



ISSN: 2617-6548

URL: www.ijirss.com



Knowledge of female and male university students in Lebanon about female breast cancer: A quantitative study

 Ghassan Nabbout¹,  Nivine Abbas^{2*},  Yara El Koussa³,  Ziad Koussa⁴,  Fadi W. Abdul-Karim¹

¹Faculty of Medicine and Medical Sciences, University of Balamand, Lebanon.

²Public Health Department, Faculty of Health Sciences, University of Balamand, Lebanon.

³Department of Biology, Faculty of Arts and Sciences, University of Balamand, Lebanon.

⁴Faculty of Arts and Sciences, University of Balamand, Lebanon.

Corresponding author: Nivine Abbas (Email: nivine.abbas@balamand.edu.lb)

Abstract

College students play a vital role in fostering awareness and support for female breast cancer initiatives. This study assessed the knowledge of breast cancer among female and male university students at the University of Balamand through an anonymous online survey between July and October 2023. 1644 students were recruited. Our results showed that females had higher knowledge scores (Mean= 8.96/15, 60%) than males (Mean=7.89/15, 53%), and students from health-related faculties scored better than other faculties. Additionally, students with prior background information about breast cancer as well as senior students had higher knowledge scores than those with a positive family history of female breast cancer. This study recommends targeted campaigns to enhance students' awareness of breast cancer.

Keywords: Breast cancer, Education, Gender difference, Knowledge, Public health, University students.

DOI: 10.53894/ijirss.v8i6.10355

Funding: This study received no specific financial support.

History: Received: 18 July 2025 / Revised: 20 August 2025 / Accepted: 25 August 2025 / Published: 29 September 2025

Copyright: © 2025 by the authors. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

Competing Interests: The authors declare that they have no competing interests.

Authors' Contributions: All authors contributed equally to the conception and design of the study. All authors have read and agreed to the published version of the manuscript.

Transparency: The authors confirm that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

Acknowledgments: The authors would like to thank the participants for their active contribution in the study.

Publisher: Innovative Research Publishing

1. Introduction

Breast cancer constitutes approximately 25-30% of all cancers in the female population globally [1]. The American Cancer Society estimates that by 2050, there will be, worldwide, 3.2 million new cases of breast cancer annually [2]. Lebanon stands out from other countries because of certain distinct demographic patterns. Despite creating the Lebanese National Cancer Registry in 2002, statistically significant data remains difficult to gather. A 2010 study revealed that breast cancer constituted about 38.2% of all cancer cases among Lebanese females, with an age-standardized incidence

rate of 71.0 per 100,000 people [3]. As such, Lebanon has one of the highest breast cancer Age-Standardized Rates (ASR), with an ASR of 79 per 100,000 women, surpassing rates in Malta and Kuwait [4]. In Lebanon, breast cancer is the leading cause of cancer-related deaths in females, with 50% of cases diagnosed before the age of 50 [5].

It is recognized that early detection and diagnosis of breast cancer play a major role in reducing global mortality [6]. Awareness and education about breast cancer are crucial for developing positive health habits, early detection, and overall outcomes [7]. The importance of fostering awareness and understanding across all strata of society cannot be over-emphasized [4, 8]. Most breast cancer awareness campaigns have been aimed at the female population. Studies that address the awareness and knowledge of female breast cancer by males (partners, family members, friends, and associates) are rare. Still, the involvement of male research participants is essential to the success of awareness of female breast cancer campaigns [9]. In the Middle East and North Africa (MENA) region, male ignorance represents a major barrier to screening and early detection of female breast cancer [10].

As influential members of the community, college students have the potential to play a pivotal role in fostering awareness and support for female breast cancer initiatives. With this recognition, we embarked on a study aimed at assessing what we considered to be basic /general information knowledge of female breast cancer among female and male university students. To our knowledge, there are no studies that assess basic or common knowledge of female breast cancer amongst young females and males in Lebanon. This study can be considered a baseline in assessing the knowledge about breast cancer among both male and female university students.

2. Materials and Methods

2.1. Study Design and Setting

A cross-sectional anonymous online survey was designed and distributed to students from different faculties at the University of Balamand (UOB) between July and October 2023. Approval was obtained on 29 May 2023 from the Institutional Review Board (IRB). The questionnaire included an informed consent form that included the study's objectives, a statement of voluntary participation, and guarantees of participants' anonymity and confidentiality. All students had to give their consent electronically before completing the online survey. The researchers adhered to the internationally recognized ethical principles for research involving human subjects throughout the study.

2.2. Inclusion/Exclusion Criteria for the Participants

All students enrolled as full-time students at the University of Balamand were invited to participate in the study. Participation requests were disseminated to this entire cohort. Exclusion criteria encompassed questionnaires that were incomplete, as well as responses in which all items were marked identically, indicating indiscriminate or blanket answering.

2.3. Target Population

The study targeted full-time UOB students (academic year 2023- 2024) from different faculties (Table 1). Only students who were above 18 years old, who know English and who gave consent were included in this study.

Table 1.
Number of enrolled students in each faculty and number of required students.

| Faculty | Number of enrolled students /males | Number of enrolled students /females | Number of required questionnaires/ males | Number of required questionnaires/females |
|---|------------------------------------|--------------------------------------|--|---|
| Faculty of Arts | 203 | 269 | 61 | 81 |
| Faculty of Sciences | 377 | 499 | 113 | 150 |
| Faculty of Business and Management | 295 | 197 | 89 | 59 |
| Faculty of Engineering | 592 | 197 | 178 | 59 |
| Faculty of Health Sciences | 220 | 625 | 66 | 188 |
| Faculty of Medicine and Medical Sciences | 254 | 277 | 76 | 83 |
| Faculty of Postgraduate Medical Education | 151 | 150 | 45 | 45 |
| Issam Fares, faculty of technology | 307 | 77 | 92 | 23 |
| Académie Libanaise des Beaux-Arts | 266 | 622 | 80 | 187 |
| Sum per column | 2665 | 2913 | 800 | 875 |
| Total | 5578 | | 1675 | |

2.4. Sampling Strategy

The numbers of full-time female and male university students were retrieved from the registrar, and a quota of 799 (30%) of the enrolled males and 873 (30%) of the enrolled females from each faculty was considered a representative sample (Table 1). Since all entries in the questionnaires were mandatory and only one response allowed by every participant, we had only completed questionnaires from our population sample with no duplications. All received responses were thus included in the study. Using stratified sampling, a total of 1644 questionnaires were filled.

2.5. Study Tool

The administered survey was modified from academic literature to what we considered as questions that addressed 'Basic or Common knowledge of female breast cancer' [11]. The survey included two sections: The first section consisted of six questions covering basic socio-demographic data and medical history. The second section included 15 questions addressing the participants' knowledge of risk factors for female breast cancer and possible culture-related misconceptions as causative factors. The questions were assessed on a 3-point scale (Yes, No, Do not Know).

2.6. Statistical Analysis

The survey was administered through an online Google Forms®. Data was collected through random sampling. The survey was sent by mail to all students and it was closed once the target number was achieved. Data was then exported to Microsoft Excel and then onto SPSS® (IBM Corp) for further analysis.

The analysis included descriptive and comparative analytical testing, including means/medians for numerical variables, percentages for categorical variables, and cross-tabulation for associational variables. Knowledge was compared with respect to gender, field of study, years at university, and background knowledge.

A total of 1672 students participated in this study. Twenty-eight (1.7%) were eventually excluded because of inaccurate data, leaving 1644 completed and validated questionnaires.

The knowledge score was calculated as the sum of the scores of all the questions. Correct answer equated to 1 point, and an incorrect or 'don't know' answer equated to 0. All data was collected at one point in time.

3. Results

3.1. Characteristics of the Study Participants

The study included 1644 UOB students representing the nine faculties at UOB (Table 1).

The participants were approximately divided equally among gender, and included 871 (53%) female and 773 male (47%) participants. In total, 355 (22%) of participants, which included 216 (25%) females and 139, (18%) males had a family history of breast cancer. All academic backgrounds were represented among the participants, including Freshman, Sophomore, Junior, Senior, Master, Med1, Med2, Med3, Med4, PG1, PG2, PG3, PG4, and PG5 Table 2.

Table 2.
Characteristics of respondents.

| Variable | Group | Number (%) |
|---------------------------------|---------|------------|
| Gender | Males | 773 (47%) |
| | Females | 871 (53%) |
| Family history of breast cancer | Yes | 354 (22%) |
| | No | 1290 (78%) |
| Background information | Yes | 1129 (69%) |
| | No | 515 (31%) |
| Year at University | 1 | 37 (2%) |
| | 2 | 378 (23%) |
| | 3 | 373 (23%) |
| | 4 | 407 (25%) |
| | 5 | 200 (12%) |
| | 6 | 66 (4%) |
| | 7 | 33 (2%) |
| | 8 | 33 (2%) |
| | 9 | 27 (2%) |
| | 10 | 35 (2%) |
| | 11 | 20 (1%) |
| | 12 | 17 (1%) |
| | 13 | 12 (1%) |
| | 14 | 6 (0.5%) |

3.2. Knowledge Compared by Faculty

One-way Anova test was conducted to assess the mean knowledge score between different faculties. This showed a statistically significant difference with $F=57.58$.

Table 3.

Percentage of correct answers by question, faculty and gender (Female, F/ Male, M).

| No | Question | Sex | Académie Libanaise des Beaux-Arts | Faculty of Arts | Faculty of Business and Management | Faculty of Engineering | Faculty of Health Sciences | Faculty of Medicine and Medical Sciences | Faculty of Postgraduate Medical Education | Faculty of Sciences | Issam Fares, faculty of technology | Total | Students with background info | Students with no background info | Students with family Hx of breast cancer | Students with no family Hx of breast cancer |
|----|--|-------|-----------------------------------|-----------------|------------------------------------|------------------------|----------------------------|--|---|---------------------|------------------------------------|------------|-------------------------------|----------------------------------|--|---|
| Q1 | Breast cancer is the most common form of cancer among women. | F | 145 (78%) | 68 (83%) | 49 (83%) | 50 (88%) | 172 (91%) | 74 (89%) | 40 (89%) | 133 (89%) | 20 (87%) | 751 (86%) | 775 (89%) | 679 (78%) | 732 (84%) | 775 (89%) |
| | | M | 63 (80%) | 51 (84%) | 70 (84%) | 122 (73%) | 57 (88%) | 65. (86%) | 39 (87%) | 94 (83%) | 66 (77%) | 627 (81%) | 673 (87%) | 564 (73%) | 642 (83%) | 618 (80%) |
| | | total | 208 (79%) | 119 (84%) | 119 (84%) | 172 (77%) | 229 (91%) | 139 (87%) | 79 (88%) | 227 (86%) | 86 (79%) | 1378 (84%) | 1448 (88%) | 1243 (75%) | 1374 (84%) | 1393 (84%) |
| Q2 | Breast cancer can be of concern in females 40 years and younger. | F | 119 (64%) | 52 (64%) | 37 (63%) | 34 (60%) | 117 (62%) | 64 (77%) | 35 (78%) | 91 (61%) | 20 (87%) | 569 (65%) | 592 (68%) | 496 (57%) | 583 (67%) | 540 (62%) |
| | | M | 41 (52%) | 28 (47%) | 51 (61%) | 94 (57%) | 47 (72%) | 47 (62%) | 37 (82%) | 69 (61%) | 45 (52%) | 459 (59%) | 510 (66%) | 387 (50%) | 464 (60%) | 456 (59%) |
| | | total | 160 (61%) | 80 (57%) | 88 (62%) | 128 (57%) | 164 (65%) | 111 (70%) | 72 (80%) | 160 (61%) | 65 (60%) | 1028 (63%) | 1102 (67%) | 883 (53%) | 1047 (64%) | 996 (60%) |
| Q3 | Use of hormone replacement therapy is one of the risk factors for developing breast cancer | F | 61 (33%) | 27 (33%) | 21 (36%) | 30 (53%) | 126 (67%) | 65 (78%) | 40 (89%) | 89 (59%) | 11 (48%) | 470 (54%) | 531 (61%) | 287 (33%) | 462 (53%) | 479 (55%) |
| | | M | 29 (37%) | 28 (47%) | 23 (28%) | 47 (28%) | 44 (68%) | 55 (72%) | 34 (76%) | 48 (42%) | 27 (31%) | 335 (43%) | 425(55%) | 193 (25%) | 355 (46%) | 317 (41%) |
| | | total | 90 (34%) | 55 (39%) | 44 (31%) | 77 (35%) | 170 (67%) | 120 (75%) | 74 (82%) | 137 (52%) | 38 (35%) | 805 (49%) | 956 (58%) | 481 (28%) | 817 (51%) | 796 (47%) |
| Q4 | Late onset menstrual period is one of the risk factors for developing breast cancer. | F | 62 (34%) | 37 (46%) | 20 (34%) | 18 (32%) | 57 (30%) | 33 (40%) | 31 (69%) | 54 (36%) | 4 (17%) | 316 (36%) | 348 (40%) | 200 (23%) | 340 (39%) | 279 (32%) |
| | | M | 14 (18%) | 13 (22%) | 11 (13%) | 27 (16%) | 17 (26%) | 24 (32%) | 22 (49%) | 28 (25%) | 13 (15%) | 169 (22%) | 209 (27%) | 108 (14%) | 178 (23%) | 162 (21%) |
| | | total | 76 (29%) | 50 (35%) | 31 (22%) | 45 (20%) | 74 (29%) | 57 (36%) | 53 (59%) | 82 (31%) | 17 (16%) | 485 (30%) | 557 (35%) | 308 (17%) | 518 (32%) | 441 (26%) |
| Q5 | Old age increases risk of breast cancer. | F | 101 (55%) | 47 (58%) | 31 (53%) | 41 (72%) | 153 (81%) | 66 (80%) | 36 (80%) | 111 (74%) | 17 (74%) | 603 (69%) | 662 (76%) | 427 (49%) | 610 (70%) | 601 (69%) |
| | | M | 55 (70%) | 37 (62%) | 52 (63%) | 92 (55%) | 50 (77%) | 69 (91%) | 41 (91%) | 84 (74%) | 44 (51%) | 524 (68%) | 587 (76%) | 433 (56%) | 533 (69%) | 518 (67%) |
| | | total | 156 (59%) | 84 (60%) | 83 (58%) | 133 (60%) | 203 (80%) | 135 (85%) | 77 (86%) | 195 (74%) | 61 (56%) | 1127 (69%) | 1249 (76%) | 860 (53%) | 1143 (70%) | 1119 (67%) |
| Q6 | There is a relationship between cigarette smoking and breast cancer. | F | 103 (56%) | 50 (62%) | 28 (47%) | 31 (54%) | 125 (66%) | 63 (76%) | 30 (67%) | 101 (67%) | 15 (65%) | 546 (63%) | 592 (68%) | 401 (46%) | 557 (64%) | 531 (61%) |
| | | M | 61 (77%) | 40 (67%) | 41 (49%) | 101 (61%) | 46 (71%) | 52 (68%) | 33 (73%) | 56 (50%) | 45 (52%) | 475 (61%) | 541 (70%) | 378 (49%) | 487 (63%) | 464 (60%) |
| | | total | 164 (62%) | 90 (64%) | 69 (49%) | 132 (59%) | 171 (68%) | 115 (72%) | 63 (70%) | 157 (60%) | 60 (55%) | 1021 (62%) | 1133 (69%) | 779 (48%) | 1044 (63%) | 995 (61%) |
| Q7 | Family history of breast cancer | F | 153 (83%) | 74 (91%) | 51 (86%) | 54 (95%) | 185 (98%) | 83 (100%) | 45 (100%) | 143 (95%) | 23 (100%) | 811 (93%) | 836 (96%) | 732 (84%) | 810 (93%) | 810 (93%) |
| | | M | 60 (76%) | 57 | 71 (86%) | 126 (76%) | 61 (94%) | 74 (97%) | 45 (100%) | 99 | 69 (80%) | 662 | 727 (94%) | 572 (74%) | 696 | 634 |

| | | | | | | | | | | | | | | | | |
|-----|---|-------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|-----------|----------|------------|------------|------------|------------|------------|
| | is a risk of breast cancer. | | | (95%) | | | | | | (88%) | | (86%) | | | (90%) | (82%) |
| | | tot | 213 (81%) | 131 (93%) | 122 (86%) | 180 (81%) | 246 (97%) | 157 (99%) | 90 (100%) | 242 (92%) | 92 (84%) | 1473 (90%) | 1563 (95%) | 1304 (78%) | 1506 (92%) | 1444 (87%) |
| Q8 | Use of oral contraceptives decrease risk of breast cancer. | F | 48 (26%) | 32 (40%) | 11 (19%) | 15 (26%) | 101 (54%) | 52 (63%) | 31 (69%) | 61 (41%) | 7 (30%) | 358 (41%) | 401 (46%) | 218 (25%) | 357 (41%) | 357 (41%) |
| | | M | 24 (30%) | 7 (12%) | 12 (14%) | 29 (17%) | 30 (46%) | 46 (61%) | 27 (60%) | 32 (28%) | 15 (17%) | 222 (29%) | 278 (36%) | 139 (18%) | 255 (33%) | 193 (25%) |
| | | total | 72 (27%) | 39 (28%) | 23 (16%) | 44 (20%) | 131 (52%) | 98 (62%) | 58 (64%) | 93 (35%) | 22 (20%) | 580 (35%) | 679 (42%) | 357 (21%) | 612 (38%) | 550 (32%) |
| Q9 | There is a relationship between size of breast and risk of breast cancer. | F | 99 (54%) | 47 (58%) | 29 (49%) | 25 (44%) | 123 (65%) | 36 (43%) | 33 (73%) | 87 (58%) | 10 (43%) | 489 (56%) | 505 (58%) | 427 (49%) | 505 (58%) | 470 (54%) |
| | | M | 22 (28%) | 31 (52%) | 39 (47%) | 57 (34%) | 27 (42%) | 34 (45%) | 28 (62%) | 45 (40%) | 37 (43%) | 320 (41%) | 356 (46%) | 271 (35%) | 363 (47%) | 286 (37%) |
| | | total | 121 (46%) | 78 (55%) | 68 (48%) | 82 (37%) | 150 (59%) | 70 (44%) | 61 (68%) | 132 (50%) | 47 (43%) | 809 (49%) | 861 (53%) | 698 (40%) | 868 (53%) | 756 (44%) |
| Q10 | Breastfeeding increases risk of breast cancer. | F | 103 (56%) | 60 (74%) | 29 (49%) | 31 (54%) | 157 (84%) | 74 (89%) | 44 (98%) | 103 (69%) | 12 (52%) | 613 (70%) | 662 (76%) | 470 (54%) | 618 (71%) | 601 (69%) |
| | | M | 40 (51%) | 34 (57%) | 45 (54%) | 75 (45%) | 46 (71%) | 63 (83%) | 42 (93%) | 63 (56%) | 42 (49%) | 450 (58%) | 518 (67%) | 349 (44%) | 487 (63%) | 417 (54%) |
| | | total | 143 (54%) | 94 (67%) | 74 (52%) | 106 (48%) | 203 (80%) | 137 (86%) | 86 (96%) | 166 (63%) | 54 (50%) | 1063 (65%) | 1180 (72%) | 810 (48%) | 1105 (68%) | 1018 (61%) |
| Q11 | Having multiple sexual partners increases the risk of breast cancer. | F | 83 (45%) | 51 (63%) | 14 (24%) | 29 (51%) | 93 (49%) | 51 (61%) | 42 (93%) | 72 (48%) | 8 (35%) | 443 (51%) | 479 (55%) | 340 (39%) | 435 (50%) | 462 (46%) |

The Post hoc test was conducted to determine how knowledge varied among faculties. The faculties with health-related fields of study, including the faculty of medicine, the faculty of postgraduate medical education, and the faculty of health sciences, have a higher mean knowledge score than the faculties of engineering, technology, or business (Table 3).

However, the Faculty of Postgraduate Medical Education (PGME) was found to be the only faculty who had significant differences in knowledge with all other faculties including faculty of medicine. No statistical significance was found between the faculties of medicine, health sciences, ALBA, business, engineering, Issam Fares Institute, or sciences. However, the cumulative average of PGME was only 80% while that of the medical students was only 70% (Table 3). Knowledge compared by academic number of years:

In the pre-graduate years, there was a progressive increase in the knowledge score with the number of years at university with a significant increase in the knowledge score starting the clinical medical years (med 3) and this continued into the residency years (Figure 1.).

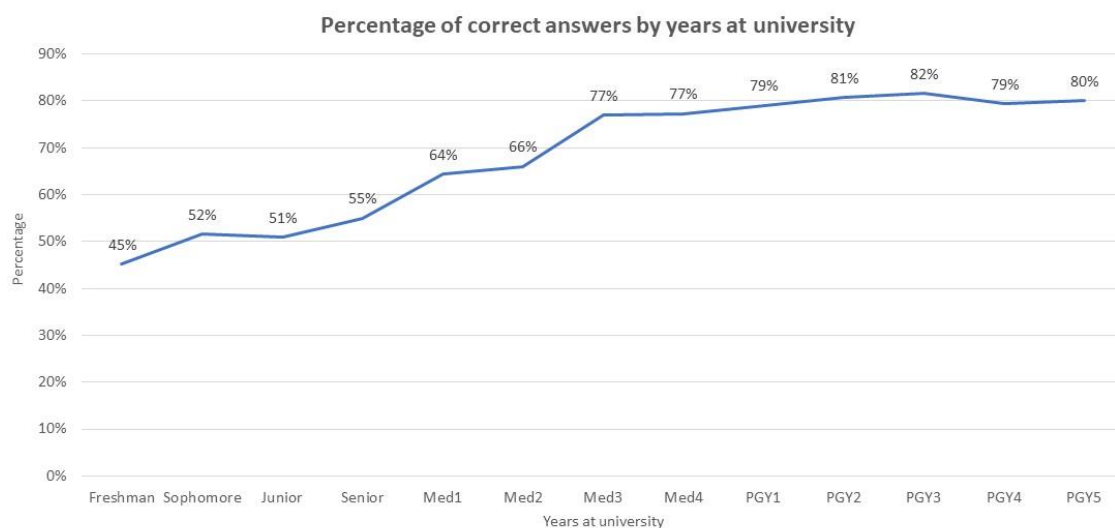


Figure 1.
Percentage of correct answers by years at university.

Using the Pearson test, results have shown that there is a significant positive linear correlation between the year of study and the knowledge score. The correlation coefficient was 0.34, and Sig. (2-tailed) = 0.0000.(figure 1).

3.3. Knowledge Compared to Having Background Information About Breast Cancer in Females

People who reported having background information scored significantly better than those who stated that they did not have any information about breast cancer ($M = 9.31$, $SD = 2.65$ vs $M = 6.57$, $SD = 3.017$) ($t(1642) = 618.5$, $p < .01$). We had 1129 (662 females and 467 males) students who reported that they had background information. In this subgroup the average knowledge score was 62% and females scored higher than males with low scores attributed to the same questions as in the total survey. The best score was among females having background information (64%) and the lowest was among males with no background information (42%).

3.4. Knowledge Compared to a Positive Family History of Female Breast Cancer

Out of the 1644 students participating in this study, 354 (22%) reported having a family history of breast cancer and 1290 (78%) had no family history of breast cancer. The average knowledge score among these participants was 58% ($SD = 2.926$), which was higher than the average score of 54% ($SD = 3.173$), obtained by the group of participants who did not have a family history of female breast cancer. This difference was statistically significant ($t(1642) = 3.55$) ($p < .01$).

3.5. Sources of Information About Breast Cancer

Our finding showed that the Internet was the main source of information regarding breast cancer knowledge, as reported by 1250, (37%) of the respondents, while books were the least consulted by only 418 (12%) of the participants (Figure 2).

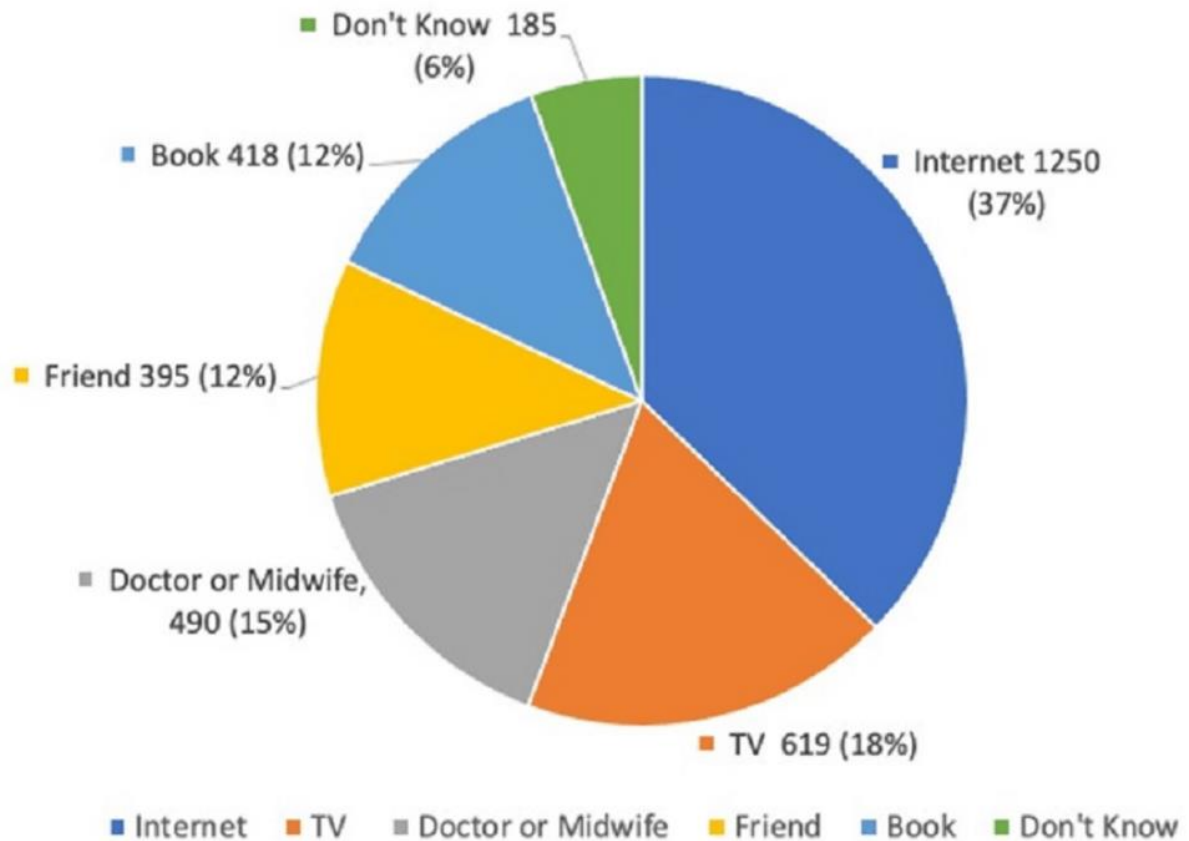


Figure 2.
Source of information about breast cancer.

3.6. Family History of Breast Cancer

A positive correlation was found between having a family history of female breast cancer and knowledge concerning female breast cancer. Out of the 1644 students participating in this study, 354 (22%) reported having a positive family history of female breast cancer, and they had an average knowledge score of 58%, which was higher than the average score of 54%, obtained by the group of participants not having breast cancer history (1290 participants) (Figure 3).

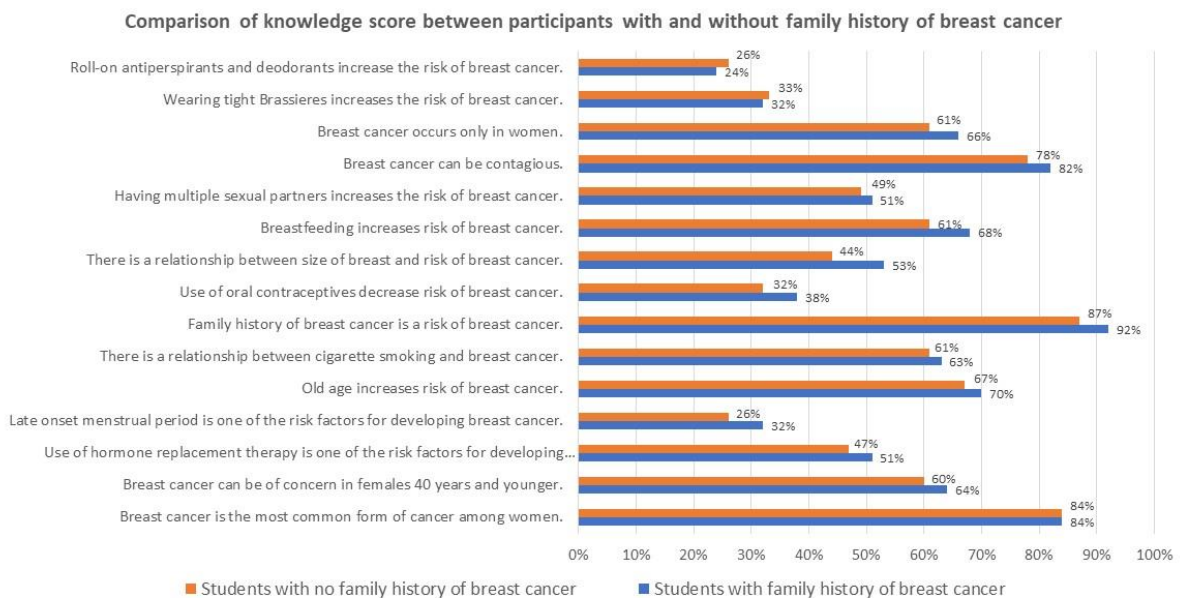


Figure 3.
Comparison of knowledge score between participants with and without family history of breast cancer.

3.7. Background Information

Participants who reported having background knowledge about female breast cancer scored higher in all questions with an average score of (62%), compared to the overall cumulative average of 56% and that of participants with a positive family history (58%).

Figure 4 illustrates the comparison of knowledge score between participants family history of breast cancer and those having background information.

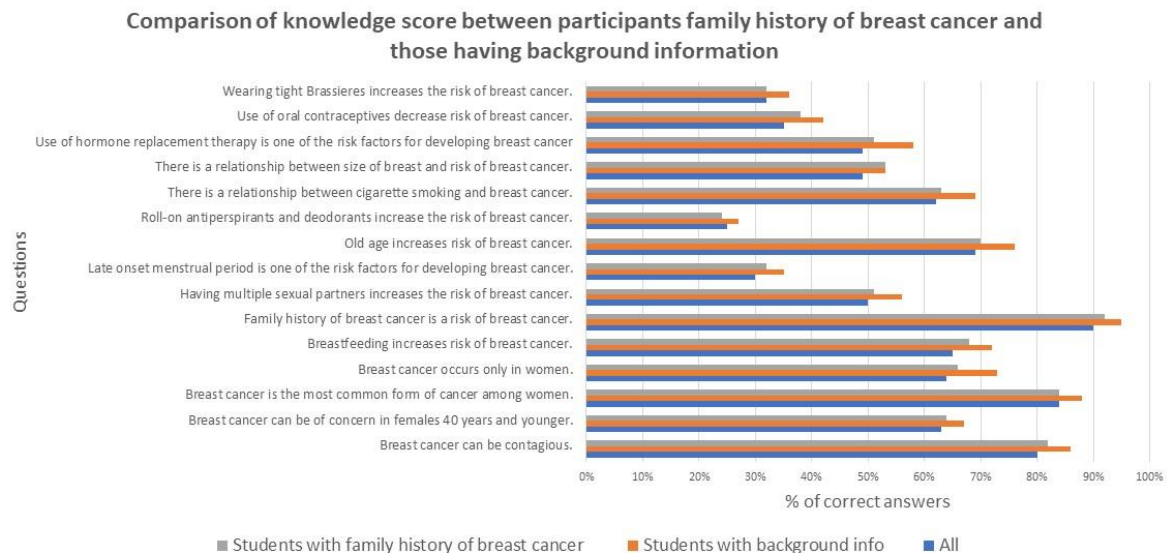


Figure 4.

Comparison of knowledge score between participants with and without family history of breast cancer.

4. Discussion

In this study, the cumulative female breast cancer knowledge score across all UOB faculties, including females and males, was (56%) with females scoring significantly higher than males (Females 60% Vs Males 53%, $p < .01$). Interestingly however, knowledge scores for questions concerning old age, cigarette smoking, having several sexual partners, and wearing tight brassieres in relation to breast cancer were similar amongst females and males. Additionally, only male knowledge of roll-on antiperspirants and deodorants in relation to the increase in the risk of breast cancer was a little higher than that of females (26% of male and 24% of female replied correctly). In general, the low knowledge score among female and male undergraduate students reflect the culture gap related to health issues in general and cancer in particular. Our results are in line with other studies that reported in Saudi Arabia where female and male individuals were found to have poor knowledge about breast cancer risk factors, with male knowledge being more limited. [8, 12]. Knowledge base among males about breast cancer is crucial in promoting screening and early detection especially in the Lebanese patriarchal society [13].

Our data showed that the general knowledge of female breast cancer increased with the number of years at university for females and males. Medical students in their clinical years scored above 70% and the maximum score was only 80% even for medical residents. Twenty (13%) of the medical students and residents did not know that breast cancer is the most common cancer among females and 19 (23%) of the female medical students did not recognize that breast cancer can be of concern before the age of 40. This observation is alarming as about 6% of female breast cancer can occur before the age of 40 [14, 15]. Our data serves to emphasize a general lack of awareness across all faculties including health related faculties as shown in the data analysis (Table 3).

The higher knowledge score among participants with background information on female breast cancer emphasizes the importance of awareness campaigns. However, low scores were still reported for questions related to behavior such as having multiple sexual partners as a cause of breast cancer (56% among those having background information vs 38% among those who do not have background information). These results could be related to social and cultural misconceptions. These misconceptions often place blame for the cancer on the affected women and may be another barrier against screening and early detection of breast cancer. Among the subgroup of those not having background information on female breast cancer, only 44% knew that breast cancer can also affect males, which may result in delayed detection among males.

Although participants with family history of breast cancer had a slightly higher knowledge score than those without a family history (58% Vs 54%), they scored lower in two questions related to the effects of roll-on antiperspirants (32% vs

33%) and the effect of tight brassieres (24% Vs 26%) (Figure 3). Our findings provide substantial insight into direct awareness campaigns towards breast cancer patients and their families. It is important to reinforce accurate knowledge and debunk some of the false beliefs that can mislead even those with a history of the disease.

Participants who reported having background information on female breast cancer scored higher than all the rests including those with positive family history (Figure 4). This finding is well in line with other studies showing discordance between awareness due to positive family history of breast cancer and a lower knowledge about the risk factors [13].

By assessing the level of knowledge of breast cancer among the university students, we were able to identify knowledge gaps and misconceptions. Promoting breast cancer awareness among all adults facilitates cross-exposure within social and family networks and promotes positive action toward healthy behavior [16]. Improved knowledge about breast cancer would increase screening rates and for early detection of female breast cancer [17, 18].

The results of this study need to be interpreted considering the following limitations. This research was limited to one subgroup of university students in a private university. The study did not address knowledge among young adults with lower education levels as some studies linked the knowledge score with higher education level [18]. Despite the limitations, the current study offers invaluable information about the knowledge of the Lebanese students about breast cancer.

Conclusions

The present study showed that, in general, the level of students' knowledge about breast cancer is low. Despite the frequent national breast cancer screening awareness efforts, the apparent lack of sound knowledge concerning breast cancer among university students is alarming. The significant degree of misconceptions might hinder regular screening and may be a cause of unnecessary stress and psychological burden of affected women. We recommend that students receive targeted training to increase their knowledge of breast cancer. Awareness campaigns about cancer in general, and breast cancer in particular, might help prepare young adults to approach cancer in a more objective scientific way, and help spread awareness in their society. Additional studies should be conducted to determine the barriers to knowledge accessibility.

We believe that informed college students can serve as advocates to encourage women to undergo regular breast screenings and provide crucial positive support for patients grappling with the challenges of breast cancer. Ultimately, we aim to foster a proactive and supportive community in the face of this pervasive health challenge.

References

- [1] A. N. Giaquinto *et al.*, "Breast cancer statistics, 2022," *CA: A Cancer Journal for Clinicians*, vol. 72, no. 6, pp. 524-541, 2022.
- [2] Z. Tao, A. Shi, C. Lu, T. Song, Z. Zhang, and J. Zhao, "Breast cancer: Epidemiology and etiology," *Cell Biochemistry and Biophysics*, vol. 72, no. 2, pp. 333-338, 2015. <https://doi.org/10.1007/s12013-014-0459-6>
- [3] N. A. Lakkis, S. M. Adib, M. H. Osman, U. M. Musharafieh, and G. N. Hamadeh, "Breast cancer in Lebanon: Incidence and comparison to regional and Western countries," *Cancer Epidemiology*, vol. 34, no. 3, pp. 221-225, 2010. <https://doi.org/10.1016/j.canep.2010.02.013>
- [4] M. Y. Fares, H. A. Salhab, H. H. Khachfe, and H. M. Khachfe, "Breast cancer epidemiology among lebanese women: An 11-year analysis," *Medicina*, vol. 55, no. 8, p. 463, 2019. <https://doi.org/10.3390/medicina55080463>
- [5] N. Jalkh *et al.*, "Prevalance of BRCA1 and BRCA2 mutations in familial breast cancer patients in Lebanon," *Hereditary Cancer in Clinical Practice*, vol. 10, no. 1, p. 7, 2012.
- [6] K. Al-Hosni, M. F. Chan, and M. Al-Azri, "The effectiveness of interventional cancer education programs for school students aged 8–19 years: A systematic review," *Journal of Cancer Education*, vol. 36, no. 2, pp. 229-239, 2021.
- [7] Z. Mohebi, M. Heidari Sarvestani, Z. Moradi, and M. M. Naghizadeh, "Female high school students' knowledge and attitude toward breast cancer," *BMC Women's Health*, vol. 23, no. 1, p. 41, 2023.
- [8] N. J. Farsi, R. Al-Wassia, and L. Merdad, "Do men and women in Saudi Arabia have the same level of awareness and knowledge of breast cancer? A cross-sectional study," *Breast Cancer: Targets and Therapy*, pp. 131-139, 2020.
- [9] A. C. Woloski-Wruble, F. Dekeyser Ganz, Y. Jiang, W. M. Qiang, and I. Kadmon, "Israeli and Chinese partners of women with breast cancer: A cross-cultural view of marital issues," *Psycho-Oncology*, vol. 21, no. 3, pp. 324-331, 2012. <https://doi.org/10.1002/pon.1899>
- [10] A. N. Özyaydin, E. Doğan, and B. Bozdoğan, "Men's knowledge and attitudes towards breast cancer: A descriptive study," *European Journal of Breast Health*, vol. 16, no. 3, p. 183, 2020. <https://doi.org/10.5152/ejbh.2020.5193>
- [11] R. Shawahna and H. Awawdeh, "Pharmacists' knowledge, attitudes, beliefs, and barriers toward breast cancer health promotion: A cross-sectional study in the Palestinian territories," *BMC Health Services Research*, vol. 21, no. 1, p. 429, 2021.
- [12] H. M. Al-Musa, N. J. Awadalla, and A. A. Mahfouz, "Male partners' knowledge, attitudes, and perception of women's breast cancer in abha, southwestern Saudi Arabia," *International Journal of Environmental Research and Public Health*, vol. 16, no. 17, p. 3089, 2019. <https://doi.org/10.3390/ijerph16173089>
- [13] E. P. K. Ameade, A. Amalpa, T. Kudjo, M. K. Kumah, and B. S. Mohammed, "Reducing the breast cancer menace: The role of the male partner in Ghana," *Asian Pacific Journal of Cancer Prevention*, vol. 15, no. 19, pp. 8115-8119, 2014.
- [14] H. A. Assi, K. E. Khoury, H. Dbouk, L. E. Khalil, T. H. Mouhieddine, and N. S. El Saghir, "Epidemiology and prognosis of breast cancer in young women," *Journal of Thoracic Disease*, vol. 5, no. Suppl 1, p. S2, 2013.
- [15] E. J. Cathcart-Rake, K. J. Ruddy, A. Bleyer, and R. H. Johnson, "Breast cancer in adolescent and young adult women under the age of 40 years," *JCO Oncology Practice*, vol. 17, no. 6, pp. 305-313, 2021.
- [16] H. Elghazaly *et al.*, "The first BGICC consensus and recommendations for breast cancer awareness, early detection and risk reduction in low-and middle-income countries and the MENA region," *International Journal of Cancer*, vol. 149, no. 3, pp. 505-513, 2021. <https://doi.org/10.1002/ijc.33506>
- [17] M. El Asmar *et al.*, "Knowledge, attitudes and practices regarding breast cancer amongst lebanese females in beirut," *Asian Pacific Journal of Cancer Prevention*, vol. 19, no. 3, pp. 625-631, 2018. <https://doi.org/10.22034/APJCP.2018.19.3.625>
- [18] P. El Maouchi *et al.*, "Breast cancer knowledge in Lebanese females with positive family history," *Medicine*, vol. 102, no. 7, p. e32973, 2023.