Artikel Asli/*Original Article*

Knowledge and Awareness of Breast Cancer among Students in the Faculty of Health Sciences, Universiti Kebangsaan Malaysia

Pengetahuan dan Kesedaran Kanser Payudara di kalangan Pelajar-Pelajar Fakulti Sains Kesihatan, Universiti Kebangsaan Malaysia

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ABSTRACT

Breast cancer is the most common cancer in women globally. Early detection improves prognosis and survival rates. In Malaysia, awareness efforts must continue as advanced cases remain high. Therefore, this study aimed to assess the knowledge and awareness of breast cancer and evaluate the effectiveness of a new intervention approach for breast cancer. A cross-sectional study was conducted exclusively among Faculty of Health Sciences students with a total sample of two hundred eighty-eight (288). The Cancer Awareness Measure (CAM) questionnaires were distributed using a simple random technique. A new intervention for breast cancer knowledge and awareness was developed. The effectiveness of pre- and post-intervention was determined. The data was analyzed using SPSS and Microsoft Excel, and the Chi-square and Wilcoxon tests were used. In general, this study reveals that the knowledge and awareness of breast cancer related to risk factors, family history, diet as risk factors, clinical manifestations and treatment were increased after the intervention. However, the practice of breast self-examination was poor among the students of the Faculty of Health Sciences. In conclusion, the study indicated that the intervention was effective in increasing the knowledge and awareness of breast cancer. The awareness of breast self-examination practice needs to be improved because early detection can be achieved and leads to better prognosis and lower mortality

Keywords: breast cancer, awareness, knowledge, intervention

ABSTRAK

Kanser payudara adalah kanser yang paling kerap berlaku di kalangan wanita di seluruh dunia. Pengesanan awal dapat meningkatkan prognosis dan kadar kelangsungan hidup. Di Malaysia, usaha peningkatan kesedaran kanser ini mesti diteruskan kerana kes kritikal yang agak masih tinggi. Oleh itu, tujuan kajian ini adalah untuk menilai tahap pengetahuan dan kesedaran kanser payudara serta menilai keberkesanan pendekatan intervensi baru untuk kanser payudara. Kajian keratan rentas ini telah dijalankan secara eksklusif di kalangan pelajar Fakulti Sains Kesihatan dengan jumlah sampel sebanyak dua ratus lapan puluh lapan (288). Borang soal selidik ukuran kesedaran kanser (CAM) telah diedarkan menggunakan teknik persampelan rawak mudah. Suatu bahan bacaan intervensi untuk pengetahuan dan kesedaran kanser payudara telah dibangunkan. Keberkesanan pada pengetahuan dan tahap kesedaran sebelum dan selepas intervensi telah ditentukan. Data dianalisa menggunakan SPSS dan Microsoft Excel, dan ujian khi kuasa dua dan ujian Wilcoxon digunakan. Secara umumnya, kajian ini mendedahkan bahawa pengetahuan dan kesedaran tentang kanser payudara berkaitan faktor risiko, sejarah keluarga, diet sebagai faktor risiko, manifestasi klinikal dan rawatan meningkat selepas intervensi. Walau bagaimanapun, amalan pemeriksaan sendiri payudara adalah lemah dalam kalangan pelajar Fakulti Sains Kesihatan. Kesimpulannya, kajian menunjukkan bahawa intervensi yang dibangunkan telah berkesan dalam meningkatkan pengetahuan dan kesedaran tentang kanser payudara. Kesedaran terhadap amalan pemeriksaan sendiri payudara perlu dipertingkatkan kerana pengesanan awal boleh dicapai dan membawa kepada prognosis yang lebih baik dan kadar kematian yang lebih rendah.

Kata kunci: kanser payudara, tahap kesedaran, tahap pengetahuan, intervensi.

INTRODUCTION

Breast cancer remains the most common cancer and leading cause of cancer-related deaths among women worldwide, including in Malaysia. According to Malaysia's National Cancer Registry Report (2017–2021), breast cancer accounts for 17.6% of all cancer cases, surpassing colorectal (14.1%), lung (10.1%), and lymphoma (5.2%) cancers. The lifetime risk for Malaysian women is 1 in 20, with the highest age-standardized incidence

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among Chinese (41.1 per 100,000), followed by Indians (37.1 per 100,000) and Malays (27.2 per 100,000). Alarmingly, Malaysia has the highest breast cancer mortality rate in Southeast Asia (18 per 100,000), exceeding rates in Singapore (15) and Thailand (11).

A major concern is the late-stage presentation of most diagnosed cases, attributed to low awareness, cultural stigma, and barriers to healthcare access (Hisham & Yip, 2003). Many Malaysian women delay seeking treatment due to limited knowledge of symptoms, risk factors, and the importance of early screening. To improve survival rates, public health efforts must prioritize awareness and early detection methods, including breast self-examination (BSE), clinical breast exams (CBE), and mammography (Yip et al., 2014).

Despite Malaysia's status as a developed nation and ongoing awareness campaigns, advanced-stage cases remain disproportionately high compared to neighboring countries (Dahlui et al., 2011). Previous literature shows some evidence of inadequate awareness on risk factor and clinical manifestation of breast cancer among Malaysian women (Lee et al., 2019). Furthermore, while numerous campaigns have been conducted, none have systematically measured effectiveness (Loh et al., 2017). This study proposes a new approach to enhance breast cancer awareness and evaluates its impact, addressing critical gaps in current interventions. The interventions produced in this study are based on the findings of previous studies which showed a lack of knowledge or awareness regarding breast cancer, especially among Malaysian women. The novelty in the interventions produced is based on their specific suitability for the Malaysian female population, which is expected to fill a population gap issue. The intervention developed is in the form of an educational booklet of breast cancer knowledge and awareness.

MATERIALS AND METHODS

A cross-sectional survey was conducted from February to June 2019 to assess the knowledge and awareness of breast cancer among undergraduate students in the Faculty of Health Science at Universiti Kebangsaan Malaysia (UKM) while simultaneously developing a new intervention approach and evaluating its effectiveness. The study was carried out at UKM, a public university located in Kuala Lumpur, Malaysia. The study protocol was approved by the Institutional Review Board of the Universiti Kebangsaan Malaysia with the approval number NN-2019-058.

The sampling criteria for this research included female and male students from the Faculty of Health Science, UKM, aged 18 and above, with proficiency in English. The exclusion criteria encompassed students of diagnostic imaging and radiotherapy, as all were engaged in the oncology domain, which would compromise the integrity of the data collected. Moreover, it can prevent potential bias due to their specialized oncology training. A cluster sampling procedure was implemented to choose a sample of 1,147 students from the list of Faculty of Health Science students. The cluster was divided based on the student's course type, and then a random selection of these clusters is chosen as the sample. Both email address and phone number are selected from the sample. From a total of 1147 individuals, 288 were invited to complete the questionnaire via face-to-face interaction and Google Forms.

This study employed a structured multiple-choice questionnaire in English, utilizing the Breast Cancer Awareness Measure (Breast CAM). The survey instrument received authorization from Cancer Research UK, and the validated questionnaire was developed by Kline (1932), demonstrating an internal reliability test score exceeding 0.7, which is deemed satisfactory for all components. The reliability test from a pilot study conducted on 30 university students in Malaysia using this questionnaire yielded a Cronbach's alpha of 0.91.

The Google form survey encompasses socio-demographic data pertinent to the analyses, including age, courses (Biomedical Science, Audiology, Optometry, Occupational Therapy, Physiotherapy, Nutrition, Dietetics, Speech Therapy, Environmental Health, Forensic Science), year of study (1, 2, 3 and 4), ethnicity (Malay, Chinese, Indian, others), languages spoken (Malay, Chinese, Tamil, English, others), marital status (single, married, divorced, others), living arrangements (own house, renting, college, others) and cancer history (personal or familial). The survey consisted of a total of 27 questions, with 12 focusing on the respondent's socio-demographic characteristics and the remaining questions covering general facts about breast cancer and screening, risk factors, signs and symptoms, and barriers to meeting with doctors. A five-point Likert-type scale was utilized, ranging from strongly agree to strongly disagree, to elicit the risk factors of breast cancer.

The intervention of breast cancer knowledge and awareness was developed in the form of a booklet or brochure tool. The content of the intervention booklet includes knowledge of symptoms, risk factors, screening practices, barriers to screening, attitudes and belief of breast cancer. The

TABLE 1 Demographic characteristics of the respondents

	Total (n=288)	(%)
Age Mean (SD)	21.89 (±1.784)	
Gender		
Male	42	14.6
Female	246	85.4
Year		
1	93	32.3
2	53	18.4
3	68	23
4	74	25.7
Course		
Biomedicine	82	28.5
Optometry	50	17.4
Audiology	15	5.2
Speech therapy	35	12.2
Physiotherapy	21	7.3
Occupational therapy	21	7.3
Environmental Health	23	8.0
Dietetic	19	6.6
Nutrition	22	7.6
Races		
Malay	176	61.1
Chinese	66	22.9
Tamil	42	14.6
Other	4	1.4
Marital Status		
Single	286	99.3
Married	2	0.7
Living arrangement		
College	220	76.4
Renting	40	13.9
Own House	28	9.7
Employment Status		
Full-time studying	279	96.9
Employed part-time while studying	9	3.1
History of breast cancer		
Yes	60	20.8
No	228	79.2

intervention tool also includes diagrams to show the physical symptoms of breast cancer and how to perform breast self-examination. The design of the intervention booklet is quite simple, attractive and easy to understand.

The intervention session was conducted in three phases. Phase I: The intervention tool was developed by generating an educational booklet. The researchers generated the information and communication, and the brochure's contents were composed in English and sent to all participants of the intervention group following the pre-intervention phase. Phase II: This phase involved a pre-intervention session during which data was obtained utilizing the Breast CAM questionnaires through interviews and an online Google form comprising structured, multiple-choice, open, and closed questions. The participants were apprised of the study's nature, ensuring complete anonymity and informed consent was obtained.

Participants were divided into two groups: intervention and control. The initial 144 individuals were assigned to the intervention group, while the remaining 144 were allocated to the control group.

TABLE 2 Knowing any of the warning signs of breast cancer

	Pre n (%)	Post n (%)	Chi-square, *p*-value
Intervention Group			
Do you know any of the warning signs of breast cancer			
Yes	128 (88.9)	141 (97.9)	$\chi^2 = 0.0246$,
No	16 (11.1)	3 (2.1)	$p = 0.002029$
Control Group			
Do you know any of the warning signs of breast cancer			
Yes	120 (83.3)	119 (82.6)	$\chi^2 = 9.523$,
No	24 (16.7)	25 (17.4)	$p = 0.0246$

TABLE 3 Contacting doctor about a change noticed in one of the breasts by respondents

	Pre n (%)	Post n (%)	Chi-square, *p*-value
Intervention Group			
Have you ever been to see a doctor about a change you have noticed in one of your breasts			
Yes	17 (11.8)	16 (11.1)	$\chi^2 = 0.4063$,
No	43 (29.9)	48 (33.3)	$p = 0.938939$
Never noticed a change in one of my breasts	81 (56.3)	77 (53.5)	
Don't Know	3 (2.1)	3 (2.1)	
Control Group			
Have you ever been to see a doctor about a change you have noticed in one of your breasts			
Yes	8 (5.6)	8 (5.6)	$\chi^2 = 0.0658$,
No	56 (38.9)	56 (38.9)	$p = 0.0658$
Never noticed a change in one of my breasts	72 (50.0)	71 (49.3)	
Don't Know	8 (5.6)	9 (6.3)	

The intervention group received the pamphlet to review prior to the post-intervention assessment. Phase III: Following a two-week interval after Phase II, a post-intervention survey was administered to assess the impact of the educational intervention. The identical instrument was employed during the pre-intervention and post-intervention phases for both groups.

Data were obtained by face-to-face interviews and online through Google Forms, utilizing a structured, multiple-choice questionnaire, and analyzed using SPSS version 25. The frequency analysis was illustrated with a chart, figures, and a table to convey the frequency and percentage of the demographic findings. The Chi-square test was employed to examine the connection between pre-intervention and post-intervention variables, with a p-value of less than 0.05 deemed statistically significant. The Wilcoxon signed-rank test was employed for the ranking question to analyze the link between pre-intervention and post-intervention, with a p-value of less than 0.05.

RESULTS

The study included 144 participants (mean age 21.9±1.784), predominantly female, Malay (61.1%), single (99.3%), and full-time students (96.9%). Notably, 20.8% reported a history of breast cancer (Table 1).

TABLE 4 Knowledge of age-related and lifetime risk

	Pre n (%)	Post n (%)	Chi-square, *p*-value
Intervention Group			
In the next year, who is most likely to get breast cancer			
A 30-year-old woman	44 (30.6)	16 (11.1)	$\chi^2 = 145.7939$,
A 50-year-old woman	26 (18.1)	14 (9.7)	$p = 0.00001$
A 70-year-old woman	1 (0.7)	97 (67.4)	
A woman of any age	65 (45.1)	16 (11.1)	
Don't know	8 (5.6)	1 (0.7)	
How many women will develop breast cancer in their Lifetime			
1 in 3 women	10 (6.9)	8 (5.6)	$\chi^2 = 49.2691$,
1 in 9 women	70 (48.6)	123 (85.4)	$p = 0.00001$
1 in 100 women	53 (36.8)	9 (6.3)	
1 in 1000 women	11 (7.6)	4 (2.8)	
Control Group			
In the next year, who is most likely to get breast cancer			
A 30-year-old woman	37 (25.7)	44 (30.6)	$\chi^2 = 1.4971$,
A 50-year-old woman	17 (11.8)	20 (13.9)	$p = 0.82716$
A 70-year-old woman	0 (0.0)	1 (0.7)	
A woman of any age	80 (55.6)	71 (49.3)	
Don't know	10 (6.9)	8 (5.6)	
How many women will develop breast cancer in their Lifetime			
1 in 3 women	18 (12.5)	23 (16.0)	$\chi^2 = 2.422$,
1 in 9 women	65 (45.1)	72 (68.5)	$p = 0.48955$
1 in 100 women	48 (33.3)	40 (27.8)	
1 in 1000 women	13 (9.0)	9 (6.3)	

The respondents' knowledge about the signs and symptoms of breast cancer was determined and compared before and after the intervention. 88.9% of respondents from the intervention group and 83.3% of respondents from the control group knew the warning signs of breast cancer (Table 2). There was a significant increase in breast cancer signs and symptoms knowledge in the post-intervention group, χ^2 (1, N = 144) = 0.0246, p = 0.002), while there were no changes in the control group. There was a total of eleven signs of breast cancer. A lump or thickening in the breast and a lump or thickening under the armpit were the most frequently correctly identified signs of breast cancer (Figure 1). Figure 2 shows most participants rarely performed breast self-exams, with no significant post-intervention changes (intervention: W=636.5, p=0.131; control: W=294.5, p=0.078). Notably, 42.4% (intervention) and 38.2% (control) reported noticing breast changes pre-study (Figure 3). The confidence level of respondents to notice a change in their breasts was significant after the intervention (W = 645.5, p = 0.00001), but it was not significant in the control group (W = 1025.5, p = 0.92034). The percentages of respondents, pre-intervention (56.3%) and pre-control (50%), were not to see the doctor because they never noticed a change in one of the breasts. The post-intervention results showed no significant, χ^2 (1, N = 144) = 0.4063, p = 0.9389) (Table 3). The respondents' delay in contacting the doctor about a change they noticed in one of their breasts was also assessed. Many respondents from the pre-intervention group were aware that they should act within a week (36.1%), followed by immediate action (30.6%). The awareness of contacting doctors significantly increased (W = 662.5, p = 0.01778) after the intervention. However, respondents from the control group were more aware, as 44.4% of pre-control respondents and 45.1% of post-control respondents answered to contact the doctor immediately (Figure 4). Figures 5 and 6 illustrate the barriers that may deter respondents from visiting the doctor. Both groups cited being too busy to see the doctor and having too many other worries as their primary barriers.

TABLE 5 Knowledge of breast screening

	Pre n (%)	Post n (%)	Chi-square, *p*-value
Intervention Group			
At what age are women first invited to the Breast Screening Programme?			
20 – 30	78 (54.2)	24 (16.7)	$\chi^2 = 127.2764$,
31 – 40	25 (17.4)	15 (20.0)	$p = 0.00001$
41 – 50	9 (6.3)	100 (69.4)	
51 – 60	2 (1.4)	1 (0.7)	
Don't know	30 (20.8)	4 (2.8)	
At what age do women receive their last invitation to the Breast Screening Programme?			
20 – 30	5 (3.5)	0 (0.0)	$\chi^2 = 89.5948$,
31 – 40	5 (3.5)	1 (0.7)	$p = 0.00001$
41 – 50	24 (16.7)	10 (6.9)	
51 – 60	34 (23.6)	114 (74.0)	
Don't know	76 (52.8)	19 (13.2)	
Have you ever been invited for breast screening on the Breast Screening Programme			
Yes	29 (20.1)	22 (25.5)	$\chi^2 = 1.3526$,
No	110 (76.4)	118 (81.9)	$p = 0.508496$
Don't know	5 (3.5)	4 (2.8)	
Control Group			
At what age are women first invited to the Breast Screening Programme?			
20 – 30	82 (56.9)	86 (59.7)	$\chi^2 = 1.1614$,
31 – 40	25 (17.4)	29 (20.1)	$p = 0.884416$
41 – 50	10 (0.5)	6 (4.2)	
51 – 60	1 (1.4)	0 (0.0)	
Don't know	26 (18.1)	23 (16.0)	
At what age do women receive their last invitation to the Breast Screening Programme?			
20 – 30			
31 – 40	8 (5.6)	13 (9.0)	$\chi^2 = 7.2039$,
41 – 50	9 (6.3)	8 (5.6)	$p = 0.125495$
51 – 60	11 (7.6)	20 (13.9)	
Don't know	22 (15.3)	29 (20.1)	
	94 (65.3)	74 (51.4)	
Have you ever been invited for breast screening on the Breast Screening Programme			
Yes	12 (8.3)	16 (11.1)	$\chi^2 = 2.1008$,
No	124 (86.1)	115 (79.9)	$p = 0.349795$
Don't know	8 (5.6)	13 (9.0)	

86.1% of respondents from both groups reported that they worry about whether the doctor's time is not a barrier to seeking medical help. There was no significant difference between pre-and post-intervention and control groups. Figure 7 shows knowledge of age-related and lifetime risks. Only 0.7% of respondents from the pre-intervention and none of the respondents of pre-control have correctly answered the age of women who are most likely to get breast cancer in the next year. Most respondents have answered that a woman of any age is most likely to get breast cancer in the upcoming years. However, following the intervention, there was a significant increase in the knowledge of the correct age, which is 70-year-old women, χ^2 (1, N = 144) = 145.79, p = 0.0001) (Table 4). Half of the total respondents are aware that 1 in 9 women will develop breast cancer in their lifetime (Figure 8).

The respondents' knowledge of breast screening was also being evaluated. 54.2% of the respondents from the pre-intervention group and 56.95% of respondents from the pre-control group have wrongly answered where women were first invited to the breast screening program at the ages of 20 to 30 (Figure 9). 52.8% and 65.3% of respondents in the pre-intervention group and pre-control group do not know at what aged women received their last

invitation to the breast screening program (Figure 10).

TABLE 6 Knowledge of risk factors of breast cancer

	Wilcoxon, *p*-value	
	Intervention	Control
Having a history of breast cancer	W = 616, *p* = 0.00001	W = 456.5, *p* = 0.36812
Using HRT (Hormone Replacement Therapy)	W = 510.5, *p* = 0.00001	W = 475, *p* = 0.63122
Drinking more than 1 unit of alcohol a day	W = 351.5, *p* = 0.00001	W = 601.5, *p* = 0.00854
Being overweight (BMI over 25)	W = 888, *p* = 0.00001	W = 470, *p* = 0.0703
Having a close relative with breast cancer	W = 1129, *p* = 0.00338	W = 555, *p* = 0.22246
Having children later in life or not at all	W = 550.5, *p* = 0.00001	W = 542, *p* = 0.05614
Starting your periods at an early age	W = 131,5, *p* = 0.00001	W = 362, *p* = 0.00782
Having a late menopause	W = 377.5, *p* = 0.00001	W = 499.5, *p* = 0.36282
Doing less than 30 mins of moderate physical activity 5 times a week	W = 952, *p* = 0.00001	W = 290, *p* = 0.00046

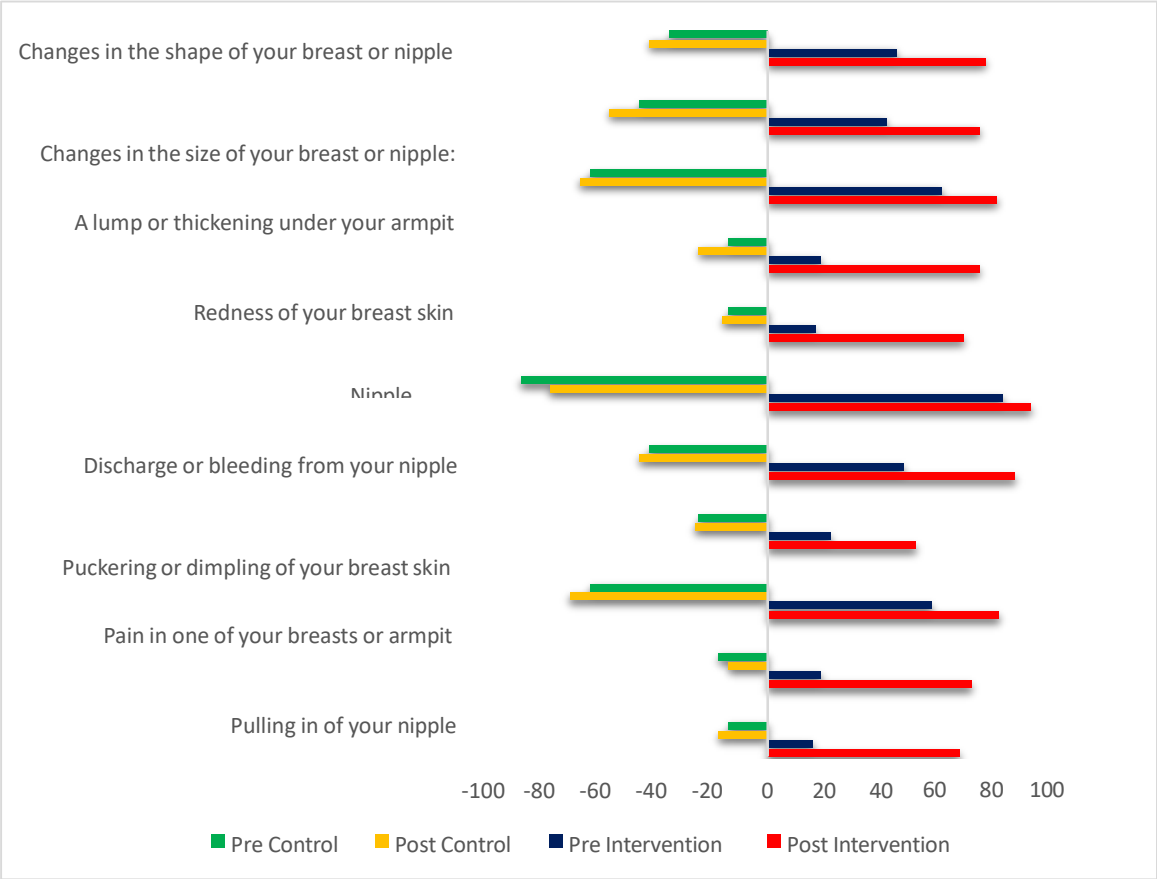

FIGURE 1 Signs of breast cancer known by respondents pre- and post- in both intervention and control groups.

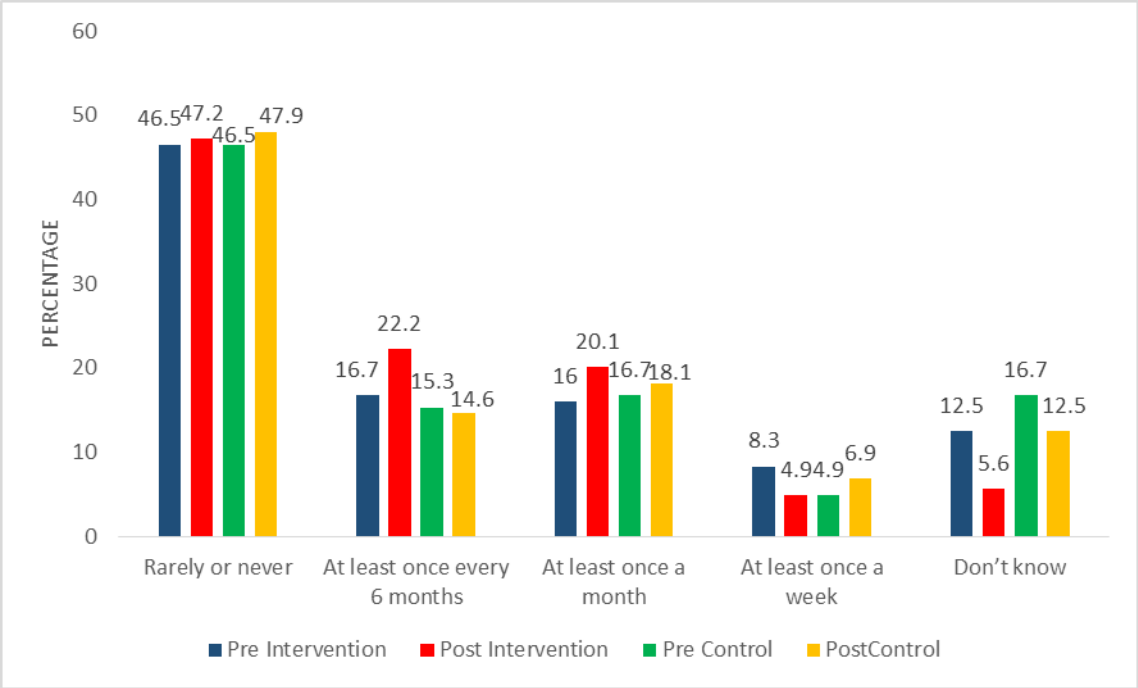

FIGURE 2 How often do respondents check their breasts.

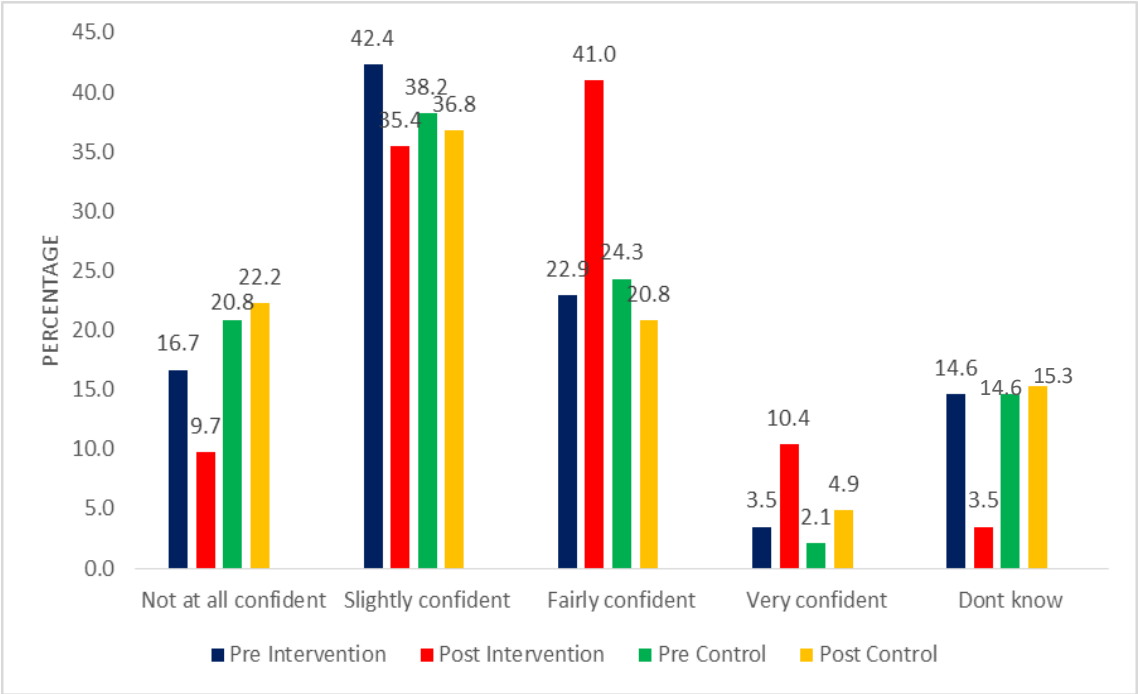

FIGURE 3 Confidence level to notice a change in breasts

The knowledge of breast screening was significantly increased in the post-intervention ($p < 0.05$), where seventy-four per cent of respondents answered correctly but not significantly in the post-control. (Table 5). Many of the respondents from both intervention and control groups have never been invited to breast screening programs (76.45% and 86.1%, respectively) (Figure 11).

Pre-intervention, 81% were uncertain about hormone replacement therapy (HRT) linking to breast cancer (Figure 12), while 42.4% of controls correctly identified personal history as a risk factor (Figure 13). Table 6 showed that post-intervention knowledge improved significantly ($p< 0.05$), though gaps remained regarding physical activity's protective effects (< 30 mins 5x times/week).

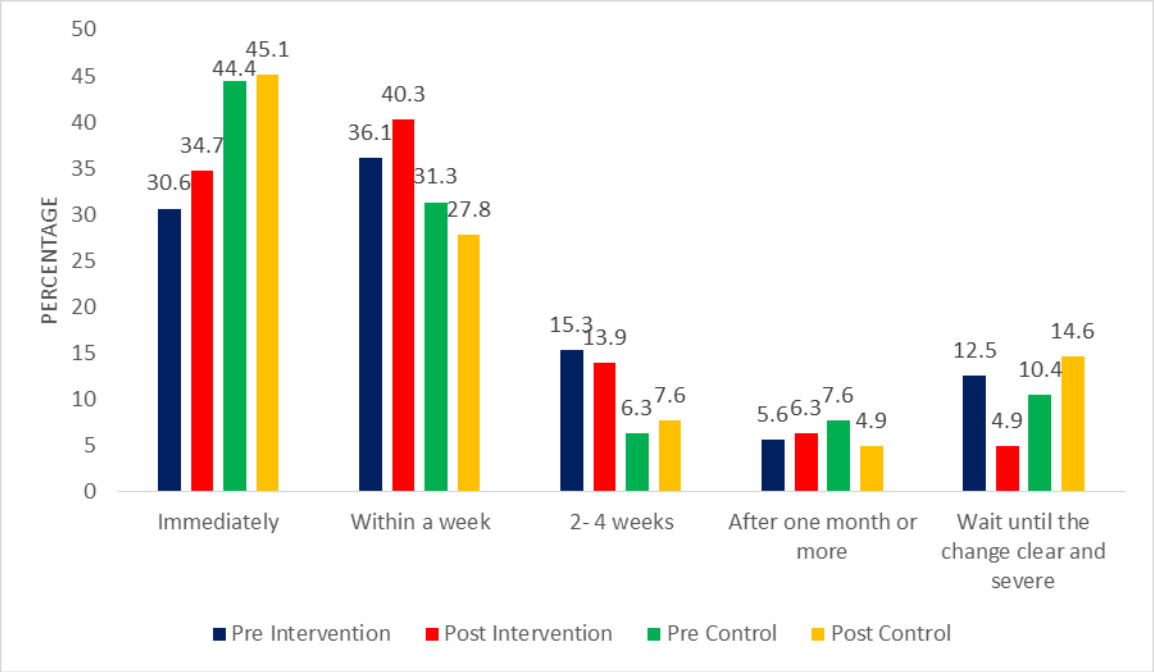

FIGURE 4 Delay in contacting the doctor.

DISCUSSION

Our findings demonstrate that while UKM health science students possess good baseline knowledge of breast cancer's primary signs (particularly breast lumps, consistent with Madhukumar et al.'s 2017 findings), significant gaps remain regarding less common symptoms like nipple changes. This knowledge deficit likely stems from insufficient public health education about the full spectrum of breast cancer manifestations. The educational intervention successfully enhanced symptom recognition, underscoring the value of targeted awareness campaigns in improving early detection capabilities.

Concerningly, BSE practices were alarmingly low among participants, mirroring Suh et al.'s (2012) findings, with many students citing technical unfamiliarity and asymptomatic status as barriers - consistent with Akhtari-Zavare et al.'s (2015) identified challenges. The persistent low BSE adherence post-intervention suggests that single educational sessions may be insufficient to change entrenched behaviors, contrasting with Avci et al.'s (2014) more positive Turkish data. This discrepancy may reflect cultural differences in health practices or more robust BSE promotion in other healthcare systems.

Participants exhibited only moderate confidence in detecting breast changes, notably lower than Forbes et al.'s (2011) UK cohort. This disparity may reflect age-related risk perception differences, as our younger population likely underestimates personal susceptibility. Swami et al.'s (2018) findings regarding body image concerns further complicate this issue, suggesting psychological barriers may compound knowledge deficits in breast health monitoring.

Time constraints emerged as the predominant barrier to medical consultation, aligning with Al-Azri et al.'s (2015) Omani study and Forbes et al.'s (2014) UK cancer presentation data. This highlights a critical challenge in young adult healthcare engagement, where academic commitments may inadvertently compromise preventive health behaviors.

Notable knowledge gaps persisted regarding breast cancer epidemiology, with most participants misunderstanding age-related risks and lifetime incidence (1 in 9 women), paralleling Dinegde et al.'s (2017) Chinese findings. While our intervention improved these metrics, the baseline deficiencies suggest current health education curricula may inadequately address cancer epidemiology. Screening knowledge proved particularly deficient, likely because Malaysian programs typically target women >30 years old (AlBlooshi et al. 2017). This exposes a critical gap in preparing young women for future screening participation. Risk factor understanding showed similar deficits, particularly regarding HRT implications concerning gap given its established association with breast cancer (particularly combined estrogen-progestin therapy). While our intervention improved overall risk knowledge, persistent misconceptions about physical activity's protective effects indicate areas needing reinforced education These findings collectively suggest that while targeted interventions can improve breast cancer knowledge, multifaceted approaches addressing psychological barriers, practical skills training, and repeated reinforcement may be

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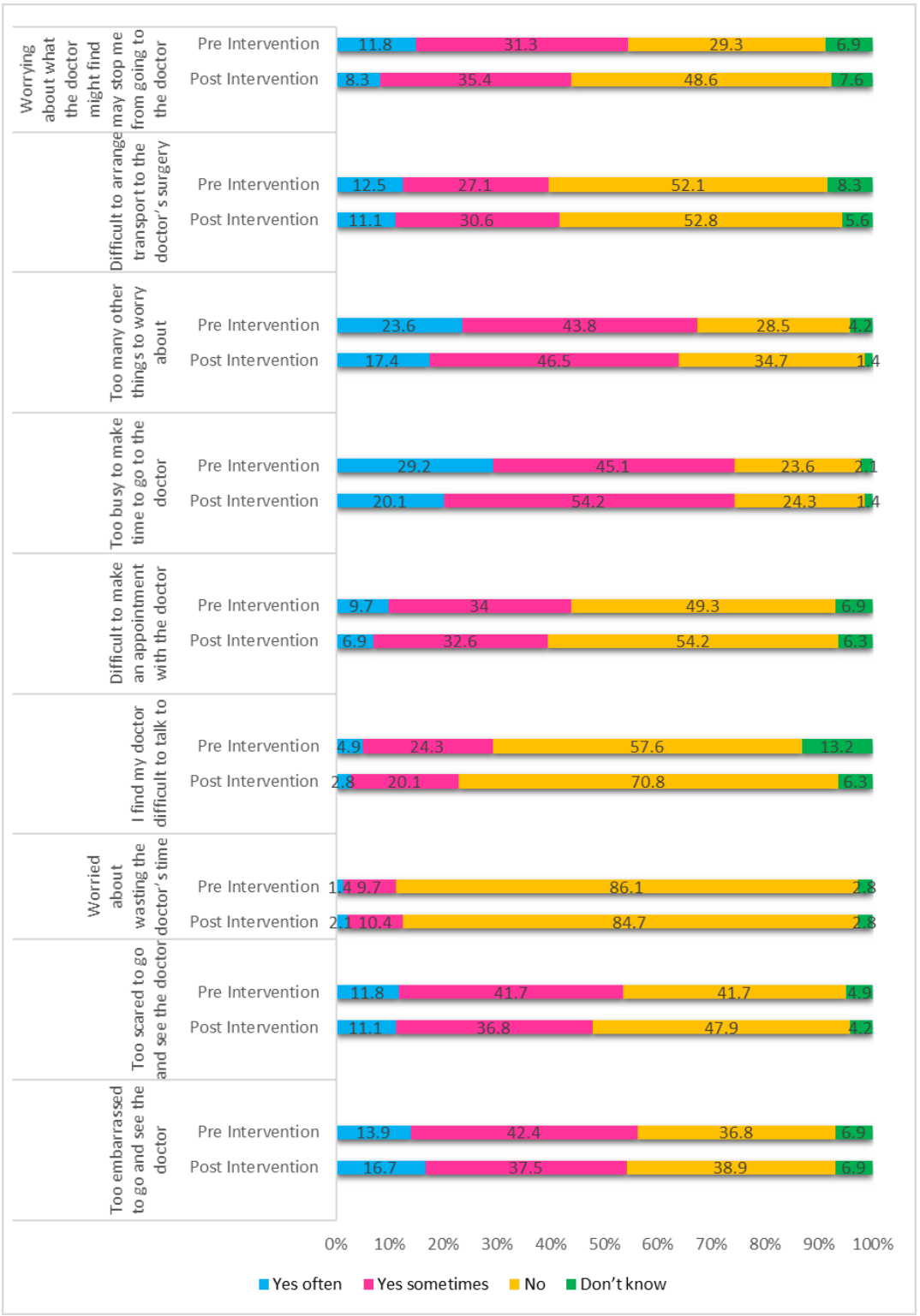

FIGURE 5 Delay in contacting the doctor.

FIGURE 6 Barrier to seeking medical help in the control group.

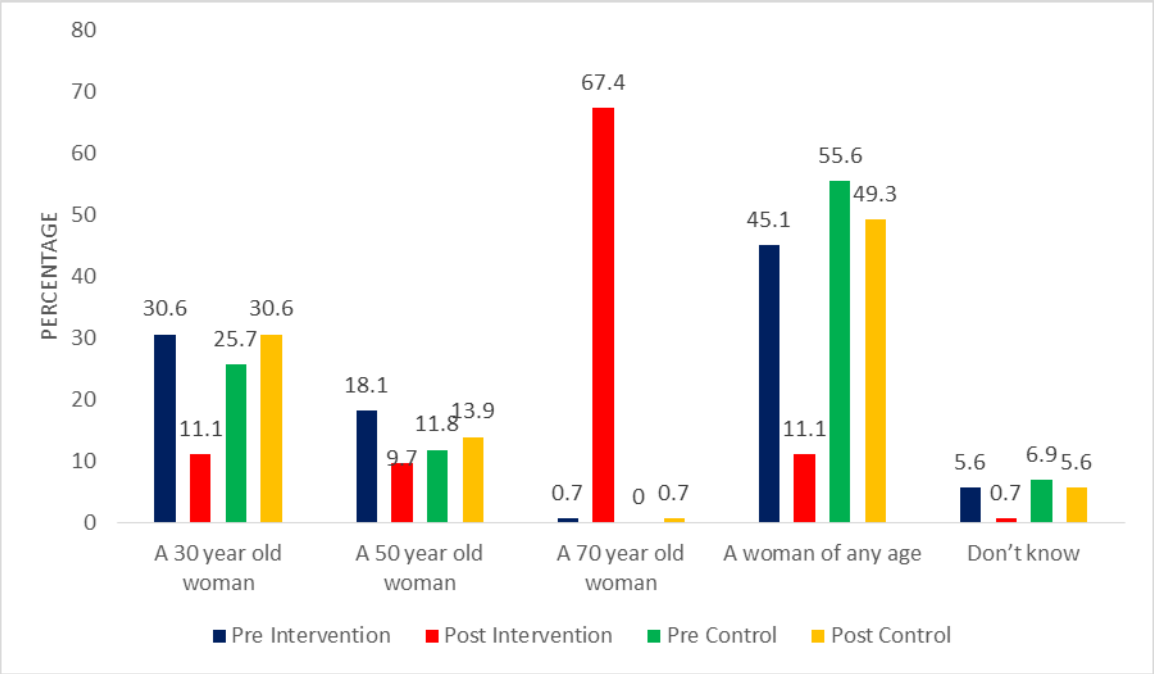

FIGURE 7 Age of women who are most likely to get breast cancer known by respondents pre and post- in both intervention and control group.

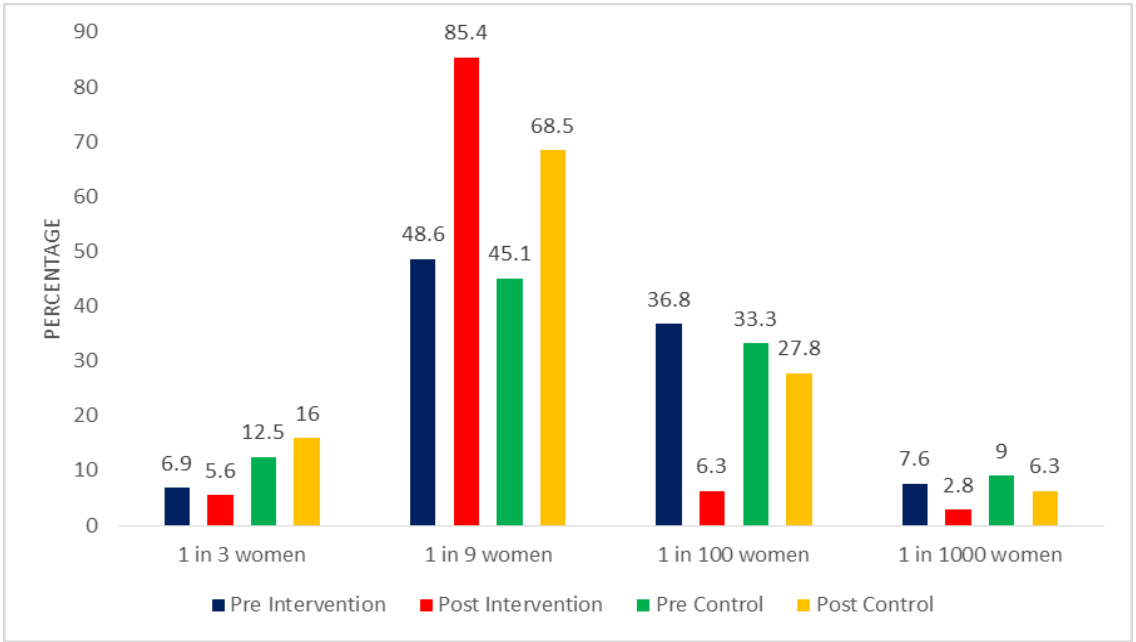

FIGURE 8 Number of women who will develop breast cancer in their lifetime known by respondent pre- and post- in both intervention and control group.

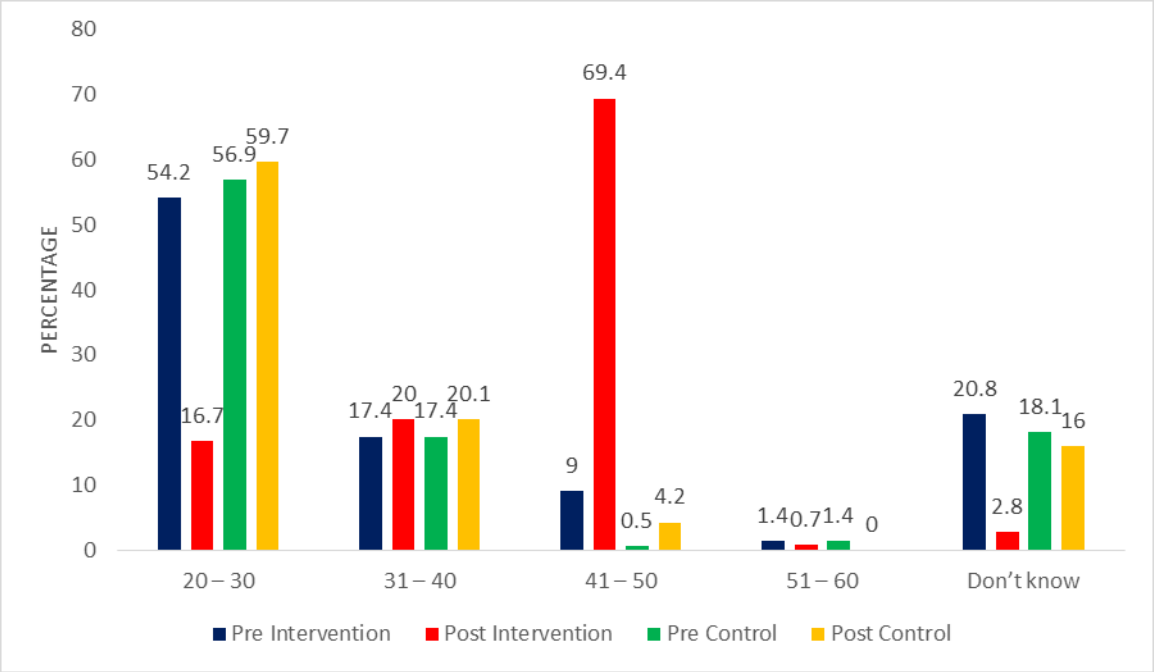

FIGURE 9 The age of women first invited to the Breast Screening Program known by respondents pre- and post- in both intervention and control groups.

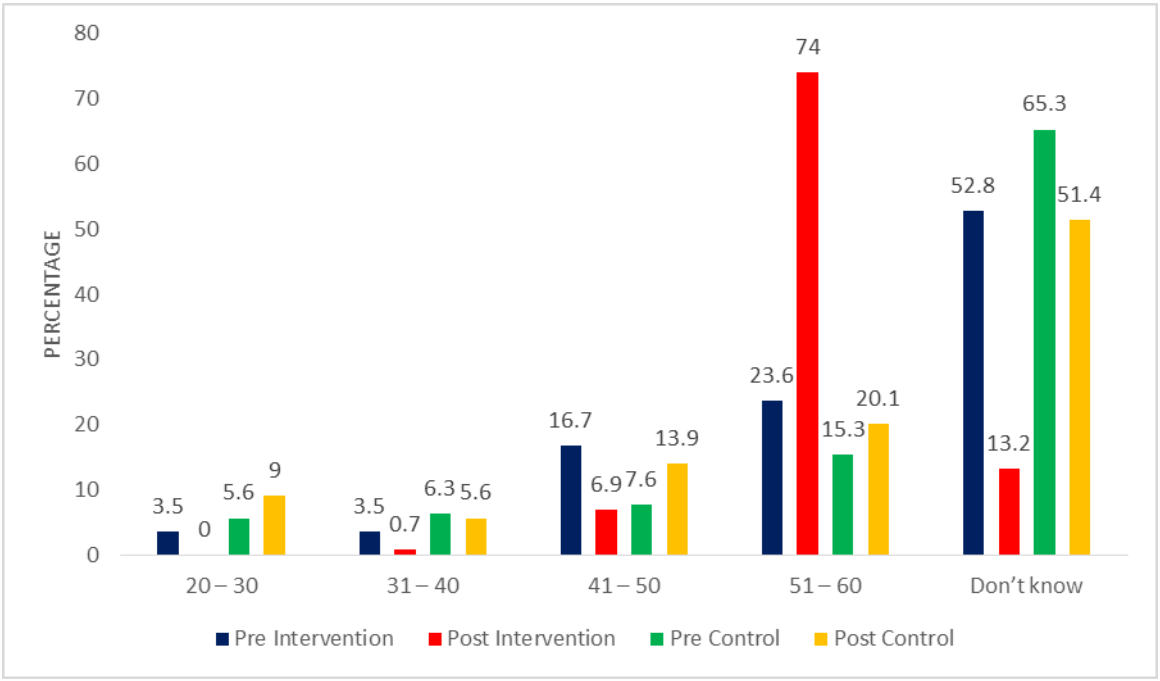

FIGURE 10 The age of women who received their last invitation to the Breast Screening Program, known by respondents pre- and post-in both intervention and control groups.

necessary to translate knowledge into lasting behavioral change. Future interventions should particularly address the unique needs and perceptions of young adult populations while preparing them for lifelong breast health vigilance. Different age groups and prior knowledge among the participants might be a main limitation in this study. The study's findings should be interpreted considering several limitations, particularly concerning participant demographics and baseline knowledge. First, the relatively young age range of respondents (mean age 21.9 years) may have influenced their perceptions of breast cancer risk and health-seeking behaviors. Younger individuals often underestimate their susceptibility to breast cancer, which could explain the low rates of breast self-examination and limited awareness of screening protocols. This contrasts with older populations, who may be more attuned to cancer risks due to age-related health concerns.

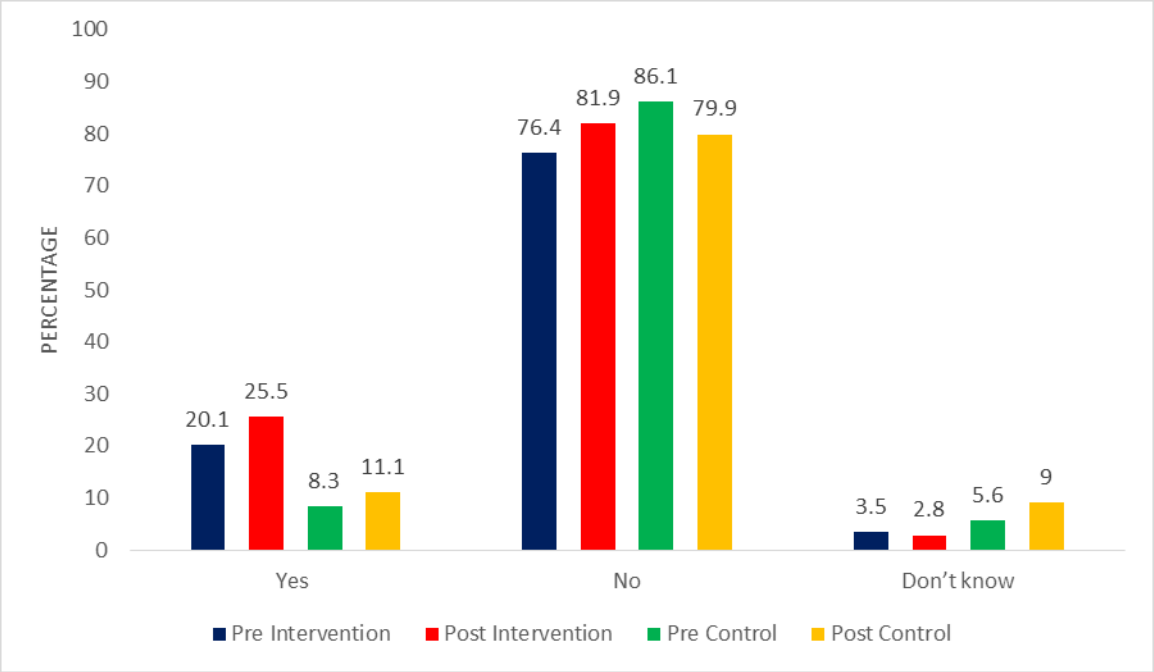

FIGURE 11 Respondents who have been invited for the Breast Screening Program pre- and post- in both intervention and control group

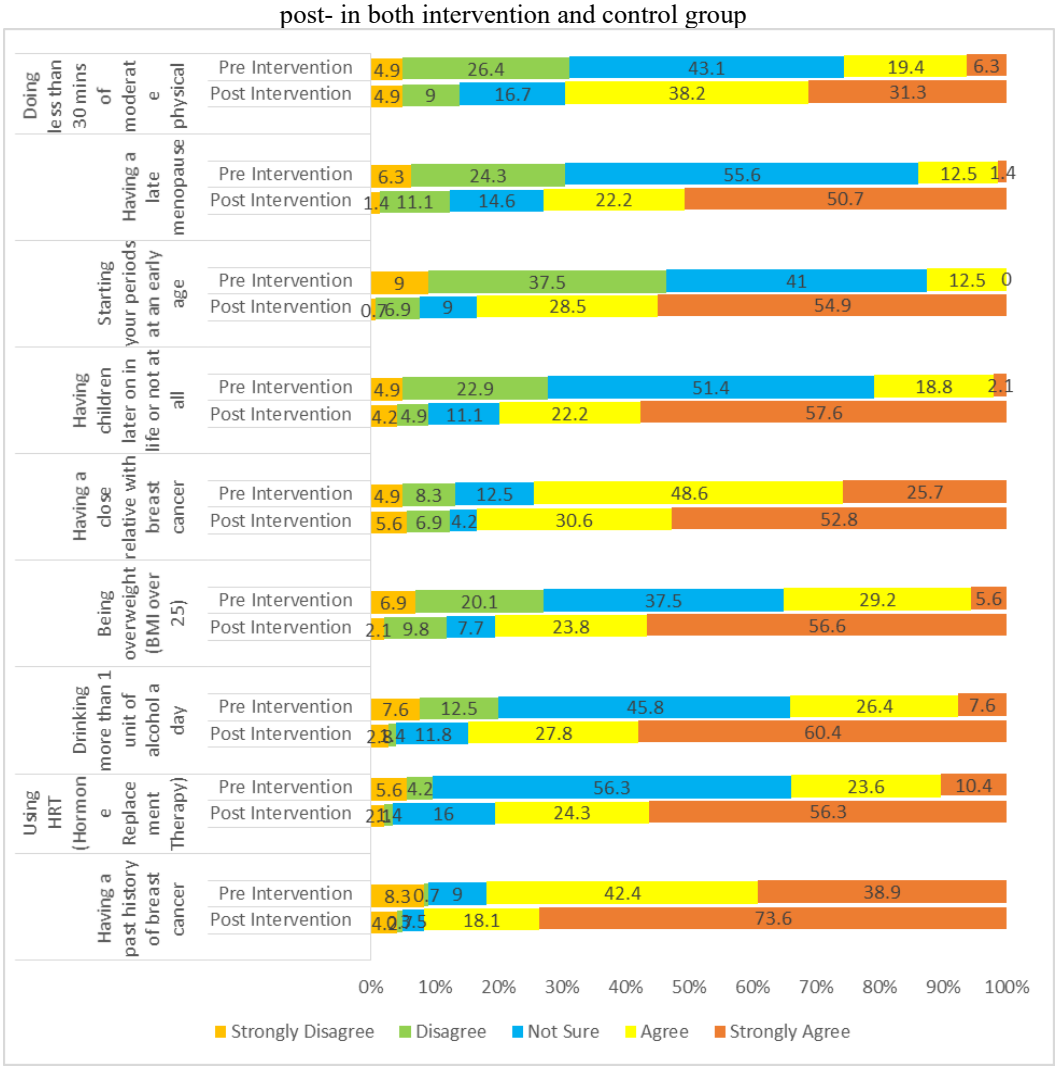

FIGURE 12 Risk factors known by respondents in pre- and post-intervention

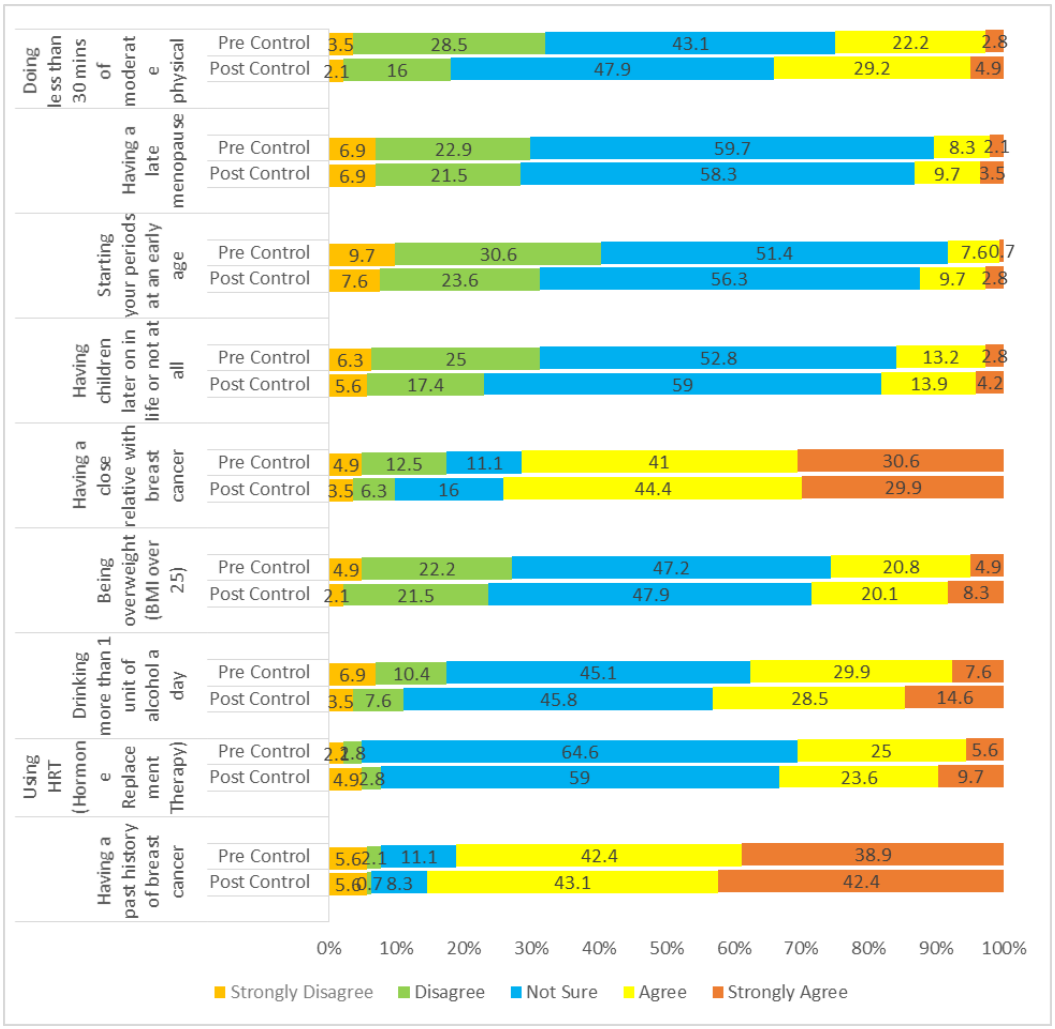

FIGURE 13 Risk factors known by respondents in pre- and post-control

Additionally, the participants' prior knowledge of breast cancer was not uniformly assessed before the intervention, potentially creating variability in baseline understanding. Health science students may have had greater initial awareness compared to the general population, which could skew the intervention's perceived effectiveness. The study also did not account for differences in academic year or prior coursework exposure to oncology topics, which might have influenced individual responses. Furthermore, the homogeneity of the sample which primarily consisting of young, single, female university students can limits the generalizability of findings to broader demographic groups, including older women, working professionals, or those from different socioeconomic backgrounds. Future research should incorporate a more diverse age range and assess baseline knowledge more comprehensively to better evaluate intervention effectiveness across different population segments.

These limitations highlight the need for longitudinal studies that track knowledge retention and behavioral changes over time, as well as investigations into how age and prior health education influence breast cancer awareness and preventive practices. Addressing these factors could enhance the design of future interventions to ensure they are appropriately tailored to the target audience's needs and knowledge levels.

CONCLUSION

The study concludes that the new approach of intervention in the form of the educational brochure on breast cancer awareness was practical and raised awareness among the Faculty of Health Science UKM students. To scale up this intervention, universities should integrate breast cancer education into orientation programs and curricula, supplemented by peer-led BSE workshops and digital campaigns. Partnering with health clinics for hands-on training and implementing reminder systems can improve BSE practice. Institutional policies should mandate annual awareness sessions, while collaborations with national health organizations can expand reach. Ongoing evaluations will ensure effectiveness, transforming this into a sustainable public health initiative.

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