Knowledge, Attitude & Practice Regarding Breast Cancer and Breast Self-examination (BSE) among Undergraduate Students of International Islamic University Malaysia (IIUM)

Siti Noorkhairina Sowtali, PhD
Department of Professional Nursing Studies,
Kulliyyah of Nursing,
International Islamic University Malaysia,
Jalan Sultan Ahmad Shah, Bandar Indera Mahkota,
25200 Kuantan, Pahang,
Malaysia
sitinoorkhairina@iium.edu.my

Nur Hazelin Hanim Halid, BSc
Gleneagles Hospital Medini Johor, 2, Jalan Medini Utara 4,
79250 Nusajaya, Johor,
Malaysia
hazelin.hanim9958@gmail.com

***Syaimaa Aisyah Mohd Salleh, BSc**
Klinik Sawfa, Ground Floor, A23 & A25, Jalan IM 7/3, Bandar Indera Mahkota,
25200 Kuantan, Pahang,
Malaysia
syaimmaaisyah@gmail.com

***Corresponding author:** Syaimaa Aisyah Mohd Salleh, syaimmaaisyah@gmail.com

Article History:
Received on February 27, 2024
Accepted on June 4, 2024
Published on July 29, 2024

Abstract:

Introduction: Breast cancer is one of the leading causes of global cancer mortality, due to late detection. This study aimed to determine the level of knowledge, attitude, and practice regarding breast cancer and breast self-examination among students. **Methodology:** A survey was conducted among 36 undergraduate students from International Islamic University Malaysia, Kuantan, Pahang who attended the Breast Cancer Webinar post six-month intervention using a validated questionnaire on knowledge, awareness on breast cancer, and practice of breast self-examination. The data obtained were analysed using descriptive statistics, Independent T-test, One-way ANOVA, and Pearson Correlation via SPSS version 27.0. **Results:** The mean age of the participants was 22.69 (±1.470), female (83.3%), Malay (100.0%), year 4 (61.1%), single (100.0%), with no family history of breast cancer (97.2%) and have experience in taking care of breast cancer patients (50.0%). There was a significant association between faculty of study and knowledge of risk factors ($p=0.008$) along with signs and symptoms of breast cancer ($p < 0.001$). Gender ($p<0.001$) and area of residence ($p<0.001$) were associated with awareness of breast cancer and breast self-examination. For practice domain, only gender was associated with breast self-examination ($p=0.011$). **Conclusion:** This study showed undergraduates still have moderate knowledge, attitude, and practice towards breast cancer and BSE even after the intervention. Integration of technology is required in the future awareness program.

Keywords: Breast self-examination, knowledge, awareness, practice, students, intervention

Introduction:

Breast cancer is more common among women in less developed nations (883,000 cases) than in developed regions (794,000 cases) (Goncheh et al., 2016). Furthermore, 59% of breast cancer cases occurred in developed countries (North America, Europe, Australia, New Zealand, and Japan) in 1990.

However, a change in the pattern of breast cancer incidence occurred in 2008, with new diagnoses equally divided between less developed and developed countries (Goncheh et al., 2016).

The five countries with the highest standardized incidence rate of breast cancer (per 100,000) were Israel (80.5), Lebanon (78.7), Armenia (74.1), Singapore (65.7), and Kazakhstan (73.5) (Goncheh et al., 2016). Across Southeast Asia, Singapore has the highest incidence rate of breast cancer, which continues to rise over the years (Ng et al., 2020). Conversely, the five countries in the Asian region with the highest standardized death rates (per 100,000) from breast cancer were Pakistan (25.2), Armenia (24.2), Lebanon (24.0), Jordan (21.8), and Syria (21.5) (Goncheh et al., 2016).

In Malaysia, regardless of gender, breast cancer contributed to 19.0% of all new cancer cases diagnosed in 2012–2016, compared with 17.7% in 2007–2011 (Clinical Practice Guidelines Ministry of Health Malaysia, 2019). The incidence was highest among Chinese (40.7 per 100,000), followed by Indians (38.1 per 100,000) and Malays (31.5 per 100,000) (Clinical Practice Guidelines Ministry of Health Malaysia, 2019). In terms of breast cancer survival, the 5-year relative survival rate between 2005 and 2009 in Malaysia was 67.8%. Approximately 48% of breast cancer cases in Malaysia are diagnosed late due to negative sociocultural perceptions regarding breast cancer, strong beliefs in traditional medicines and treatments, and financial problems (Clinical Practice Guidelines Ministry of Health Malaysia, 2019; Shah et al., 2020).

Therefore, early screening measures such as BSE, clinical breast examination (CBE), and mammography have the potential to reduce the burden of breast cancer caused by late presentation (Massat et al., 2016; Clinical Practice Guidelines Ministry of Health Malaysia, 2019; Shah et al., 2020; Htay et al., 2021). Although BSE is not a screening method, it is advocated to raise awareness of breast cancer and empower women to take responsibility for their own health (Clinical Practice Guidelines Ministry of Health Malaysia, 2019). Mammography is the best method for early detection of breast cancer; however, in most developing countries, mammography is expensive and inaccessible. Hence, breast self-examination is the most practical and cheapest way (Fondjo et al., 2018).

Furthermore, there are limited studies on measuring the impact of knowledge, attitude, and practice among university students after certain health education programs. Previous studies in local settings were conducted among nurses (Siti Noorkhairina et al., 2020; Siti Noorkhairina & Fadhlin Farhanah, 2023), the general population (Akhtari-Zavare et al., 2016), and private college students (Yong & Soon, 2017; Ali et al., 2019). Thus, the present study aims to investigate the knowledge, attitude, and practice regarding breast cancer and breast self-examination among undergraduate students at the International Islamic University Malaysia (IIUM) Kuantan, Pahang, six months post-breast cancer awareness program.

Methodology:

Participants

A quasi-intervention study for a single arm (post) was conducted between June and July 2022 among 36 students after they participated in a one-day "Breast Cancer Webinar" organized by the students of NURF 4314 Discovery of Specialization: Continuous Nursing Education, Kulliyyah of Nursing, IIUM Kuantan, six months ago. The study was approved by the Kulliyyah of Nursing Postgraduate Research Committee (KNPGRC) No. 1/2022 dated 1st March 2022 and IIUM Research Committee (IREC 2002-KON/60).

Settings

Students were conveniently recruited from IIUM Kuantan Campus only.

Measures

A previously validated instrument, namely the Knowledge Awareness and Practice Test regarding Breast Cancer, was adopted with modifications after permission was obtained from the original author (Siti Noorkhairina et al., 2020). The final version of the questionnaire consisted of five parts. Part A is on sociodemographic data; Part B has 17 items that measured risk factors, while Part C has 10 items that assessed the knowledge of signs and symptoms with a dichotomous choice of 'yes' or 'no'. Meanwhile, 10 items in Part D measured the awareness of BSE, and Part E described the practice of BSE on an extreme end 10-point Likert scale ranging from 0 points for strongly disagree to 10 points for strongly agree. Five nursing experts were invited to validate the questionnaire. The content validity index (CVI) obtained was 99% with a strong internal consistency of r2 = 0.885, which was piloted among 30 nursing students. The students involved in the pilot study were not recruited for the actual study.

Data Analysis

The IBM Statistical Package for Social Sciences (SPSS) software version 27.0 was used for descriptive analysis. Mean and standard deviation were reported for numerical data, while frequency and percentage represented categorical data. The Independent T-test, One-way ANOVA, and Pearson Correlation were used to determine the association between socio-demographic background and knowledge, attitude, and practice towards breast cancer and BSE. Statistical significance was accepted at $p < 0.05$.

Results:

Socio-demographic Background

Table 1 shows the socio-demographics of the students. The mean age of the students in this study was 22.69 (± 1.47) years, with 83.3% being female, 100.0% Malay, studying in the Kulliyyah of Nursing (69.4%), and staying at Mahallah Ummu Kalthum (52.8%).

Table 1: Sociodemographic background of students (n=36)

Variable		Frequency (n)	Percentage (%)	Mean (SD)
Age				22.69 (±1.470)
Gender	Male	6	16.7	
	Female	30	83.3	
Race	Malay	36	100.0	
Kulliyyah (Faculty)	Kulliyyah of Nursing	25	69.4	
	Kulliyyah of Allied Health Science	2	5.6	
	Kulliyyah of Dentistry	2	5.6	
	Kulliyyah of Medicine	6	16.7	
	Kulliyyah of Sciences	1	2.8	
Year	Year 1	3	8.3	
	Year 2	8	22.2	
	Year 3	3	8.3	
	Year 4	22	61.1	
Residency area	Living off campus	8	22.2	
	Living on campus			
	a) Mahallah Ummu Khaltum	19	52.8	
	b) Mahallah Khalid Al-Walid	5	13.9	
	c) Mahallah Fatimah Az-Zahra	4	11.1	
Marital status	Single	36	100.0	
Family history	Yes	1	2.8	
	No	35	97.2	
Experience taking care of breast cancer patients	Yes	18	50.0	
	No	18	50.0	

Knowledge of the Risk Factors of Breast Cancer
Most of the students know that breast cancer risk increases with age (97.2%) and smoking habits (94.4%) (Table 2). The mean score is 12.97 (±2.591), which is lower than the 50th percentile score (14.00), indicating moderate knowledge (Siti Noorkhairina et al., 2020; Siti Noorkhairina & Fadhlin Farhanah, 2023).

Table 2: Knowledge regarding risk factors of breast cancer answered correctly (n=36)

No.	Items	Answer	Frequency (n)	Percentage (%)
1.	Breast cancer risk increases with age	Yes	35	97.2
2.	Breast cancer is inherited disease	Yes	32	88.9
3.	A high-fat diet is a risk factor for breast cancer	Yes	25	69.4
4.	Smoking is a risk factor for breast cancer	Yes	34	94.4
5.	Alcohol consumption increases the risk for breast cancer	Yes	31	86.1
6.	Pregnancy at age of more than 30 years old increases the risk for breast cancer	Yes	26	72.2
7.	Early menarche below 11 years old increases the risk for breast cancer	Yes	23	63.9
8.	Late menopause is a risk factor for breast cancer	Yes	22	61.1
9.	Stress increases the risk for breast cancer	Yes	29	80.6
10.	Obesity is one of the risk factors for breast cancer	Yes	30	83.3
11.	Women who have never conceive (*nulliparous*) is at risk for breast cancer	Yes	29	80.6
12.	The use of contraceptive pills increases the risk for breast cancer	Yes	20	55.6
13.	Breastfeeding decreases the risk for breast cancer	Yes	34	94.4
14.	A high level of estrogen hormone increases the risk for breast cancer	Yes	27	75.0
15.	Breast cancer is one type of contagious disease	Yes	3	8.3
16.	Breast cancer has no cure	Yes	11	30.6
17.	Late detection of breast cancer can cause death	Yes	34	94.4

Knowledge on the Signs and Symptoms of Breast Cancer
Almost 97.2% recognized that a lump in the breast and armpits, along with pain, soreness, and swelling or enlargement of the breasts, were signs and symptoms of breast cancer (Table 3). The mean score is 10.22 (±1.692), which is lower than the 50th percentile score (11.00), indicating moderate knowledge (Siti Noorkhairina et al., 2020; Siti Noorkhairina & Fadhlin Farhanah, 2023).

Awareness of Breast Cancer and its Screening Method (BSE)
The mean score of the awareness level was 85.94 (±11.074), which is lower than the 50th percentile score (89.50), indicating moderate awareness of BSE (Siti Noorkhairina et al., 2020; Siti Noorkhairina & Fadhlin Farhanah, 2023). Table 4 shows that only 27.8% of the students could perform BSE correctly, and 47.2% could not.

Practice of BSE
The mean practice score is 26.53 (±8.529), which is lower than the 50th percentile score (30.00), indicating low practice levels of BSE (Siti Noorkhairina et al., 2020; Siti Noorkhairina & Fadhlin Farhanah, 2023).

Associations between Sociodemographic Factors and Knowledge, Awareness, and Practice
The knowledge domain demonstrated that the Faculty of Study was significantly associated with risk factors (p=0.008) along with signs and symptoms of breast cancer (p<0.001) (Table 5). Gender (p<0.001) and area of residence (p<0.001) were associated with awareness of breast cancer and breast self-examination. Only gender (p=0.011) was associated with the practice of breast self-examination.

Discussion:

The present study assessed the knowledge, attitude, and practice (KAP) regarding breast cancer and breast self-examination (BSE) among undergraduate students at the International Islamic University Malaysia (IIUM) Kuantan, six months post a breast cancer awareness webinar. The findings indicate that students maintain moderate levels of knowledge and awareness but exhibit low practice levels of BSE, underscoring the need for enhanced educational interventions.

Knowledge of Risk Factors and Signs/Symptoms
The study reveals that while students are aware of common risk factors and signs/symptoms of breast cancer, their knowledge remains moderate, with mean scores falling below the 50th percentile. This is consistent with previous findings by Siti Noorkhairina et al. (2020) and Siti Noorkhairina and Fadhlin Farhanah (2023), suggesting a persistent gap in comprehensive understanding. The significant association between faculty of study and knowledge of risk factors and signs/symptoms (p=0.008 and p<0.001, respectively) highlights the role of educational background in shaping awareness levels. This aligns with Abdullah et al. (2020), who reported similar associations in different academic settings.

Table 3: Knowledge regarding sign and symptoms of breast cancer answered correctly (n=36)

No.	Items	Answer	Frequency (n)	Percentage (%)
1.	A lump at the area of the breast is a sign of breast cancer	Yes	35	97.2
2.	A nipple discharge indicates the sign of breast cancer	Yes	34	94.4
3.	Pain and soreness in the breast are signs and symptoms of breast cancer	Yes	35	97.2
4.	Changes in the size of one or both breasts indicate a sign of breast cancer	Yes	33	91.7
5.	Breast skin ulceration is one of the breast cancer signs	Yes	33	91.7
6.	A breast cancer patient usually experiences weight loss	Yes	32	88.9
7.	Changes in the shape of one or both breasts indicate a sign of breast cancer	Yes	33	91.7
8.	An inverted nipple in one or both breasts is a sign of breast cancer	Yes	29	80.6
9.	Breast cancer will cause swelling and enlargement of the breast	Yes	35	97.2
10.	Lumps under the armpit is a sign of breast cancer	Yes	35	97.2
11.	*Peau d'orange* skin at the breast area is a sign of breast cancer	Yes	34	94.4

Table 4: Association between sociodemographic factors and knowledge towards risk factors of breast cancer among undergraduates in IIUM (n=36)

Characteristic	Variables	n	Mean (SD)	Mean Diff (95% CI)	t-stats (df)	p-value
Gender				1.23 (-1.12, 3.58)	1.07 (34)	0.294*
	Male	6	14.00 (1.67)			
	Female	30	12.77 (2.71)			
Race					*NR	*NR
	Malay	36	*NR			
Kulliyyah					4.23 (4, 35) [c]	**0.008****
	Kulliyyah of Nursing	25	12.88 (2.40)			
	Kulliyyah of Allied Health Sciences	2	14.00 (2.83)			
	Kulliyyah of Dentistry	2	7.50 (0.71)			
	Kulliyyah of Medicine	6	14.83 (0.98)			
	Kulliyyah of Sciences	1	13.00 (-)			
Year					2.42 (3, 35) [b]	0.084**
	Year 1	3	9.67 (3.79)			
	Year 2	8	14.13 (2.64)			
	Year 3	3	13.00 (2.65)			
	Year 4	22	13.00 (2.18)			
Residency Area					1.42 (2, 35) [b]	0.255**
	Urban	8	11.50 (3.34)			
	Mahallah Khalid Al-Walid	5	14.20 (1.79)			
	Mahallah Ummu Khaltum	19	13.11 (2.31)			
	Mahallah Fatimah Az-Zahra	4	13.75 (2.63)			
Marital Status					*NR	*NR
	Single	36	*NR			
Family History				0.03 (*NR)	*NR	*NR
	Yes	1	13.00 (-)			
	No	35	12.97 (2.63)			
Experience				-0.39 (-2.17, 1.39)	-0.45 (34)	0.659
	Yes	18	12.78 (2.46)			
	No	18	13.17 (2.77)			

Note: Significant level set p-value <0.05, with 95% confident interval (CI); NR: not relevant

*: Independent T-Test; **: One-Way ANOVA

[b]: f-stats; [c]: Post Hoc test was unavailable due to at least one of the groups has fewer than two cases

Table 5: Association between sociodemographic factors and knowledge towards sign and symptoms of breast cancer among undergraduates in IIUM (n=36)

Characteristic	Variables	n	Mean (SD)	Mean Diff (95% CI)	t-stats (df)	p-value
Gender				-1.67	-1.32	0.243*
	Male	6	8.83 (3.06)	(-4.87, 1.54)	(5.29)	
	Female	30	10.50 (1.17)			
Race					*NR	*NR
	Malay	36	*NR			
Kulliyyah					6.28 (4, 35) [c]	**<0.001****
	Kulliyyah of Nursing	25	10.16 (1.52)			
	Kulliyyah of Allied Health Sciences	2	11.00 (0.00)			
	Kulliyyah of Dentistry	2	11.00 (0.00)			
	Kulliyyah of Medicine	6	11.00 (0.00)			
	Kulliyyah of Sciences	1	4.00 (-)			
Year					3.14 (3, 35) [b]	0.361**
	Year 1	3	11.00 (0.00)			
	Year 2	8	10.88 (0.35)			
	Year 3	3	10.67 (0.58)			
	Year 4	22	9.82 (1.69)			
Residency Area					0.28 (2, 35) [b]	0.839**
	Urban	8	10.00 (2.45)			
	Mahallah Khalid Al-Walid	5	9.80 (2.17)			
	Mahallah Ummu Khaltum	19	10.32 (1.42)			
	Mahallah Fatimah Az-Zahra	4	10.75 (0.50)			
Marital Status					*NR	*NR
	Single	36	*NR			
Family History				0.80	*NR	*NR
	Yes	1	11.00 (-)	(*NR)		
	No	35	10.20 (1.71)			
Experience				0.11	0.19	0.847*
	Yes	18	10.28 (1.45)	(-1.05, 1.27)	(34)	
	No	18	10.17 (1.95)			

Note: Significant level set p-value <0.05, with 95% confident interval (CI); NR: not relevant

*: Independent T-Test; **: One-Way ANOVA

[b]: f-stats; [c]: Post Hoc test was unavailable due to at least one of the groups has fewer than two cases

Awareness and Practice of Breast Self-Examination
Awareness of breast cancer and BSE among students is moderate, as evidenced by the mean awareness score. Despite this, the practice of BSE remains low, with only 27.8% of students able to perform BSE correctly. This discrepancy between awareness and practice is concerning and reflects findings by Akhtari-Zavare et al. (2016) and Siti Noorkhairina et al. (2020), who reported similar trends in awareness and practice among health students and the general population in Malaysia.

Gender and Area of Residence
The study found that gender and area of residence significantly influence awareness and practice of BSE ($p<0.001$). Female students, who predominantly reside in Mahallah Ummu Kalthum, exhibit higher awareness levels compared to their male counterparts, yet both genders demonstrate low practice levels. This is consistent with studies by Akhtari-Zavare et al. (2016), which suggest that targeted interventions should consider these demographic factors to improve overall engagement in BSE practices.

Technological Integration in Awareness Programs
The results indicate that traditional methods of breast cancer education might not be sufficient to instill lasting behavioral changes in BSE practices. Integrating technology into awareness programs, such as mobile apps, online tutorials, and virtual workshops, could provide interactive and engaging platforms for students to learn and practice BSE. Previous studies have shown that technology-enhanced learning tools can significantly improve health education outcomes (Massat et al., 2016; Htay et al., 2021).

Limitations and Recommendations:

The study's limitations include its small sample size and single-institution scope, which may restrict the generalizability of the findings. Future research should include larger, more diverse populations across multiple universities to validate these results. Additionally, implementing and evaluating the impact of innovative technological tools in breast cancer awareness programs could offer valuable insights into enhancing KAP among university students.

Conclusion:

This study underscores the moderate levels of knowledge, attitude, and practice regarding breast cancer and BSE among IIUM Kuantan undergraduates, even after an awareness intervention. Addressing these gaps through the integration of advanced technologies in awareness programs could lead to better outcomes in breast cancer education and early detection practices.

Acknowledgements:

Special thanks to Madam Nisha Sanita Binti Mohd Norha, Mr. Ahmad Nu'man Bin Abdul Rahman, Madam Rosnani Binti Sarkasi and Asst. Prof. Dr. Abdul Alif Bin Abd Hamid for validating and harmonizing the research instruments.

References:

Abera, H., Mengistu, D., & Bedaso, A. (2017). Effectiveness of planned teaching intervention on knowledge and practice of breast self-examination among first year midwifery students. *PLOS ONE*, *12*(9), e0184636.

Abu Samah, A., Ahmadian, M., & Latiff, L. A. (2016). Insufficient Knowledge of Breast Cancer Risk Factors Among Malaysian Female University Students. *Global Journal of Health Science*, *8*(1), 277.

Akhtari-Zavare, M., Juni, M. H., Ismail, I. Z., Said, S. M., & Latiff, L. A. (2015). Barriers to breast self examination practice among Malaysian female students: a cross sectional study. *SpringerPlus*, *4*(1). https://doi.org/10.1186/s40064-015-1491-8

Akhtari-Zavare, M., Juni, M. H., Said, S. M., Ismail, I. Z., Latiff, L. A., & Ataollahi Eshkoor, S. (2016). Result of randomized control trial to increase breast health awareness among young females in Malaysia. *BMC Public Health*, *16*, 1-11.

Ali, A. N., Yuan, F. J., Ying, C. H., & Ahmed, N. Z. (2019). Effectiveness of intervention on awareness and knowledge of breast self-examination among the potentially at risk population for breast cancer. *Asian Oncol Res J*, *2*(1), 1-13.

Alsaraireh, A., & Darawad, M. W. (2017). Impact of a Breast Cancer Educational Program on Female University Students' Knowledge, Attitudes, and Practices. *Journal of Cancer Education*, *34*(2), 315–322.

Asghari, E., Nahamin, M., Khoshtarash, M., Ghanbari, A., Parizad, N., Mahdavi, N., & Asgarlo, Z. (2015). The Relationship Between Health Belief and Breast Self-examination Among Iranian University

Students. *International Journal of Women's Health and Reproduction Sciences*, *4*(3), 110–113.

Cichomska, J., Sak-Dankosky, N., & Czarkowska-Pączek, B. (2020). Knowledge of nursing students about breast cancer prevention. *Pielegniarstwo XXI Wieku / Nursing in the 21st Century*, *19*(2), 102–109.

Fondjo, L. A., Owusu-Afriyie, O., Sakyi, S. A., Wiafe, A. A., Amankwaa, B., Acheampong, E., Ephraim, R. K. D., & Owiredu, W. K. B. A. (2018). Comparative Assessment of Knowledge, Attitudes, and Practice of Breast Self-Examination among Female Secondary and Tertiary School Students in Ghana. *International Journal of Breast Cancer*, *2018*, 1–10.

Ghoncheh, M., Mahdavifar, N., Darvishi, E., & Salehiniya, H. (2016). Epidemiology, incidence and mortality of breast cancer in Asia. *Asian Pacific journal of cancer prevention*, *17*(sup3), 47-52.

Haque, A. E., Mohd Hisham, M. A. B., Ahmad Adzman, N. A. L. B., Azudin, N. A. B., Shafri, N. B., & Haque, M. (2016). Cognizance and utilization about breast cancer screening among the health professional female students and staffs of University Kuala Lumpur, Royal College of Medicine Perak, Malaysia. *Indian Journal of Medical and Paediatric Oncology*, *37*(04), 286–292.

Htay, M. N. N., Donnelly, M., Schliemann, D., Loh, S. Y., Dahlui, M., Somasundaram, S., Nor Saleha, I. T., & Su, T. T. (2021). Breast Cancer Screening in Malaysia: A Policy Review. *Asian Pacific Journal of Cancer Prevention*, *22*(6), 1685–1693.

Massat, N. J., Dibden, A., Parmar, D., Cuzick, J., Sasieni, P. D., & Duffy, S. W. (2015). Impact of Screening on Breast Cancer Mortality: The UK Program 20 Years On. *Cancer Epidemiology Biomarkers & Prevention*, *25*(3), 455–462.

Mehmet, N., Rahimi, A., Donkor, A. G., Alabed, A. A. A., & Lotfizadeh, M. (2020). Knowledge, attitude and practice of breast cancer screening among health science students in Shahrekord City, Iran. *Malaysian Journal of Public Health Medicine*, *20*(21), 178–184.

Ministry of Health Malaysia. (2019). *Clinical Practice Guidelines: Management of Breast Cancer* (3rd ed.). Malaysian Health Technology Assessment Section (MaHTAS).

Ng, C. W. Q., Lim, J. N. W., Liu, J., & Hartman, M. (2020). Presentation of breast cancer, help seeking behaviour and experience of patients in their cancer journey in Singapore: a qualitative study. *BMC Cancer*, *20*(1). https://doi.org/10.1186/s12885-020-07585-8

Pagkatipunan, P. M. N. (2018). Peer Leaders and Phone Prompts: Implications in the Practice of Breast Care among College Students. *Asian Pacific Journal of Cancer Prevention*, *19*(5), 1201–1207.

Qasim, S., Tayyab, H., Zulqadar, K., Masood, S., Qasim, T. B., & Zubair, Z. (2020). Breast Cancer knowledge and perceived barriers to help seeking among pre-clinical and clinical female medical students of King Edward Medical University, Lahore: a cross-sectional study. *BMC Medical Education*, *20*(1). https://doi.org/10.1186/s12909-020-02132-2

Ranganath, R., Muthusami, J., Simon, M., Mandal, T., & Kukkamulla, M. A. (2020). Female medical and nursing students' knowledge, attitudes, and skills regarding breast self-examination in Oman: a comparison between pre- and post-training. *Journal of Educational Evaluation for Health Professions*, *17*, 37.

Sadoh, A. E., Osime, C., Nwaneri, D. U., Ogboghodo, B. C., Eregie, C. O., & Oviawe, O. (2021). Improving knowledge about breast cancer and breast self-examination in female Nigerian adolescents using peer education: a pre-post interventional study. *BMC Women's Health*, *21*(1). https://doi.org/10.1186/s12905-021-01466-3

Sama, C. B., Dzekem, B., Kehbila, J., Ekabe, C. J., Vofo, B., Abua, N. L., Dingana, T. N., & III, F. A. (2017). Awareness of breast cancer and breast self-examination among female undergraduate students in a higher teachers training college in Cameroon. *Pan African Medical Journal*, *28*. https://doi.org/10.11604/pamj.2017.28.91.10986

Shah, S. F., Azman, A., & Baloch, J. (2020). Socio-Cultural Barriers to Early Detection of Breast Cancer Among Malaysian Postgraduate Students. *Progressive Research Journal of Arts and Humanities (PRJAH)*, *2*(2), 67–78.

Siti Noorkhairina, S., & Fadhlin Farhanah, M.F. (2023). Knowledge, Awareness and Breast Self-Examination Practice among Sultan Ahmad Shah Medical Centre@International Islamic University Malaysia Nurses: Follow Up 6 Months Study. *International Journal of Allied Health Sciences*, *7*(2), 2901-2908.

Siti Noorkhairina, S., Fatin Noraliah, A. & Nor Syawanidamia, N. *Knowledge, awareness, and practice on breast cancer among staff nurses in Sultan Ahmad Shah Medical Centre (SASMEC@IIUM), Kuantan, Pahang: preliminary findings.* In: The 11th Annual Indonesian Society for Cancer Chemoprevention Conference and Congress 2020, 9th - 21st November 2020, Yogyakarta, Indonesia. 2020; (Unpublished).

Sung, H., Ferlay, J., Siegel, R. L., Laversanne, M., Soerjomataram, I., Jemal, A., & Bray, F. (2021). Global Cancer Statistics 2020: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. *CA: A Cancer Journal for Clinicians*, *71*(3), 209–249.

Yong, N. T., & Soon, L. K. (2017). The effects of educational intervention on knowledge and practice of breast self-examination among female college students. *International Journal of Public Health and Clinical Sciences*, *4*(6), 120-131.