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Breast Cancer Awareness among Female Students in City University Malaysia

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Abstract

Introduction: *In Malaysia, one of the most frequent cancer sites in females is breast. In 2020, there were 2.3 million women diagnosed with breast cancer and 685,000 deaths worldwide. Increasing awareness among women is important for early detection of breast cancer, thereby increasing their rates of surviving from breast cancer. This study aimed to evaluate the level of breast cancer awareness among the female students in City University Malaysia.*

Methodology: *This was a cross-sectional study conducted from 1st July 2022 to 2nd August 2022. Data were collected through the validated "Breast Cancer Awareness Measure" developed by Cancer Research UK, King's College London, and University College London in 2009. Data were analyzed using IBM Statistical Package for Social Sciences (SPSS) software version 27. Kruskal-Wallis tests and Mann-Whitney U tests were conducted. The awareness level was categorized based on the participant's total scores for breast cancer warning signs and risk factors into: very poor (≤6), poor (7-10), moderate (11-15), good (16-19), and very good (>19).*

Results and discussion: *A total of 325 female university students participated in this study. The level of breast cancer awareness was moderate with average scores of 13.52 ± 5.29. The most recognizable breast cancer warning sign was 'lump or thickening in breast' (87.1%) whilst the most recognizable risk factor was 'having a past history of breast cancer' (85.5%). It was found that the participants' breast cancer awareness differed significantly by their age group (p=0.006).*

Conclusion and recommendations: *This study demonstrated a moderate level of breast cancer awareness among the female students in City University Malaysia. More educational programmes are needed to promote women's awareness of breast cancer to help in early detection of the disease.*

Keywords: *Breast Cancer Awareness, Breast Cancer Warning Signs, Breast Cancer Risk Factors, Female Students, City University, Malaysia*

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1.0 Introduction

In Malaysia, one of the most frequent cancer sites in females is breast (Malaysia National Cancer Registry Report (MNCRR), 2019). Based on World Health Organization (2021), in 2020, there were 2.3 million women diagnosed with breast cancer and 685,000 deaths worldwide. Breast cancer had been diagnosed in a total of 7.8 million women in the previous five years as of the end of 2020, making it the most prevalent cancer in the world.

The prevalence of female breast cancer in Malaysia is increasing, a total of 21,634 cases of female breast cancer were diagnosed from 2012-2016 compared with 18,206 cases in 2007-2011 (MNCRR, 2019). In 2020, there were 8418 total cases of breast cancer compared to 4624 total cases in 2016, the number of cases almost doubled in the span of four years (GLOBOCAN, 2020; MNCRR, 2019). According to the World Health Organization (2020), the estimated total cases of breast cancer in Malaysia will be 13,345 in the year 2040.

Increasing breast cancer awareness is a public health priority, especially since some studies have found that well-known risk factors can be detected in up to 40% of new cases (Moridi, Mahmoodi, Rahmati, Fathi, & Naeiji, 2021). The survival rates of breast cancer are reduced when the diagnosis and the treatment are delayed. The survival rate for breast cancer that is discovered early is around 90%. The survival probability reduces to around 70% at stage 2. At stage 3 and stage 4, the prognosis is even worse, and the treatment is more complicated (Paruchuri, Sim, Balasubramanian, Thamby, & Ping, 2021). Previous studies has found that stage 1 and 2 breast cancer patients have a much longer median survival time (42-164 months) than stage 3 and stage 4 patients (6.9-53 months), regardless of the age at diagnosis (Tan, Adam, Hami, Shariff, & Mujar, 2020).

According to Malaysia National Cancer Registry Report (MNCRR) 2012-2016, the percentage of staging for breast cancer that may be detected by early screening in 2012-2016 increased for stage 3 and stage 4, compared to 2007-2011. For breast cancer stage 3, it increased from 23.1% to 25.1% while for stage 4, it increased from 20.1% to 22.8%. This proved that there is improvement in early breast screening for stage 3 and 4 of breast cancer in Malaysia. Unfortunately, nearly 40% of new breast cancer patients diagnosed in Malaysia each year were already in late stages of the illness, stage 3 and stage 4 (MNCRR, 2019). Thus, increasing awareness among women is important for early detection of breast cancer, thereby increasing their rates of surviving from breast cancer. Therefore, the aim of this study was to evaluate the level of breast cancer awareness among the female students in City University Malaysia.

Table 1.0 Definitions of some study variables

Variables	Definitions
Breast cancer awareness level	Obtained through totalling the scores of warning signs and risk factors of breast cancer.
Warning sign of cancer	A feeling of illness, or physical or mental change, that may or may not be caused by cancer.
Risk factor for cancer	Something about the individual or their lives that increases the chances of developing cancer.
Drinking more than 1 unit of alcohol a day	A unit of alcohol is one small measure of spirits, half a pint of lager/beer (3-4% strength) or half a small glass 8 (175ml) of wine (12% strength).
Having a close relative with cancer	A close relative means parents, children, brothers or sisters.
Moderate physical activity	Anything that leaves the person warm and slightly out of breath.
Change in the position of nipple	E.g. pointing up or down or in a different direction to normal.
Pulling in of nipple	Where the nipple no longer points outwards but into the breast.
Puckering or dimpling of breast skin	E.g. a dent or orange peel appearance.

Source: Cancer Research UK, King's College London, and University College London, 2009.

1.0 Literature review

1.1 Anatomy of breast

Males and females both have breasts (Akram, Iqbal, Daniyal, & Khan, 2017). Abnormalities that affect the breast can be comprehended by understanding thoroughly the anatomy of this organ (Rivard, Galarza-Paez, & Peterson, 2021). The overlying skin, glandular tissue, fibrous tissue, and adipose tissue are the four types of tissues that make up the breast (Gaskin, 2017). An endocrine gland, breast is located on the front of the chest (Cirolla, 2017). The breasts of females commonly contain more glandular tissue than that of the males. The glandular and adipose tissue forms the underlying breast. The glandular to fat ratio varies among individuals by age, postmenopausal state, postpartum status, or pregnant status. The breasts are glandular organs that are very sensitive to body's hormonal changes, the sex hormone, estrogen has a significant impact on the breast (Akram et al, 2017; Rivard et al, 2021). The pigmented skin region at the apex of breast, the mammary areola, is characterized by the presence of modified sebaceous glands whose secretion is responsible for making the nipple smooth and elastic. At

the surface of the nipple, the tubules from which the secretion product of the gland comes out (Cirolla, 2017).

1.2 Types of breast cancer – anatomical origin

According to the anatomical origin, breast cancer is divided into non-invasive and invasive breast cancers. Non-invasive breast cancer is a type of malignancy that hasn't spread beyond the lobules or ducts in which it's found. However, the abnormal cells can develop and mature into invasive breast cancer. Non-invasive breast cancer includes the ductal and lobular carcinoma in situ. The term "in situ" refers to being "in place". When atypical cells from the lobules or ducts spread out into close proximity to breast tissue, the non-invasive breast cancer progresses to invasive breast cancer. Through the immune system or the systemic circulation, cancer cells can spread from breast to other regions of the body. They may move early in the formation of the tumour, when it is little, or later, when it is large. Metastatic breast cancer is defined as invasive breast cancer that has spread to other parts of the body. The brain, bones, lungs, and liver are the most common organs to which these cells travel. These cells divide and proliferate irregularly once more, resulting in new cancers (Akram et al., 2017).

1.2 Types of breast cancer – hormones and proteins

Breast cancer is classified into three categories based on whether or not certain proteins are present in the breast cancer cells. Breast cancer that is hormone receptor–positive accounts for 70% of all instances and possesses either estrogen receptor (ER) or progesterone receptor (PR) protein in the cancer cells. ERBB2-positive breast cancer, also known as HER2-positive breast cancer, accounts for 15%- 20% of all instances of breast cancer and has high levels of the ERBB2 protein on cancer cells. Triple-negative breast cancer is characterised by the absence of the proteins ER, PR, or ERBB2 in the cancer cells. It accounts for 15% of all breast cancer cases (Waks & Winer, 2019).

1.3 Pathophysiology of breast cancer

Breast cancer is caused by DNA damage and genetic alterations, which are impacted by estrogen exposure. DNA abnormalities or pro-cancerous genes like BRCA1 and BRCA2 sometimes can be passed down from generation to generation. As a result, having a family history of ovarian or breast cancer raises the chance of developing breast cancer. The immune system fights cells with aberrant DNA or abnormal growth in a healthy person, but when this fails in people with breast cancer, the tumour grows and spreads (Alkabban & Ferguson, 2021).

1.4 Staging of breast cancer

Breast cancer is classified with the TNM classification method which divides patients into four stages depending on the size of primary tumour (T), the status of regional lymph nodes (N), and the presence of distant metastases (M). The American Joint Committee on Cancer's method is the most extensively used breast cancer staging (Alkabban & Ferguson, 2021). Stage

0 is a non-invasive tumour stage in which both cancerous and non-cancerous cells are contained within the boundaries of the part of the breast where the tumour begins to grow, and no evidence of their invasion in the surrounding tissues of that part is found whilst stage 4 is the advanced and metastatic stage of the cancer, which depicts the spread of cancer to other body organs such as the lungs, bones, liver, and brain (Akram et al., 2017).

1.5 Risk factors

According to Malaysian Health Technology Assessment Section (MaHTAS, 2019), the vast majority of breast cancers have no recognised cause. However, a number of risk factors have been identified, which can be classified as non-modifiable or modifiable. Non-modifiable risk factors include increasing age, female, having family history of breast cancer, carriers of pathogenic or potentially pathogenic mutations, early menarche and late menopause, having history of neoplastic disease of breast, and highly dense breasts. Modifiable risk factors include nulliparity, lack of breastfeeding, older age at first live childbirth, oral contraceptives use, being obese or overweight, alcohol consumption, and radiation exposure.

2.0 Methodology

A cross-sectional study was conducted among 325 female students of City University Malaysia. Sample size was calculated using a table constructed by Krejcie & Morgan (1970). The total population, *N*, of this study is 2116. Hence, based on Krejcie & Morgan (1970), a minimum 322 subjects/students were required for this study. Inclusion criteria of this study are female students of all faculties in City University Malaysia, including all educational experience, age, marital status, ethnicity, and race. This study also includes students with experience of cancer. The exclusion criteria are male students and refusal to give informed consent. The questionnaire used in this study contained five sections, which are about: (I) demographic questions; (II) warning signs of breast cancer; (III) risk factors of breast cancer; (IV) breast cancer and age; and (V) confidence, skills, and behaviour regarding breast cancer. The questionnaire is obtained from Breast Cancer Awareness Measure (Breast CAM) Toolkit Version 2 developed by Cancer Research UK et al. in 2009.

The first section – demographic questions are divided into five items; (i) age; (ii) ethnicity; (iii) marital status; (iv) experience of cancer; and (v) education. The second section, warning signs of breast cancer are made up of 11 items that were used to determine how many warning signs a woman can identify when prompted. The responses were measured as “Yes”, “No”, and “Don’t know”. Then there are the risk factors questions, which are the third section consisting of nine items and designed to assess how many risk factors a woman can identify when prompted. A five-point Likert scale was used to measure the responses. The most crucial risk factor, increasing age, has been asked as a separate question, thus it will not be asked again here.

Next, the fourth section consists of one item to examine women's understanding of the relationship between age and breast cancer. Meanwhile, the last section – confidence, skills,

and behaviour questions are designed to assess participants' confidence, skills, and behaviour in detecting breast changes and acting on them. There are a total of three items, the first question concerns breast checking frequency, second concerns confidence in detecting a breast change, and third concerns reporting a breast change to a doctor.

The questionnaires were distributed to City University's female students after their consent to participate in this study. The data collection was gathered from 1st July 2022 to 2nd August 2022 in online survey platform 'Google Forms'.

Scoring was performed for section II – warning signs of breast cancer, section III – risk factors of breast cancer, and section IV – breast cancer and age. In section II, every "Yes" answer was scored 1 point and every "No"/ "Don't know" answer was scored 0 point. In section III, 5-point Likert scales were used in the questionnaire. "Strongly agree" and "Agree" were considered correct answers hence 1 point was given. "Strongly disagree", "Disagree", and "Not sure" were considered incorrect answers, 0 points were given. For section IV, participants who answered "A 70 years old woman" get 1 point whilst participants who answered other than "A 70 year old woman" get 0 point. Reverse scoring was performed on the questions involved. The maximum points that can be scored were 21. This study adopted rank criteria from Masood, Saleem, Hassan, Sadeeqa, and Akbar (2016) which was obtained from the study done by Hadi, Hassali, Shafie, and Awaisu (2010). The ranks are very poor (≤6), poor (7-10), moderate (11-15), good (16-19), and very good (>19).

4.0 Data analysis

Data collected were analyzed using IBM Statistical Package for the Social Sciences (SPSS) version 27. A Kolmogorov-Smirnov's test ($p < 0.05$) and visual inspection of the data's histograms, normal Q-Q plots, and box plots showed that the breast cancer awareness scores were not approximately normally distributed for the demographic variables, hence, non-parametric tests were used in this study (Mishra et al., 2019). The demographical data and the participant's responses to the questionnaire were summarized in this study by frequencies and percentages. The scoring was performed and non-parametric tests were applied to measure the differences in breast cancer awareness scores by demographic variables. Kruskal-Wallis tests were applied where variables contained more than two sub variables whereas the Mann-Whitney U tests were applied upon variables containing only two sub variables. A p-value of less than 0.05 ($p < 0.05$) for all statistical analysis was considered significant.

5.0 Results

5.1 Demographic characteristics

A total of 325 female students participated in this study. Table 5.1 summarized the demographic characteristics of the study participants. Almost half of the female students aged between 22-25 years old [157 (48.3%)]. 101 (31.1%) participants are Indian, 46 88 (27.1%) are Malay, 80 (24.6%) Others, and 56 (17.2%) are from Chinese ethnicity. Majority of the respondents were single [297 (91.4%)] and do not have a family history of breast cancer [273 (84.0%)]. 239 (73.5%) participants were taking non-health related courses and 86 (26.5%) participants were taking health-related courses in City University Malaysia.

Table 5.1 Demographic characteristics of study participants (*N*=325)

Category	***Answer***	***N***	***%***
Age of respondents	18-21 years old	111	34.2%
	22-25 years old	157	48.3%
	26-30 years old	40	12.3%
	Above 30 years old	17	5.2%
Ethnic group	Malay	88	27.1%
	Chinese	56	17.2%
	Indian	101	31.1%
	Others	80	24.6%
Marital status	Single	297	91.4%
	Married	25	7.7%
	Divorced/Widowed	3	0.9%
Family history of breast cancer	Yes	52	16.0%
	No	273	84.0%

Course	Health related course	86	26.5%
	Non-health related course	239	73.5%

Source: Developed for this research

5.2 Recognition of breast cancer warning signs

Participant's responses for warning signs of breast cancer were presented in Table 5.2. In this study, the most known warning signs of breast cancer was lump or thickening in breast [283 (87.1%)] followed by pain in one of the breasts or armpit [279 (85.8%)]. The least identified warning signs was pulling in of the nipple [189 (58.2%)] followed by redness of breast skin [192 (59.15%)]. The overall mean score was 7.87 ± 3.43 out of a maximum score of 11 points.

Table 5.2 Summary of responses by participants to breast cancer warning signs (*N*=325)

Questions & Answers	***N***	***%***
Do you think a change in the position of your nipple could be a sign of breast cancer?		
Yes	234	72.0%
No	41	12.6%
Don't know	50	15.4%
Do you think pulling in your nipple could be a sign of breast cancer?		
Yes	189	58.2%
No	61	18.8%
Don't know	75	23.1%
Do you think pain in one of your breasts or armpit could be a sign of breast cancer?		
Yes	279	85.8%
No	18	5.5%
Don't know	28	8.6%
Do you think puckering or dimpling of your breast skin could be a sign of breast cancer?		
Yes	222	68.3%
No	37	11.4%
Don't know	66	20.3%
Do you think discharge or bleeding from your nipple could be a sign of breast cancer?		
Yes	261	80.3%
No	15	4.6%
Don't know	49	15.1%
Do you think a lump or thickening in your breast could be a sign of breast cancer?		
Yes	283	87.1%
No	8	2.5%
Don't know	34	10.5%
Do you think a nipple rash could be a sign of breast cancer?		

Yes	195	60.0%
No	43	13.2%
Don't know	87	26.8%
Do you think redness of your breast skin could be a sign of breast cancer?		
Yes	192	59.1%
No	44	13.5%
Don't know	89	27.4%
Do you think a lump or thickening under your armpit could be a sign of breast cancer?		
Yes	248	76.3%
No	26	8.0%
Don't know	51	15.7%
Do you think changes in the size of your breast or nipple could be signs of breast cancer?		
Yes	217	66.8%
No	44	13.5%
Don't know	64	19.7%
Do you think changes in the shape of your breast or nipple could be signs of breast cancer?		
Yes	238	73.2%
No	26	8.0%
Don't know	61	18.8%

Source: Developed for this research

5.3 Recognition of breast cancer risk factors

The frequencies and percentages of participants who answered correctly was summarized in Table 5.3. Having a past history of breast cancer [278 (85.5%)] and close relatives with breast cancer [269 (80%)] was the most identifiable risk factor by the participants. Having children later on in life or not at all was the least known risk factor [132 (40.6%)] followed by drinking alcohol [153 (47.1%)]. The overall mean score was 5.63 ± 2.95 out of a maximum score of 9 points.

Table 5.3 Participants who answered breast cancer risk factors correctly (*N* = 325)

Risk Factors	***N***	***%***
How much do you agree that each of these can increase the chance of developing breast cancer?		
Having a past history of breast cancer	278	85.5
Using HRT	175	53.8
Drinking more than 1 unit of alcohol a day	153	47.1
Being overweight	218	67.1
Having a close relative with breast cancer	260	80.0
Having children later on in life or not at all	132	40.6
Starting periods at an early age	187	57.5
Having a late menopause	193	59.4
Doing less than 30 mins of moderate physical activity 5 times a week	233	71.7

Source: Developed for this research

5.4 Breast cancer and age

For this section, only one question was asked – breast cancer and its relation with age. As the breast cancer risk increases with increasing age, the correct answer to this question is ‘‘A 70 years old woman’’. But only 7 (2.2%) participants chose the correct answer. Table 5.4 presents the response of the participants.

Table 5.4 Breast cancer and age (*N*=325)

Question & Answers	***N***	***%***
In the next year, who is most likely to develop breast cancer?		
A woman of any age	201	61.8
A 30 years old woman	63	19.4
A 50 years old woman	54	16.6
A 70 years old woman	7	2.2

Source: Developed for this research

5.5 Confidence, skills, and behaviour concerning breast cancer

In this section, there is no correct or incorrect answer as these questions are attitudinal questions. Table 5.5 summarized the participant responses.

Table 5.5 Confidence, skills, and behaviour concerning breast cancer (*N*=325)

Questions & Answers	***N***	***%***
How often do you check your breasts?		
At least once a week	34	10.5%
At least once a month	36	11.1%
At least once every 6 months	100	30.8%
Rarely or never	155	47.7%
Are you confident you would notice a change in your breasts?		
Very confident	38	11.7%
Fairly confident	170	52.3%
Not very confident	90	27.7%
Not at all confident	27	8.3%
Have you ever been to see a doctor about a change you have noticed in one of your breasts?		
Yes	22	6.8%
No	78	24.0%
Never noticed a breast change	225	69.2%

Source: Developed for this research

5.6 Breast cancer awareness

Breast cancer awareness scores were computed and the average score of participants were 13.52 ± 5.29. None of the participants showed complete breast cancer awareness, except one respondent. The gaps in knowledge of participants are explained in detail in Table 5.6.

Table 5.6 Status of breast cancer awareness in study population (*N*=325)

Total Score	***Status of Awareness***	***N***	***%***
(≤6)	Very Poor	34	10.5%
(7-10)	Poor	70	21.5%
(11-15)	Moderate	86	26.5%
(16-19)	Good	79	24.3%
(>19)	Very Good	56	17.2%

Source: Developed for this research

5.7 Differences in participants' breast cancer awareness by demographic variables

Lastly, Table 5.7 illustrates the differences in breast cancer awareness by various demographic categories. The non-parametric tests revealed that females in age 22-25, Indian women, and divorced or widowed women showed significant breast cancer awareness as compared to others. A significant difference was found between age group and breast cancer awareness (p= 0.006). Breast cancer awareness was found higher (14.38 ± 4.89) in the age group of 22-25 years old women as compared (10.41 ± 4.46) to women aged above 30 years old.

Table 5.7 Differences in breast cancer awareness by demographic variables of participants

	N	***Mean***	***±SD***	***Mean Rank***	***p-value***
Age group[a]					
18-21 years old	111	13.16	5.63	158.11	**0.006***
22-25 years old	157	14.38	4.89	177.64	
26-30 years old	40	12.48	5.49	144.11	
Above 30 years old	17	10.41	4.46	104.12	
Ethnic group[a]					
Malay	88	13.00	5.40	154.43	0.507
Chinese	56	12.93	5.95	154.99	
Indian	101	14.13	4.99	172.84	

Others	80	13.73	5.02	165.61	
Marital status [a]					
Single	297	13.56	5.21	163.26	0.778
Married	25	12.84	6.26	156.02	
Divorced/widowed	3	15.67	4.93	195.50	
Family history of breast cancer [b]					
Yes	52	13.73	5.54	168.09	0.669
No	273	13.48	5.25	162.03	
Course/ education [b]					
Health related course	86	13.93	5.63	172.88	0.254
Non-health related course	239	13.37	5.16	159.45	

[a] Kruskal-Wallis test.
[b] Mann-Whitney U test.
*p < 0.05 was considered significant.

Source: Developed for this research

6.0 Discussion

The number of breast cancer cases increases worldwide as the years go by (WHO, 2021). Early detection of breast cancer could increase the survival rate of the patient as the early stage of breast cancer has a higher survival rate than the later stage of the malignancy (Paruchuri et al., 2021). Being aware of the warning signs and symptoms also the risk factors could lead to early detection of breast cancer, thus decreasing the chance of mortality due to breast cancer. Hence, this study was performed to determine the level of breast cancer awareness among the female university students in City University.

The main finding of this study was that the female students had a moderate level of breast cancer awareness. The average score of the participant breast cancer awareness was 13.52 ± 5.29, which fell into the moderate category in the scoring scheme. The level of breast cancer awareness was evaluated according to the total scoring of participant's knowledge about warning signs and risk factors (including age) of breast cancer. None of the participants showed complete breast cancer awareness, except for one respondent. The moderate level of breast cancer awareness in this study were not align with founding of past studies which mostly shown poor level of breast cancer awareness (Ghazi et al., 2020; Hadi et al., 2010; Kan'an, 2018; Lee et al., 2019; Liu et al., 2014; Masood et al., 2016; Radi, 2013; Ullah, Khan, Din, &

Afaq, 2021; Okobia, Bunker, Okonofua, & Osime, 2006). Notwithstanding, a study done by Ameen, Al-kareem, & Abed (2021) and Osei-Afriyie et al. (2014) both found a moderate level of breast cancer awareness in the participants.

The moderate level of breast cancer awareness found in this study might be due to the lack of understanding or misunderstanding of the questions by the participants. The participants might not understand some of the statements in the questionnaire such as 'pulling in of the nipple', 'puckering or dimpling of breast skin', and 'using hormone replacement therapy (HRT)'. In addition, this study was conducted in an online platform rather than face-to-face interview which might lead to difficulties in asking any enquiries to the interviewer by the participants. Other than that, the differences in population characteristics, cultural aspects, and sample size might contribute to this outcome.

In this study, the female students were highly aware that lump or thickening in breast (87.1%), pain in one of the breasts or armpit (85.8%), and discharge or bleeding from nipple (80.3%) were the breast cancer warning signs. The female students also had a high awareness about lump or thickening under armpit (76.3%), changes in shape of breast or nipple (73.2%), a change in the position of nipple (72.0%) as the warning signs of breast cancer. Other warning signs include puckering or dimpling of breast skin (68.3%), changes in the size of breast or nipple (66.8%), nipple rash (60.0%), redness of breast skin (59.15%), and the least identified warning signs, pulling in of the nipple (58.2%). A previous study done in Ghana (Osei-Afriyie et al., 2021) and Malaysia (Ghazi et al., 2020) showed a similar finding of high awareness about lump or thickening in breast and discharge or bleeding from nipple as warning signs of breast cancer and low awareness about pulling in of the nipple. The incognisance of pulling in of the nipple as warning signs were also found in study done by Elshami et al. (2022) in Palestine and Ullah et al. (2021) in Pakistan. The warning signs – lump or thickening in breast, were the most identifiable warning sign in few past studies concerning breast cancer (Elshami et al., 2022; Masood et al., 2016; Paruchuri et al., 2021; Radi, 2013; Yadav & Chauhan, 2014).

Having a past history of breast cancer (85.5%) and having close relatives with breast cancer (80.0%) was the most known risk factor by the participants. Having children later on in life or not at all (nulliparity) (40.6%) was the least known risk factor followed by drinking alcohol (47.1%). Other risk factors include using hormone replacement therapy (HRT) (53.8%), early menarche (57.5%), late menopause (59.4%), being overweight (67.1%), and less physical activity (71.7%). Similar finding of that the participants are incognizant of having children later on in life or not at all (nulliparity) as risk factors of breast cancer were shown in many study such as study conducted by Radi (2013) in Saudi Arabia, Liu et al. (2014) in China, Masood et al. (2016) and Ullah et al. (2021) in Pakistan, Melaku et al. (2018) in Ethiopia, Ghazi et al. (2020) in Malaysia, Moridi et al. (2021) in Iran, and Osei-Afriyie et al. (2021) in Ghana.

Next, breast cancer and age section, one question about breast cancer and its relation with age were asked. This is the most crucial risk factor of breast cancer. As the breast cancer risk increases with increasing age, the correct answer to this question is ''A 70 year old woman''.

But only 7 participants chose the correct answer whilst mostly chose “A woman of any age” (61.8%).

To get more insight, assessment of the differences in breast cancer awareness by demographic variables were performed. This study revealed that participants aged 22-25 years old, Indian, and who are divorced or widowed had a comparatively high awareness. A significant difference was found between age group and breast cancer awareness (p= 0.006), with participants aged 22-25 scoring higher than others. While the differences of breast cancer awareness in other demographic variables – ethnic group, marital status, family history of breast cancer, and course/education with breast cancer were found insignificant. The finding of significant differences between age and breast cancer awareness in this study is also in line with studies done in Iran, Pakistan, and China (Ameen et al., 2021; Masood et al., 2016; Liu et al., 2014).

The confidence, skills, and behaviour regarding breast cancer questions are attitudinal questions. For frequency of breast checking / breast self-examination (BSE), 47.7% of the participants rarely or never checked their breasts, 30.8% checked it at least once every 6 months, 11.1% checked it at least once a month, and 10.5% checked their breast at least once a week. The frequency of breast checking done monthly in this study (11.1%) was lower than that of study conducted in AIMST University in Malaysia (22.4%) (Paruchuri et al., 2021) and UHAS University in Ghana (82.9%) (Osei-Afriyie et al., 2021). This finding may differ due to both of these studies being conducted within the population of students taking health-related courses. 52.3% felt fairly confident in noticing a change in their breasts, 11.7% felt very confident, 27.7% felt not very confident, and 8.3% felt not at all confident. 6.8% of the participants had seen a doctor about a change they noticed in one of the breasts, 69.2% of the participants never noticed a breast change, 24.0% participants never seen a doctor about a change they noticed in one of the breasts. The results in confidence, skills, and behaviour regarding breast cancer shows that different societies have different attitudes and perceptions towards breast cancer.

7.0 Conclusion, recommendations, and limitations

7.1 Conclusion

In conclusion, the level of breast cancer awareness among female students in City University Malaysia is moderate. Most of the female students recognized the warning signs of breast cancer, especially the lump or thickening in breast. The students were also highly aware that having personal history and close relatives with breast cancer as risk factors, but only four-tenths of the participants identified having children later on in life or not at all as risk factors of breast cancer. Only seven participants chose the correct answer in the breast cancer and age section. The differences in breast cancer awareness by demographic variables were insignificant except for age group (p= 0.006). Almost half of the female students never or rarely checked their breasts but also half of the female students felt fairly confident in noticing a change in their breasts.

7.2 Recommendations

The outcomes of this research recommend the Ministry of Education and Ministry of Health to develop educational programmes to raise women's awareness of breast cancer throughout their adolescent years. Mass media and even healthcare settings can also be used to raise awareness of breast cancer. In addition to educating people about the risk factors and warning signs, educational programmes should highlight the importance of breast cancer prevention by encouraging a healthy diet and regular exercise. Spreading the crucial information about breast cancer should be made use of social media, radio broadcasts, and leaflet distribution. Some people choose to learn about cancer-related topics from experts and health organizations. Therefore, appropriate counselling should be provided on a regular basis by healthcare professionals in clinics and hospitals to raise awareness of breast cancer, and in this situation, pamphlets may be a useful tool. The main objective is to raise the survival rate by promoting early detection and encouraging medical help-seeking behaviours among women. Further research is suggested to be done on women's awareness and behaviour related to breast cancer.

7.3 Scope and limitations of study

This study was done among the students of City University Malaysia only and therefore might not be a representative of all universities across Malaysia. Another limitation is that due to the COVID circumstance, this study was conducted using online questionnaires instead of face-to-face interviews with students which may have led to misinterpretations in some of the questions posed and thus, led on to wrongly answered by the participants.

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