create breast awareness, and lead to regular professional breast examination and screenings later in adult life.

A study in the United States revealed that 280 adolescent girls aged 13 to 17 years lacked knowledge about breast cancer (Freeman et al., 2000). A 50-minute breast education intervention on adolescent girls aged 11 to 14 years significantly improved knowledge, including on breast cancer symptoms, attitudes toward breasts, and engagement with positive breast habits compared to the control group (Omrani et al., 2020). However, the breast health education module targeting school-going adolescents is scarce in the Malaysian context (Che et al., 2014). Thus, our study aimed to determine the level of knowledge and awareness related to breast cancer and associated factors among secondary school adolescent girls in Kota Bharu, Kelantan.

2. MATERIALS AND METHODS

Study Design

We conducted a cross sectional study.

Study Population & Sampling method

The target population was female adolescents in Kota Bharu district. Our samples were female students at secondary schools in Kota Bharu, Kelantan, Malaysia. Five schools were randomly selected from 39 secondary schools in Kota Bharu district. The criteria for schools were public schools, and boarding schools, religious schools were excluded. Meanwhile, the eligibility criteria for respondents were the fourth formers who were present when we visited the schools. Students with learning disabilities and special needs were excluded from our study. Among all fourth-former girls, respondents were selected using simple random sampling.

Questionnaires & Data Collection

Structured and self-administered questionnaires in the Malay language were developed based on the literature review (Norsa'adah et al., 2011, Sambanje et al., 2012), previous research, and expert opinions. The questionnaire was pre-tested and validated. The questionnaire was reviewed, and necessary modifications were made before the start of the study. The questionnaire was constructed in four sections:

Section A consists of general demographic information.

Section B consists of 24 statements onbreast cancer risk factors. Factor analysis grouped them into five domains with loading factors ranging from 0.341 to 0.687. The total variance explained was 55.3%, with ap value of Kaiser-Meyer-Olkin (KMO) <0.001.

Section C consists of 19 statements onbreast cancer symptoms. We decided to keep it all in one component with loading factors ranging from 0.417 to 0.823. The total variance explained was 48.94%, with a p value of Kaiser-Meyer-Olkin (KMO) <0.001.

Section D consists of four questions onknowledge and awareness about BSE, CBE, and mammogram. There were 29 additional statements on knowledge and opinions about BSE, CBE, and mammogram practices. There were three domains with loading factors ranging from 0.471 to 0.730. The total variance explained was 51.01%, with a p value of Kaiser-Meyer-Olkin (KMO) <0.001.

Section B to D used the Likert scale 1 to 10, which measured strongly disagree to strongly agree responses. The questionnaire was pre-tested and validated with the necessary modifications made before the start of the study. The scores for each section were

totaled and transformed into a percentage. Later, the percentage of total scores were categorized by equal and above 60% as the cut off point for 'good knowledge' and below as 'poor knowledge'. Cronbach's alpha reveals that the internal consistency validity for risk factors, symptoms, and screening were0.816, 0.935 and 0.935, respectively. Once the questionnaires were pre-tested and validated, they were distributed to adolescents in the selected schools. The study was conducted between June 2020 and May 2021.

Sample Size

We calculated the required sample size using a two proportions formula for the associated knowledge factors (Lwanga and Lemeshow, 1991). We estimated that 70% of the higher education and 60% of the low education groups would have good knowledge, considering a confidence level of 95% and a margin of error of 5%. Given a 10% of non-response or drop-out rate, the estimated required sample size was 396.

$$n = \frac{p_1(1-p_1) + p_2(1-p_2)}{(p_1 - p_2)^2}\left(Z_\alpha + Z_\beta\right)^2$$

$p_1 = estimated\ proportion\ of\ good\ knowledge\ in\ high\ education\ group$
$p_2 = estimated\ proportion\ of\ good\ knowledge\ in\ low\ education\ group$
$Z_\alpha = 1.96$
$Z_\beta = 0.84$

This study received permission to conduct research from the Malaysia Ministry of Education and Kelantan Department of Education. It has also received ethics approval from the Research Ethics Committee, Universiti Sains Malaysia. Written informed consents were obtained from each parent or guardian and study participants. All data has been kept confidential for only research purposes and should not be disclosed to third parties.

Statistical Analysis

Analysis of data was performed by using SPSS version 26. A descriptive analysis was prepared to describe the characteristics of the respondents and the knowledge questions. Frequency and percentage were used to describe qualitative variables, while quantitative variables were described by mean and standard deviation. The associated factors of knowledge were analyzed by Logistic regression. The good knowledge outcome was coded one, and poor knowledge was coded zero. The result was presented as an adjusted odds ratio (AOR), 95% confidence interval (CI), and a p-value the significant level was set at 0.05. Factor with an AOR greater than one was considered to have a higher probability of having good knowledge than the reference group.

3. RESULTS

The response rate was 100%. A total of 359 girls were involved with the characteristics of the respondents shown in Table 1. Most parents were moderately educated. The majority (94.7%) of respondents have heard of breast cancer. Only 12.3% had a family member with history of breast cancer. Most of them have subscribed to internet access (88.3%).

Table 1 Socio-demographic factors of female adolescents in secondary schools in Kota Bharu (n=359)

Variables	Frequency (%)
Schools	
School A	86 (24.0)
School B	44 (12.3)
School C	56 (15.6)
School D	103 (28.7)
School E	70 (19.5)
Father's education Background	
Lower than high school	89 (24.8)
High school	168 (46.8)
Above high school	102 (28.4)
Mother's Education Background	
Lower than high school	78 (21.7)

High school	178 (49.6)
Above high school	103 (28.7)
Ever heard about breast cancer	340 (94.7)
Have family member with breast cancer	44 (12.3)
Have internet access (at home or mobile phone)	317 (88.3)

Table 2 shows the mean knowledge scores for breast cancer risk factors. The possible score range is between one and ten. Although a tight bra is not a risk factor for breast cancer, it had a mean score of 6.76. Most respondents answered correctly that a cellular phone is not a risk factor for breast cancer. Early menarche as a risk factor scored lowest with 3.99, and oral contraceptive pill, obesity, early menarche, late menopause, nulliparity, late childbearing, and meat consumption had mean scores of less than five.

Table 2 Means score for knowledge of risk factors of breast cancer among female adolescents in secondary schools in Kota Bharu (n=359)

Risk factors of breast cancer	Mean (SD)
Big breasts	4.27 (2.34)
Tight bra	6.76 (2.44)
Older age	5.48 (2.70)
Family history of breast cancer	6.54 (3.28)
Long-term oral contraceptive pills	4.98 (2.71)
Hormone replacement therapy	5.42 (2.61)
Obesity	4.61 (2.68)
Menses before the age of 11	3.99 (2.44)
Menopause after the age of 55	4.88 (2.51)
Had no children	4.80 (2.72)
Had first child after the age of 30	4.90 (2.45)
Did not breastfeed own babies	5.97 (2.76)
Smoking	6.28 (3.11)
Second-hand smokers (passive smokers)	5.89 (2.81)
Wear frequent deodorant	4.86 (2.71)
Talk frequently on cell phone	3.64 (2.53)
Frequent exposure to radiation such as x-rays	4.75 (2.70)
Exposure to environmental pollutants such as pesticides	5.15 (2.69)
Lack of regular exercise	6.23 (2.59)
Eat meat frequently such as beef and lamb	4.83 (5.62)
Frequent eat foods containing saturated fats such as chicken wings, margarine, fast food, and others	5.81 (2.53)
Frequent consumption of internal organs of animals such as the liver, stomach, and others	5.13 (2.50)
Eat less or no vegetables and fruits	6.56 (2.71)
Frequently eat foods containing soy beans such as soy milk, soy extract, tempe, and others	5.66 (2.67)

Rating 1-strongly disagree to 10-strongly agree

Table 3 shows the mean scores for breast cancer symptoms. The mean knowledge score on breast cancer symptoms ranged from 4.58 to 7.63. Higher scores indicated correct agreement with the risk factors. Breast lump, breast pain, and abnormal enlargement of the breast scored had the highest scores, while lumps at the armpit and collarbone, skin changes, and systemic symptoms had the lowest scores. Regarding the awareness of screening methods, less than half of adolescents have ever heard of BSE (44.0%) and CBE (49.3%) and even less of mammograms (11.1%).

Table 3 Means score for knowledge of symptoms of breast cancer among female adolescents in secondary schools in Kota Bharu (n=359)

Symptoms of breast cancer	Mean (SD)
Breast lump	7.32 (2.55)
Breast pain	7.62 (2.42)
Lump at the armpit	5.18 (2.88)
Lump at the collarbone	4.58 (2.40)
Nipple discharge	6.44 (2.64)
Nipple itchiness	6.18 (2.55)
Pull in nipples	5.76 (2.71)
Nipples that cannot be pulled out	5.74 (2.63)
Change in breast shape	6.56 (2.72)
Breast swelling	7.63 (2.59)
Abnormal enlargement of breast	7.24 (2.56)
Dimpling of breast skin	5.94 (2.48)
Discoloration of the breast skin such as redness	6.37 (2.66)
Wrinkled or scaly breast skin	5.79 (2.57)
Puckering skin or like orange peel	5.76 (2.72)
Frequent fatigue	5.96 (2.65)
Frequent pain in bones or joints	5.32 (2.69)
Lack of appetite	5.46 (2.67)
Lost of body weight	5.62 (2.83)

Rating 1-strongly disagree to 10-strongly agree

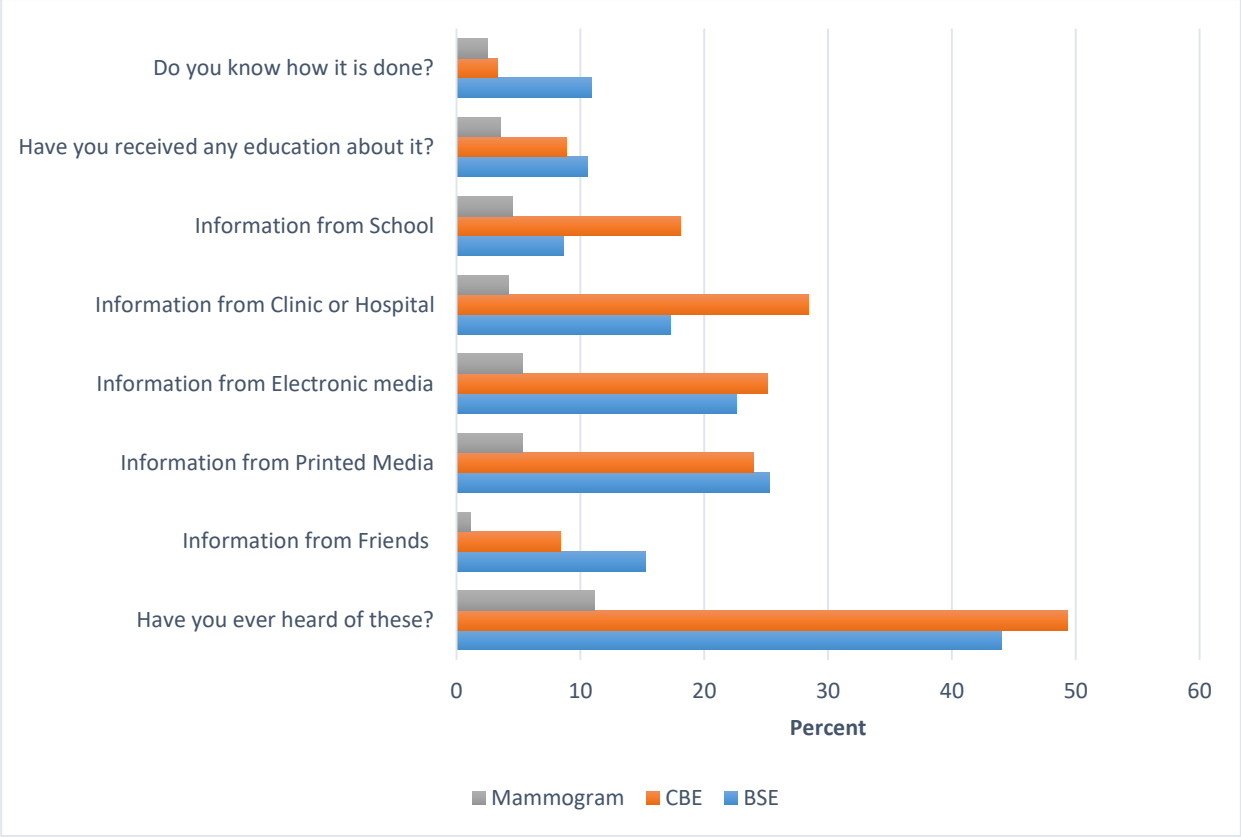

Figure 1 Main sources of information

Less than half of the respondents ever heard BSE and CBE, but only 1.1% ever heard mammograms. The main sources of information were printed media for BSE, clinics/hospitals and electronic media for CBE, printed and electronic media for the mammogram as shown in figure 1. There were very few respondents who had education about the screening tests and knew procedures. Table 4 shows the mean scores for breast cancer screening test knowledge. The mean scores were lower for the technical methods of BSE.

Table 4 Mean scores of screening test knowledge of breast cancer among female adolescents in secondary schools in Kota Bharu (n=359)

Knowledge tegarding breast cancer screening	Mean (SD)
BSE is a breast examination by yourself	7.07 (2.56)
BSE detects any breast abnormality	6.76 (2.43)
BSE detects signs of breast cancer	7.01 (2.40)
BSE is useful in detecting early breast cancer	7.22 (2.42)
BSE allows you familiarise your own breasts	6.94 (2.52)
BSE helps women detect changes in their own breast	7.14 (2.37)
The appropriate time to do BSE is a week after menses	5.69 (2.17)
BSE is recommended for women once a month	5.94 (2.28)
BSE is suggested to perform on the same date each month for post-menopausal women	5.57 (2.15)
BSE is done by looking for breast changes in a mirror	6.14 (2.65)
BSE includes squeezing of the nipples	5.56 (2.48)
Women at the age of 20 years and older should practice BSE	6.76 (2.44)
Women should practice BSE even if they are not at risk of breast cancer	7.45 (2.36)
Women need to spend time with BSE	7.18 (2.29)
BSE takes a short time to perform	6.29 (2.34)
Most women do not have time to do BSE	5.96 (2.86)
Most women find that BSE is not a requirement	5.82 (2.83)
Many women do not know how to perform BSE	7.01 (2.74)
CBE is a breast examination by a doctor or nurse	7.69 (2.37)
CBE is recommended for women once a year	6.44 (2.44)
Many women do not allow doctors to examine their breasts	6.79 (2.71)
Embarassment is a reason women are reluctant to have a breast examination	7.87 (2.47)
Mammogram is an x-ray scanning method to uncover early stage breast cancer	6.94 (2.56)
Annual mammogram is recommended for women aged over 50 years	6.16 (2.28)
Many women did not have a mammogram because they were afraid of the effects of radioactivity	6.69 (2.44)
Mammogram is painful	5.28 (2.29)
Mammogram is expensive	5.99 (2.54)
Mammogram takes time to schedule the appointment	6.14 (2.40)

Rating 1-strongly disagree to 10-strongly agree

The means (standard deviations) of total scores for risk factors, symptoms, and screening were 55.13 (10.20), 59.06 (15.75), and 64.97 (12.03), respectively. We categorized the total scores in each category into good and poor knowledge using a 60% cut-off point. The percentages of respondents who scored ≥60% for knowledge about risk factors, symptoms, and cancer screening were 32.9%, 52.6%, and 69.6%, respectively. Table 5 shows the factors associated with knowledge and awareness of breast cancer among adolescent girls. School and mother's education levelwere significantly associated with the knowledge about breast cancer's risk factors. A mother's education and family member with breast cancer were significantly associated with knowledge of breast cancer symptoms. Only a mother's education was significantly related with knowledge of breast cancer screening.

Table 5 Factors associated with total score of breast cancer knowledge among female adolescents in secondary schools in Kota Bharu (n=359)

Knowledge on	Risk Factor		Symptoms		Screening	
	AOR (95% CI)	P value	AOR (95% CI)	P value	AOR (95% CI)	P value
School						
School E	1					
School A	1.01 (0.51,2.00)	0.968				
School B	0.73 (0.31,1.69)	0.457				
School C	1.04 (0.49,2.22)	0.912				
School D	0.45 (0.23,0.90)	0.025				
Mother's education						
Less than high school	1					
High school	2.33 (1.19,4.57)	0.014	2.42 (1.39,4.22)	0.002	2.60 (1.47,4.59)	0.001
More than high school	3.22 (1.54,6.72)	0.002	2.81 (1.52,5.19)	0.001	2.83 (1.49,5.37)	0.002
Ever heard breast cancer					0.30 (0.08,1.08)	0.066
Family member with breast cancer			2.06 (1.04,4.09)	0.038		

AOR = Adjusted Odd Ratio; CI = Confidence Interval

4. DISCUSSION

Our study found that most 16-year-old female students (94.7%) in secondary schools in Kota Bharu had heard of breast cancer. This result was supported by a study among secondary school girls in Nigeria, which found that most (97%) had heard about breast cancer as a disease entity (Irurhe et al., 2012). However, 65% of university students in Angola didn't know breast cancer was one of the most common cancers (Sambanje et al., 2012). There was a misconception about the factors that increase risk for breast cancer among adolescents in our study. This was shown when "tight bra" had a relatively high mean score for breast cancer risk factor.

Our study also showed that oral contraceptive pill, obesity, early menarche, late menopause, nulliparity, late childbearing, and meat consumption had lower scores, and the early menarche scored the lowest among all risk factors. Most adolescents were unaware of the reproductive risk factors for breast cancer. The percentage of respondents scoring greater than 60% for knowledge about risk factors was only 32.9%. These findings were supported by a study of Malaysians aged 15-19 that reported poor knowledge of risk factors (Che et al., 2014). Approximately 67.5% and 74.7% of adolescent girls in Colombo District schools identified family history of breast cancer and irradiation exposure as factors that increase the risk for breast cancer, respectively (Ranasinghe et al., 2013). Similarly, most of the adolescents answered incorrectly for reproductive risk factors.

A study carried out in Nigeria where predisposing factors to breast cancer were identified by only 36.7% of respondents (Irurhe et al., 2012). Most respondents did not aware that early onset of menstruation and late menopause are the risk factors for breast cancer (Hadi et al., 2010). In another study, 60% of respondents were aware that late having a child and non-breast feeding could enhance the risk of developing breast cancer (Sambanje et al., 2012). Symptoms recognition is vital for women to seek health care. Knowledge of breast cancer symptoms plays an important role in ensuring that women can present themselves early at health care facilities for their diagnosis and treatment. In our study, breast lumps, breast pain, and abnormal enlargement of breast received the highest scores, while lumps at the armpit or collarbone, skin changes, and systemic symptoms had the lowest scores. This indicated that adolescents were aware of usual symptoms of breast cancer but were unaware of uncommon symptoms such as lumps at the armpit or collar bone, skin changes, and non-specific symptoms. Similarly, most adolescent girls in Colombo schools were aware of the significance of breast lumps as a sign of breast cancer, but knowledge of other signs was poor (Ranasinghe et al., 2013).

Yadav & Jaroli (2010) found that more than half of 392 college-going young women in Jaipur were aware that breast cancer symptoms included breast lumps, breast changes in sizes and shapes, nipple rashes, and pain in breast or under armpits. However, they were less knowledgeable about other breast cancer symptoms, such as redness of the skin, lump in the armpit, and changes of the nipples. Irurhe et al., (2012) reported only 37.5% of school children in Nigeria had good scores in the knowledge about breast cancer symptoms. In another cross-sectional study conducted in Malaysia, most female university students were aware that breast cancer could present as a lump in the armpit and pain in the breast (Hadi et al., 2010). Montazeri et al., (2008) reported that 44% of

respondents knew the painless breast lump as one of the symptoms, but 46% of them answered that they were unsure about it. Only 5% of them were aware of nipple retraction, and 6% noticed bloody nipples discharge. Another study reported a misunderstanding among 80% of respondents that the lump in the breast must be painful, then it can be considered a breast cancer symptom (Sambanje et al., 2012).

Less than half of the adolescents in our study have heard of BSE and CBE, and even fewer of a mammogram. Adolescents are generally unaware of screening tests for breast cancer. Most of them didn't know how to do BSE. The mean scores are low for the technical methods of BSE. These findings were supported by a previous study that reported poor knowledge of BSE among 15-19 years school and university adolescents (Che et al., 2013). Most developing countries promote BSE because it is a cost-effective screening method available, even though a meta-analysis found that trials of BSE did not affect breast cancer's mortality (Hackshaw and Paul, 2003). BSE is one of the screening tests for the early discovery of breast cancer (Miller & Baines, 2011). The chances of BSE picking up a lump are higher when it is performed correctly. BSE is associated with more women seeking medical consultation and undergoing breast biopsy (Hackshaw and Paul, 2003). Malaysian Clinical Practices Guidelines encourage women to practice BSE as it familiarizes them with the typical structure of their breasts and helps to recognize any abnormalities that may occur (Ministry of Health Malaysia, 2002). In Malaysia, it is suggested that BSE should be practiced once a month and all women over the age of 20 should be educated in BSE practice (Ministry of Health Malaysia, 2002).

Although, the Ministry of Health Malaysia has announced BSE as a method for detecting symptoms of breast cancer, many adolescents were unaware of BSE. Our study showed that only a few adolescents knew how to perform BSE (10.9%), CBE (3.3%), and mammogram (2.5%). In Montazeri et al., (2008), only 31% of respondents knew about BSE, 21% knew about CBE, and only 9% knew about mammography. The study also showed that 37% of respondents had practiced BSE, and 64% respondents didn't know how to do it. A quarter of 392 young women in Jaipur, India were unaware of the diagnostic modalities of breast cancer screening, and 28% were unaware of BSE (Yadav & Jaroli, 2010). Another study reported that 80.9% had heard about BSE but only 53.9% had practiced it (Wong-Kim & Wang, 2006).

A study by Ranasinghe et al., (2013) found a low level of knowledge about breast cancer screening as only 9.4% of their respondents knew about breast cancer diagnostic tests. The study also reported that 17.1% of adolescents knew how to perform BSE, and only 6.17% had performed it once (Ranasinghe et al., 2013). The lack of knowledge among young Malaysian women, on how to perform BSE was due to insufficient education on breast cancer awareness. The main reasons young women didn't practice BSE were that they had no knowledge of how to perform BSE and didn't think they were at risk of getting breast cancer (Al-Naggar et al., 2011). BSE is troublesome and time-consuming (Al-Naggar et al., 2011).

Mass-media, whether print or electronic, plays an important role in introducing facts about breast cancer. Our study found that mass media is the most common source of information about breast cancer screening. The responsibility of mass media needs to be further emphasized as it has been shown to play a vital role in disseminating breast health education. Internet use among adolescents is relatively high, with 14.2% of internet users belonging to this age group (Malaysian Communications and Multimedia Commission, 2012). Therefore, it is highly recommended spreading breast health information via internet social networks.

Maternal education was significantly associated with all types of breast cancer knowledge in adolescents. While school was significantly associated with knowledge about risk factors of breast cancer, and family history of breast cancer was significantly associated with knowledge about symptoms of breast cancer. The result of this study was consistent with the finding obtained in another study in Riyadh, that there was a significant association between demographic characteristics and breast cancer knowledge (McMenamin et al., 2005). There were significant relationships between age, marital status, and level of education and the breast cancer knowledge and its screening methods (Montazeri et al., 2008). Respondents with a family history had higher knowledge of BSE than those without a family history (Ranasinghe et al., 2013).

This study was conducted in randomly selected schools that increased the generalizability of the findings to adolescents in Kota Bharu district. The samples were adequate in numbers. However, there are limitations to our study. This is a quantitative study that requires an in-depth exploration of some opinions of adolescents on breast issues for a better understanding. This is an eye-opening research finding that provides a steppingstone to deeper discovery for future research.

5. CONCLUSION

The level of breast cancer knowledge among adolescent girls is upsettingly low level. They are in a dangerous position as they have very minimal knowledge about all aspects related to breast cancer. They are unaware of the importance of risk factors, symptoms, and screening tests that can put them at high risk for breast cancer and delay diagnosis later in their life as a woman. Learning about breast cancer is crucial in the early stage of a women's development, especially during adolescence. Increased effort must be

made to ensure that the level of knowledge about breast cancer can be improved. BSE should be practice to detect symptoms of breast cancer earlier.

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Author Contributions

Conceptualization and designing the study: BN.
Data collection and analysis: CJS-F-A, WHW-N-S
Writing original draft: BN, CJS-F-A, WHW-N-S
Reviewing & editing the final paper: BN, CJS-F-A, WHW-N-S

Ethical approval

Ethical approval was received from the Human Research Ethics Committee of the Universiti Sains Malaysia with the reference number USMKK/PKK/JK EP (M)-191.

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Conflicts of interest

The authors declare that there are no conflicts of interests.

Data and materials availability

All data associated with this study are present in the paper.

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