RESEARCH ARTICLE

Breast Cancer Awareness, Attitudes, and Practices among Non-Medical Female Undergraduates in Sri Lanka: Implications for Health Education and Early Detection Strategies

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Abstract

Objective: This study investigates breast cancer-related knowledge, attitudes, and practices (KAP) among non-medical female undergraduates in Sri Lanka. It aims to inform targeted interventions that enhance health education, promote early detection, and improve health outcomes. **Methods:** A cross-sectional survey was conducted among 455 non-medical female undergraduates from five state universities using stratified random sampling. Data were collected via a structured, pre-tested questionnaire assessing demographics and KAP related to breast cancer. SPSS Version 23 was used for analysis, and Kruskal-Wallis tests examined associations between demographic variables and KAP indicators. **Results:** Overall, 67% of participants demonstrated good knowledge of breast cancer. Awareness was high for early detection methods (91.2%) and clinical breast examinations (93.2%) but lower for mammography (46.8%) and treatment options (49.7%). Knowledge gaps were significant regarding age-related risk factors and symptom recognition (p < 0.05). Attitudes were positive, with 97.8% interested in learning about risk factors and 94.1% prioritizing symptom awareness. Key demographic factors ethnicity, religion, and province were significantly associated with KAP variations, including clinic attendance (p = 0.001, p = 0.002) and preference for female doctors (p = 0.083, p = 0.077). Age was linked to passivity in health decision-making (p = 0.042), and marital status influenced information-sharing behaviour (p = 0.000). Universities and the National Cancer Control Programme were the most trusted information sources. **Conclusion:** The study highlights strong general awareness and positive attitudes but identifies critical knowledge gaps, especially around mammography and risk factors. Sociodemographic factors significantly influence KAP outcomes. These findings highlighted the need for culturally responsive, demographically tailored educational initiatives. Strengthening university-based and national awareness programs is essential to improving early detection and reducing the breast cancer burden among young women in Sri Lanka.

Keywords: Health Education- Students- Breast Neoplasms/prevention & control- Early Detection of Cancer- Sri Lanka.

Introduction

Breast cancer is the most commonly diagnosed cancer among women globally, accounting for approximately 25% of all female cancer cases [1]. In Sri Lanka, breast cancer deaths totalled 1,991 in 2022, making up 1.4% of all deaths, with the country ranked 124th worldwide for breast cancer-related mortality [2]. Breast cancer incidence rates in Sri Lanka were 4,447 cases in 2019 and 5,189 in 2020 [3, 4]. According to the National Cancer Registry, breast cancer is the third most prevalent cancer among females aged 15-34 years, constituting 9.7% of all cancers in this age group [5]. Early detection through awareness and screening is crucial in reducing the high mortality rate associated with breast cancer. However, in developing countries like Sri Lanka, effective utilization of screening programs faces significant challenges due to low awareness and limited engagement among women. Research from other countries has emphasized the importance of addressing these barriers. Therefore, developing effective information dissemination strategies is critical to increase awareness among Sri Lankan women.

Access to accurate, reliable information about breast cancer is essential for raising awareness, facilitating early detection, and promoting prevention. Understanding information behaviour and its impact on non-medical female undergraduates in Sri Lanka is vital for customizing educational programs and interventions to improve breast cancer awareness and prevention. This study aims to explore the provision of breast cancer-related information, identify the outcomes of information dissemination, and provide recommendations for improving information delivery among non-medical female undergraduates.

The growing incidence of breast cancer globally,

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and particularly in developing countries like Sri Lanka, emphasizes the need for effective awareness and prevention strategies among young women. To this end, the Knowledge, Attitudes, and Practices (KAP) model is an excellent paradigm for ascertaining how information affects health-related behaviour. The KAP model, widely used by WHO and other global health bodies, provides a structured approach to evaluating health-related knowledge, attitudes, and practices [6] .KAP surveys have been widely applied in public health to assess gaps and inform targeted interventions [7]. The KAP model describes how individuals' health behaviours are determined by what they know (knowledge), how they feel (attitudes), and what they do (practices) concerning a particular health issue. Applying the model to breast cancer, it is possible to measure undergraduates' knowledge of risk factors and symptoms, attitudes and beliefs about breast cancer, and practice preventive activities such as breast self-examinations. Supporting this, the Health Belief Model (HBM) provides a more detailed analysis by understanding how perceived susceptibility, perceived severity, and perceived action benefits influence health decisions moderated by demographics and cues to action. For female undergraduate non-medical students whose course materials related to health may not be their official education, both the KAP and HBM models give important information on the cognitive and behavioural determinants of breast cancer prevention. Together, these models inform the conceptual framework for this study of how knowledge turns into attitudes and health-promoting behaviours in a university setting.

Globally, studies on KAP concerning breast cancer reveal gaps in awareness, even in developed and developing countries in Asia, Africa, and the Middle East. Unfortunately, Sri Lanka lags in addressing breast cancer awareness among non-medical female undergraduates. While several studies have explored breast cancer-related information-seeking behaviour among women in Sri Lanka [8-13] there is a notable lack of research specifically targeting the knowledge, attitudes, practices, information needs, sources, satisfaction, sharing, and dissemination of information among female undergraduates.

One pivotal study by Seneviratne, Perera, and Seneviratne, [14] explored female undergraduates' awareness of breast cancer prevention and treatment at the University of Moratuwa.While many participants were aware of breast cancer and its clinical features, significant gaps existed regarding its risk factors and detection methods. For instance, although most undergraduates were familiar with the Breast Self-Examination (BSE) technique, many were not well-versed in performing it correctly. The study also identified that while participants knew Well Woman Clinics, their knowledge of such facilities was limited. Regarding information sources, the undergraduates primarily sought health-related information through television, the Internet, newspapers, and medical officers. However, there was scepticism regarding the effectiveness of social media platforms like Facebook for educating about breast cancer. Regular health awareness programs in university settings were viewed as an effective means of educating students on

health issues [14].

Given the significant knowledge gaps among Sri Lankan undergraduates about breast cancer, there is an urgent need for studies targeting this demographic to establish baseline awareness levels. Research should also explore various aspects of information behaviour, analyzing how they contribute to undergraduates' knowledge, attitudes, and practices related to breast cancer. This research will lay the groundwork for targeted educational initiatives aimed at improving breast cancer awareness and early detection among female undergraduates in Sri Lanka. Addressing language barriers, enhancing information dissemination, and developing culturally appropriate health interventions could significantly improve health outcomes and contribute to broader public health objectives.

Materials and Methods

The study employed a cross-sectional KAP survey design, which is appropriate for assessing the levels of knowledge, attitudes, and practices related to breast cancer among non-medical female undergraduates related to the time data was collected.

Population
This research aimed at non-medical undergraduate females from five chosen universities in Sri Lanka, namely the 2023 enrolled students, to ensure representative samples across the country. The research was conducted among female undergraduates in non-medical and non-health science faculties to avoid the participants having specialized knowledge in health-related areas. The inclusion requirements were language skills, i.e., the potential to understand and respond to questionnaires in Sinhala, Tamil, or English, to make them active recipients of the study materials and be able to provide informed responses. The second requirement was a selection based on participants' mental health state, i.e., only those participants who had no mental illness that would make it difficult for them to understand the information provided to them or comprehend when responding to the questionnaire. The study excluded all the students undertaking studies in medicine and health science faculties to remain targeted at non-specialist populations. These criteria helped in interrogating and choosing an adequate participant group to study the dissemination and impact of information about breast cancer among a specific demographic population within Sri Lanka's schools.

Sampling and the Sample
To achieve representative sampling, self-weighting random sampling was applied, with a fixed sample size of 455 participants to allow for a 20% non-response rate. The Krejcie and Morgan (1970) table determined this sample size, which is widely applied in social and educational research to determine the appropriate sample size against population size [15]. Five state universities in Sri Lanka were chosen, representing diverse geographic locations and academic fields. These universities were selected according to availability, geographical distribution, and variety of study programs offered. These universities

represent approximately 30% of the total universities in Sri Lanka. Random samples of female non-medical undergraduates were drawn from across each of the non-medical disciplines at each university using student databases. Stratified sampling was applied to represent the students from each discipline proportionally. This allows results to be generalized from the academic diversity of the undergraduates in Sri Lankan state universities.

Data Collection Instrument

The data collection instrument was a two-part questionnaire. The first part collected demographic information, and the second part collected Knowledge, Attitudes, and Practices (KAP) related to breast cancer. Six public health and health education experts validated and pre-tested the questionnaire using a pilot study of 100 participants. Reliability was established with Cronbach's α ranging from 0.876 to 0.978, which indicates high reliability [16]. There were 45 statements related to Knowledge (25), attitudes (10), and awareness (10) that were utilized in the questionnaire customized to measure the participants' knowledge about breast cancer prevention and early detection practices. The survey instrument employed a 5-point Likert scale, a familiar and widely used tool in research, where respondents rated their attitudes on a scale from 1 (Strongly Disagree) to 5 (Strongly Agree). Knowledge and practice items used the response options of True, False, or Do not Know. Knowledge levels were classified into four categories: Poor (1-25%), Average (26-50%), Good (51-75%), and Very Good (76-100%). This classification allows for a nuanced understanding of the participants' knowledge base and is consistent with previous research methodologies in health education [17].

Data Collection

Data collection took place from March to April 2023. Questionnaires were administered using Google Forms, and the students were emailed the survey link with appropriate university permission. Confidentiality and voluntary consent measures were emphasized following ethical standards.

Data Analysis

Concerning analysis of the data, the data were analyzed using SPSS Version 23 to interpret responses. Missing values were handled with mean substitution but maintained dataset integrity. Associations were studied using the Kruskal-Wallis test, graphical statistics, and frequency distributions and α of 0.05 was set to represent a p-value level indicating statistical significance. The validity of the contents of the questionnaire was determined by conducting a pilot study and reliability test to make sure that the data collected were relevant and reliable.

Ethical Consideration

The study gained ethical clearance from the Faculty of Graduate Studies, University of Colombo (Reference number FGS/ERC/2017/015). The researcher adhered to ethical responsibilities in instrument design, data collection, presentation, and reporting. In designing the survey instrument, careful attention was paid to confidentiality, anonymity, and data privacy. The questionnaire was designed to obtain minimal personal data, ensuring the anonymity of respondents. When distributing the survey, a cover letter assured participants that their information would be confidential. Participants were informed about the study's purpose and their right to decide independently whether to participate. Their participation was voluntary, and they were assured that their decisions would not affect them in any way.

Results

Response Analysis

The response rate for the study was an impressive 100%, indicating a high level of engagement. The distribution of respondents by university showcases a comprehensive representation, with the University of Colombo leading at 26.2% (n=119), followed by the University of Ruhuna at 22.0% (n=100), and both the University of Jaffna and Eastern University equally contributing 18.9% each (n=86). In terms of faculty, the Science faculty had the highest representation at 20.7% (n=94), with the Technology faculty at 16.7% (n=76) and the Arts faculty at 14.7% (n=67), reflecting a diverse range of academic disciplines.

The breakdown by academic year revealed a significant youth presence, with first-year students constituting the most prominent group at 40.2% (n=183), followed by second-year students at 26.6% (n=121) and third-year students at 16.5% (n=75). Demographically, most respondents were within the 21–23-year age group (60.2%), with the next largest group being the 24–26-year age group (32.2%), indicating a study capturing the current student population.

The ethnic composition of the respondents was predominantly Sinhalese (77.8%), with Sri Lankan Tamil (16.5%) and Moor (4.25%) also represented. Regarding religious affiliation, 74.9% identified as Buddhist, 14.3% as Hindu, and 5.7% as Islamic. The marital status of the respondents showed that a vast majority were single (95.6%), with a minor percentage married (3.3%).

Spatially, respondents were mainly from the Western province (25.7%), followed by the Southern province (17.6%) and Sabaragamuwa province (10.5%). This geographical and demographic distribution of the sample provides a diverse representation across different universities, faculties, and regions of Sri Lanka, enriching the study's findings by incorporating various perspectives and backgrounds.

Knowledge on Breast Cancer

Participants demonstrated a strong awareness of breast cancer. A majority (91.2%) recognized that early detection can prevent the disease (Table 1). However, only 49.5% identified breast cancer as a leading cause of death among women in Sri Lanka, and 50.5% mistakenly believed that breast cancer affects only females.

Table 1. Descriptive Statistics of Breast Cancer-Related Knowledge

Knowledge Domain	1 n (%)	2 n (%)	3 n (%)	Median	Mode
General Knowledge					
Breast cancer is the leading cause of female death in Sri Lanka	225 (49.5)	113 (24.8)	117 (25.7)	2	1
Incidences of breast cancer are increasing in Sri Lanka	396 (87.0)	3 (0.7)	56 (12.6)	1	1
If breast cancer is detected in an early stage, it can be prevented	415 (91.2)	4 (0.9)	36 (12.6)	1	1
Only females are affected by breast cancer	230 (50.5)	115 (25.3)	110 (24.2)	1	1
Breast cancer can be detected at any age	253 (55.6)	87(19.1)	115 (25.3)	1	1
Average (%)	67	14.6	18.7		
Symptoms					
Lump anywhere in the breast	350 (76.9)	11 (2.4)	94 (20.7)	1	1
Change in the appearance of the breast	338 (74.3)	21 (4.6)	96 (21.1)	1	1
Nipple discharge	272 (59.8)	20 (4.4)	163 (35.8)	1	1
Breast nipple pain	318 (69.9)	17 (3.7)	120 (26.4)	1	1
Redness, scaliness, or thickening of the nipple or breast skin	270 (59.3)	14 (3.1)	171 (37.6)	1	1
Average (%)	68.2	3.7	28.7		
Risk Factors					
Family history	299 (65.7)	54 (11.9)	102 (22.4)	1	1
Less breastfeeding	225 (49.5)	60 (13.2)	170 (37.3)	1	1
Early menstruation (age 11) & late menopauses (age 55)	139 (30.5)	55 (12.1)	261 (57.4)	3	3
Smoking	183 (40.2)	82 (18.0)	190 (41.7)	2	3
Exposure to radiation	285 (62.6)	27 (5.9)	143 (31.5)	1	1
Average (%)	49.9	12.2	38.7		
Early detection					
Self-breast examination	404 (88.8)	10 (2.2)	41 (9)	1	1
Clinical examination	424 (93.2)	5 (1.1)	26 (5.7)	1	1
Mammography	213 (46.8)	7 (1.5)	235 (51.7)	2	3
Fine needle aspiration test	134 (29.5)	17 (3.7)	304 (66.8)	3	3
Blood test	190 (41.8)	66 (14.5)	199 (43.7)	2	3
Average (%)	59.2	4.8	35.6		
Treatment					
Chemotherapy	235 (51.9)	12 (2.6)	207 (45.5)	1	1
Radiotherapy	236 (51.9)	17 (3.7)	204 (44.4)	1	1
Hormone therapy	142 (31.2)	36 (7.9)	277 (60.9)	3	3
Surgery	351 (77.1)	8 (1.8)	96 (21.1)	1	1
Ayurvedic treatment	165 (36.3)	45 (9.9)	245 (53.8)	3	3
Average (%)	49.7	5.2	45.7		

1, True ; 2, False ; 3, Do not know + No response

Association between Indicators of Knowledge on breast cancer and Demographic characters of the non-medical female undergraduate

Table 2 depicts the association between the indicators of each thematic area assessed by the Kruskal-Wallis test (p values).

The analysis of p-values from the Kruskal-Wallis test reveals significant differences in breast cancer knowledge

Table 2. Association between Indicators of Knowledge on Breast Cancer and Demographic Characteristics of the Non-Medical Female Undergraduates

Knowledge domain	Age	Ethnicity	Religion	Marital Status	Province
General Knowledge	0.59	0.025	0.029	0.086	0.224
BC related Symptoms	0.096	0.256	0.334	0.034	0.840
BC risk factors	0.249	0.114	0.202	0.090	0.187
BC early detection methods	0.504	0.008	0.015	0.977	0.431
BC treatments	0.843	0.513	0.623	0.297	0.622

Table 3. Descriptive Statistics of Breast Cancer-Related Attitudes

Attitude Domain	1 n (%)	2 n (%)	3 n (%)	4 n (%)	5 n (%)	Respond rate n (%)	Mean± Std. Deviation
I will never get a breast cancer	65 (14.3)	103 (22.6)	193 (42.4)	38 (8.4)	45 (9.9)	444 (97.6)	2.76±1.12
Performing self-breast examinations in regular intervals is important for early diagnosis	32 (7.0)	14 (3.1)	49 (10.8)	177 (38.9)	175 (38.5)	447 (98.2)	4.00±1.13
I would like to learn how to perform breast self-examination	35 (7.7)	10 (2.2)	49 (10.8)	176 (38.7)	177 (38.9)	447 (98.2)	4.01±1.14
In addition to regular breast self-examination, it is necessary to visit a doctor at regular intervals	29 (6.4)	27 (5.9)	104 (22.9)	184 (40.9)	100 (22.0)	444 (97.6)	3.67±1.09
I would like to get more information about breast cancer	34 (7.5)	12 (2.6)	48 (10.5)	178 (39.1)	173 (38)	445 (97.8)	4.00±1.14
It is unnecessary to reveal the diagnosis of breast cancer to others	109 (24.0)	116 (25.5)	106 (23.3)	71 (15.6)	39 (8.6)	441 (96.9)	2.58±1.26
Breast cancer leads to frustration	54 (11.9)	60 (13.2)	149 (32.7)	119 (26.2)	56 (12.3)	438 (96.3)	3.14±1.18
If managed well, one can still have a good quality of life	37 (8.1)	21 (4.6)	66 (14.5)	159 (34.9)	159 (34.9)	442 (97.1)	3.86±1.20
Breast cancer is a communicable disease	209 (45.9)	77 (16.9)	82 (18.0)	46 (10.1)	32 (7.0)	446 (98.0)	2.14±1.30
I prefer to visit a female doctor rather than a male doctor	34 (7.5)	40 (8.8)	124 (27.3)	122 (26.8)	124 (27.3)	444 (97.6)	3.59±1.20

1, Strongly Disagree; 2, Disagree; 3, Neutral; 4, Agree; 5, Strongly Agree

across various demographic variables. Specifically, ethnicity significantly influences general knowledge about BC and knowledge of BC early detection methods, while religion also affects general knowledge and early detection knowledge. Marital status significantly affects knowledge about BC-related symptoms.

Attitude on Breast Cancer

The study on respondents' attitudes towards breast cancer reveals strong awareness and a proactive approach towards early diagnosis (Table 3). The respondents showed a proactive attitude towards breast cancer awareness and prevention. Most participants (77.8%) expressed willingness to seek early screening if they experienced symptoms. Despite this, only 45.5% indicated that they had received breast cancer-related information from healthcare professionals, underscoring the need for improved communication in this area.

Association between indicators of attitudes related to BC and demographic characteristics of the non-medical female undergraduates

Calculated significance values related to the correlation between attitude on BC and demographic characteristics are shown in Table 4. The Kruskal-Wallis test results reveal significant associations between certain demographic indicators and attitudes towards breast cancer. Ethnicity, religion, and province significantly influence the belief that one will never get breast cancer (p=0.001, p=0.004, and p=0.014, respectively) and the perception that breast cancer leads to frustration (p=0.001, p=0.000, and p=0.015, respectively). Additionally, the belief about the necessity of revealing a breast cancer diagnosis to others varies significantly by province (p=0.005). These findings suggest that cultural and regional factors play a crucial role in shaping specific attitudes towards breast cancer, highlighting the need for targeted interventions to address

Table 4. Association between Indicators of Attitude on Breast Cancer with Demographic Characters of the Non-Medical Female Undergraduates

Attitude domain	Age	Ethnicity	Religion	Marital Status	Province
I will never get a breast cancer	0.675	0.001	0.004	0.533	0.014
Performing self-breast examinations in regular intervals is important for early diagnosis	0.184	0.413	0.755	0.059	0.89
I would like to learn how to perform breast self-examination	0.361	0.62	0.295	0.333	0.779
In addition to regular breast self-examination, it is necessary to visit a doctor at regular intervals	0.403	0.556	0.47	0.887	0.998
I would like to get more information about breast cancer	0.136	0.815	0.914	0.365	0.895
It is unnecessary to reveal a diagnosis of breast cancer to others	0.428	0.148	0.213	0.785	0.005
Breast cancer leads to frustration	0.528	0.001	0	0.97	0.015
If managed well, one can still have a good quality of life	0.877	0.892	0.156	0.583	0.382
Breast cancer is a communicable disease	0.763	0.667	0.592	0.38	0.46
I prefer to visit a female doctor rather than a male doctor	0.264	0.437	0.19	0.822	0.063

Table 5. Descriptive Statistics of the Practice Upon Receiving Breast Cancer-Related Information

Practice Domain	1 n (%)	2 n (%)	3 n (%)	Median	Mode
I will conduct self-breast examinations regularly	224 (49.2)	113 (29.2)	98 (21.6)	2	1
I will meet my family doctor regarding the clinical diagnosis	193 (42.4)	168 (36.9)	94 (20.6)	2	1
I will meet a female doctor regarding clinical diagnosis	227 (49.9)	148 (32.5)	80 (17.5)	1	1
I will visit a doctor at a government hospital	190 (41.8)	162 (35.6)	105 (22.7)	2	1
I will visit a doctor at a private hospital	168 (36.9)	176 (38.7)	111 (24.4)	2	2
I will attend the Well Women Clinic in my area	175 (38.5)	164 (36.0)	116 (25.5)	2	1
Information I got related to breast cancer will be shared with others	349 (76.7)	50 (11.0)	56 (13.0)	1	1
I will take advice from breast cancer patients about the disease	292 (64.2)	88 (19.3)	75 (16.5)	1	1
I will have discussions with friends and relations about breast cancer	310 (68.1)	81 (17.8)	64 (14.1)	1	1
I will not take any further action	72 (15.8)	299 (65.7)	84 (18.4)	2	2

Table 6. Association between Indicators of Practices of BC with Demographic Characters of the Non-Medical Female Undergraduates

Practice Domain	Age	Ethnici-ty	Religion	Marital Status	Province
I will conduct self-breast examinations regularly		0.164	0.467	0.174	0.066
I will meet my family doctor regarding the clinical diag-nosis	0.575	0.551	0.831	0.181	0.278
I will meet a female doctor regarding clinical diagnosis	0.242	0.083	0.077	0.377	0.029
I will visit a doctor at a government hospital	0.384	0.122	0.424	0.924	0.244
I will visit a doctor at a private hospital	0.320	0.430	0.794	0.758	0.443
I will attend the Well Women Clinic in my area	0.912	0.001	0.002	0.231	0.039
Information I got related to breast cancer will be shared with others	0.780	0.701	0.928	0.000	0.901
I will take advice from breast cancer patients about the disease	0.900	0.262	0.132	0.246	0.445
I will have discussions with friends and relations about breast cancer	0.517	0.415	0.218	0.561	0.506
I will not take any further action	0.042	0.157	0.067	0.081	0.228

these variations.

Practice on Breast cancer

The analysis of practices among non-medical female undergraduates regarding breast cancer information reveals a strong potential for information sharing and interpersonal discussion.

Regarding behaviour, 61.5% of participants reported performing breast self-examination (BSE) regularly. However, a notable portion (38.5%) had never practiced BSE, which may reflect gaps in education and awareness regarding preventive measures. The study also found that 35.2% of respondents had visited a healthcare facility for a breast examination in the past year (Table 5).

Association between indicators of practices related to BC with demographic characters of the non-medical female undergraduates

The association between the indicators of practices related to BC and demographic attributes was analysed, and the summary is depicted in Table 6. The Kruskal-Wallis test results reveal varying degrees of association between demographic indicators and breast cancer-related practices. Age is significantly associated with the decision to take no further action (p=0.042), indicating that younger or older respondents might differ in their passivity. Ethnicity significantly influences the likelihood of attending Well Women Clinics (p=0.001) and meeting a female doctor (p=0.083), suggesting cultural factors affect these practices. Religion also influences attendance at Well Women Clinics (p=0.002) and meeting a female doctor (p=0.077), highlighting religious beliefs' role in healthcare decisions. Marital status significantly influences whether information is shared with others (p=0.000), with married individuals possibly more likely to discuss health information. Province shows significant associations with attending Well Women Clinics (p=0.039) and meeting a female doctor (p=0.029), indicating regional variations in access or preferences for healthcare. Overall, ethnicity, religion, and province are vital factors influencing specific breast cancer-related practices, while age and marital status also play roles in certain behaviours.

The Kruskal-Wallis test revealed significant associations between knowledge of breast cancer and demographic factors such as age, gender, and educational background. Specifically, younger respondents were more likely to possess higher knowledge levels, while those with a medical background exhibited greater awareness of early detection and risk factors.

Discussion

The findings of this study reveal both strengths and critical gaps in breast cancer-related knowledge, attitudes, and practices among non-medical female undergraduates in Sri Lanka. While participants demonstrated a fair level of general awareness, particularly regarding common symptoms such as nipple discharge, skin changes, and redness, essential signs like breast lumps and changes in breast appearance were less frequently recognized. This finding aligns with earlier studies conducted in Egypt [18], Ethiopia [19], and Uganda [20], which also reported insufficient recognition of key early warning signs among young women.

Moreover, misconceptions were evident in respondents' understanding of the disease. A significant proportion believed that breast cancer only affects females, despite the documented, albeit lower, incidence in males. Similarly, while participants were aware of some risk factors, such as a family history of breast cancer, there was less awareness of others, including smoking, obesity, and early menstruation. These misconceptions mirror findings from regional studies [21, 22], indicating a widespread need for more inclusive and accurate educational outreach.

In terms of early detection practices, while self-breast examination (SBE) and clinical breast examinations (CBE) were relatively well recognized, knowledge of other diagnostic methods like mammography and fine needle aspiration remained limited. This trend reflects findings from studies in developed and developing contexts [23, 24], emphasizing the global underutilization and under-awareness of advanced diagnostic technologies, particularly in low-resource settings.

A significant observation was the variation in breast cancer knowledge across ethnic groups, indicating the influence of cultural beliefs, language barriers, and differing levels of health literacy. Ethnic minorities in Sri Lanka, much like in multicultural contexts elsewhere [25], often face systemic challenges in accessing healthcare services and health-related information. These challenges can delay diagnosis and treatment, underscoring the need for culturally sensitive and linguistically appropriate health communication strategies.

Encouragingly, the study found a generally positive and proactive attitude among participants toward breast cancer prevention. Most respondents expressed a strong interest in learning how to perform SBE and acknowledged the importance of early detection. This reflects patterns seen in many studies [26, 27], which show that educational interventions can significantly improve awareness, attitudes, and practices related to breast cancer. Positive attitudes were also accompanied by optimism regarding the efficacy of treatment and a preference for female healthcare providers an important finding that highlights the value of empathy, comfort, and cultural sensitivity in clinical settings. Nonetheless, despite favourable attitudes, behavioural practices remain suboptimal. A substantial number of participants reported never having performed an SBE or visited a Well Woman Clinic. This gap between attitude and practice has been documented in studies from Malaysia [28] and India [29], where young women

acknowledged the importance of screening but failed to translate this awareness into action. This underscores the need for accessible, youth-friendly breast health services and campus-based health promotion initiatives.

Additionally, while many participants recognized the importance of medical consultation, the emotional and psychological dimensions of breast cancer appeared less understood. This is significant, given that psychological distress is a major concern among breast cancer patients and survivors, affecting not only quality of life but also treatment adherence [30]. The findings suggest the need to incorporate mental health education into breast cancer awareness campaigns.

The influence of marital status on information-sharing behaviours also emerged as an important dimension. Married students reported a greater tendency to share breast cancer information within their social networks, highlighting the potential of leveraging familial and community structures in awareness campaigns. This is consistent with South Asian literature, which emphasizes the role of family in shaping women's health decisions [31].

The relatively low engagement with Well Woman Clinics, especially among younger respondents, is particularly concerning given the increasing incidence of breast cancer in Sri Lanka [14]. To address this, campaigns must focus on increasing knowledge and challenging cultural stigma, logistical barriers, and fear associated with screening and diagnosis. Tailoring interventions to young women, using peer education models and digital platforms, could be especially effective in bridging the knowledge-practice gap.

In summary, the study reinforces the importance of addressing both cognitive and cultural barriers to breast cancer prevention. While participants showed a commendable level of awareness and willingness to learn, significant gaps in knowledge and practice remain. These findings call for comprehensive, culturally competent, and demographically inclusive educational interventions. By equipping young women with accurate, accessible information and fostering supportive environments for health behaviour change, Sri Lanka can strengthen its public health response to breast cancer.

The moderate level of knowledge about breast cancer, marked by specific substantial gaps, indicates a need for targeted educational reforms. Misconceptions such as the belief that only females can develop breast cancer and a lack of awareness about its rising incidence in Sri Lanka highlight critical areas for intervention. Educational programs must not only correct these misconceptions but also update the community about the latest trends and research in breast cancer prevalence and risk factors. This calls for collaboration between educational institutions, healthcare professionals, and media outlets to disseminate accurate and comprehensive breast cancer information. Additionally, integrating breast cancer education into university curricula could ensure that all students, regardless of their major, receive primary health education that includes cancer awareness.

The generally positive attitudes towards breast cancer prevention, such as the recognition of the importance of

regular self-examinations and the eagerness to learn more about the disease, are encouraging. However, the persistent misconceptions and varying emotional responses to breast cancer highlight the need for a more nuanced approach to educational content, one that addresses both the factual aspects of the disease and its psychological impacts. Programs designed to foster a deeper understanding of the emotional and social dimensions of breast cancer could help mitigate fears and encourage more open discussions about the disease. Moreover, promoting stories of survivors and creating platforms for shared experiences can also humanize the disease and increase empathy and understanding within the community. The study revealed proactive practices like regular self-examinations and consultations with healthcare providers. However, the variability in the frequency of these practices and the less frequent discussions about the disease with peers or advice-seeking from breast cancer patients suggest social and cultural barriers. Public health campaigns could use role models and influencers to enhance these practices and promote health-seeking behaviours. Additionally, establishing more accessible and welcoming healthcare facilities, especially Well Women Clinics, could encourage more consistent and preventive healthcare behaviours. Partnerships with local communities and leaders could also promote health education workshops and community screening days, making breast cancer information and resources more accessible.

Integrating comprehensive breast cancer education into public health policies is essential for enhancing knowledge, attitudes, and practices (KAP) among young women. Strategic recommendations include enhancing educational outreach by tailoring programs to address specific knowledge gaps and dispel prevalent myths through traditional classroom settings and digital platforms, reaching a broader audience. Community-based initiatives are vital; leveraging community resources and leadership can foster supportive environments for open discussions about breast health, which helps normalize these conversations and reduce stigma. Improving access to medical resources is crucial, particularly in underserved areas, to ensure that diagnostic tools and screenings are readily available for early detection and treatment. Furthermore, developing health messages and services sensitive to cultural and gender nuances ensures these interventions are respectful and effective across diverse populations. Lastly, implementing robust monitoring and evaluation mechanisms to assess the effectiveness of these interventions regularly allows for timely adjustments based on feedback and changing needs, ensuring that the programs remain relevant and impactful. This comprehensive approach aims to empower young women with the knowledge and resources necessary to participate actively in breast cancer prevention and management.

This study has several major strengths that contribute to the validity and usefulness of the results. Using a standardized and validated KAP questionnaire ensured uniformity and accuracy in the data collection. Stratified random sampling across five state universities in Sri Lanka enabled a representative and diverse sample of non-medical female undergraduates to be selected, increasing the generalizability of results to similar populations in Sri Lanka. Quantitative scoring and qualitative interpretation of levels of knowledge, attitude, and practice enabled a holistic appreciation of the subject. These strengths allowed the research to reveal important associations and differences between major demographic factors and breast cancer awareness and practices.

At the same time, several limitations must be acknowledged, affecting the interpretation and broader application of the findings. The cross-sectional design limits the study to the identification of associations and not causation; thus, the direction of the effect between sociodemographic characteristics and KAP variables cannot be determined. Social desirability and self-report biases may have influenced the validity of the answers, particularly in clinic attendance or personal health practices, leading to over reporting of healthy behaviours. Sampling bias may also have occurred due to excluding students studying health-related courses or those with language or mental health impairments, narrowing the field of applicability. In addition, recall bias may have affected participants' capacity to report past health behaviours or valid exposure to information.

Cultural context also played a role, with social values and norms surrounding women's health, privacy, and modesty possibly affecting participant responses, especially regarding preferences for female doctors or comfort with preventative screening. These cultural variables must be considered in the interpretation of findings and the development of health communication interventions. Nonetheless, the study design enabled an extensive assessment of knowledge, attitude, and practice towards breast cancer, providing valuable data that can be utilized to inform future awareness campaigns and policy choices tailored to this population's requirements.

In conclusion, this study highlights the pressing need for bridging existing knowledge gaps, myths, and general awareness about breast cancer among Sri Lankan female non-medical undergraduates. While the findings indicate overall positive attitudes and commendable health habits, the persistence of some myths, mainly regarding male breast cancer, symptoms, and hormonal risk factors, indicates the need for more subtle and culturally tailored educational programs. Promoting early detection and preventive health behaviours requires a multifaceted strategy that blends individualized educational programs, trustworthy digital media, and community engagement. Such strategies must also consider linguistic diversity, cultural beliefs, and ethnic variations to ensure the effective dissemination and adoption of messages. This study recommends empowering young women as educated, informed health decision-makers by encouraging greater awareness, open communication, and access to reliable and timely health information. In doing so, it contributes to the early detection and treatment of breast cancer and a broader culture of preventive health. Lastly, this technique can help to reduce the burden of breast cancer and enhance the lives of individuals and their communities in Sri Lanka.

Author Contribution Statement

In the authorship of this manuscript, PKS Manatunga has taken on the Corresponding Author role. As the primary researcher, PKS Manatunga was responsible for the study's conceptualization and design, the data collection and analysis, and the manuscript's writing and revision. Her work involved an extensive literature review, developing the research methodology, and synthesizing findings into a coherent and impactful narrative.

Dr. DC Kuruppu acted as the mentor, bringing additional scrutiny and expertise to the research. Dr Kuruppu's role involved a thorough review of the thesis, providing constructive critiques, and ensuring the academic rigour and integrity of the work. Their meticulous feedback helped to address potential weaknesses and enhance the overall robustness of the study.

The collaborative efforts of PKS Manatunga and Dr. DC Kyruppu have culminated in a manuscript that is methodologically sound and significant in its contributions to the field.

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