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***Observational Study***

**Knowledge, attitude, practice and factors that influence the awareness of college students with regards to breast cancer**

Zhang QN *et al*. KAP, cancer and college students

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**Abstract**

BACKGROUND

Breast cancerhas the highest incidence of all global cancers. Recent data show that breast cancer is becoming more prevalent in the younger population. Therefore, preventing breast cancer in young populations is a significant priority for public health. Relevant investigations of the incidence of breast cancer in young females have already been undertaken in China; however, none of these previous studies investigated the awareness of female college students with regards to breast cancer.

AIM

To investigate the knowledge, attitude, and practice (KAP) of female college students in Yunnan with regards to breast cancer and a series of influential factors.

METHODS

A random sample of 1387 female college students from two universities in Dali city were investigated by questionnaires.

RESULTS

The total KAP scores for breast cancer were 9.86 ± 2.50, 3.19 ± 2.01 and 13.31 ± 2.49, respectively. Multiple linear regression analysis showed that educational grade was the most significant influential factor underlying the level of knowledge female college students had with regards to the treatment of breast cancer (*P <* 0.05). Registered residence and educational grade were the most significant factors that influenced attitude (*P <* 0.05). Age, registered residence, grade and major, were the most significant factors that influenced behavior (*P <* 0.05). The KAP of female college students in western Yunnan with regards to breast cancer were low.

CONCLUSION

There is an urgent need to provide standardized publicity and educational strategies in China to improve the knowledge, attitude, and practice, of college students with regards to breast cancer.

**Key Words:** Breast cancer; Regression analysis; Rejuvenation; Western Yunnan; College students; Knowledge, attitude and practice

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**Core Tip:** By applying self-designed questionnaires that specifically targeted the knowledge, attitude, and practice of college students at two universities, we were able to ascertain that the knowledge levels of college students in Yunnan with regards to breast cancer were low. Collectively, our data indicated that we should strengthen publicity and educational strategies on university campuses with regards to breast cancer, particularly in terms of prevention, self-examination and examination methods. These strategies will reduce the incidence of breast cancer, specifically in the younger population.

**INTRODUCTION**

In 2020, 2.26 million new cases of female breast cancer were diagnosed; consequently, breast cancer replaced lung cancer and became the most common form of cancer in the world. The early onset of breast cancer can be indicative of a familial case of breast cancer. According to the annual report of China cancer residence in 2017, there are 210000 new cases of breast cancer in China each year, with an annual growth rate of 2%[1]. By 2020, there were 420000 new cases; furthermore, data showed that patients were younger[2-5].The screening guidelines for breast cancer recommended by the American Cancer Society indicate that the incidence rate of breast cancer is higher among women aged 20-39 years, and that the preventing the occurrence of breast cancer in younger age groups should be the key focus for the formulation of public health policies[6,7].

The knowledge, attitude, and practice (KAP) of young women is very important if we are to reduce the morbidity and mortality associated with breast cancer. If we can reduce the trend for breast cancer by primary prevention in the younger groups, then it will be possible to reduce the incidence rate significantly over the next 30 years[3-5]. China has already carried out a survey on young women with regards to understanding breast cancer and self-examination[8]. Research studies have also been published that describe regional differences and ethnic characteristics with regards to breast cancer awareness[9-11]. However, many female college students are not aware of breast cancer, thus resulting in a lower self-examination rate; this is because they do not feel that breast cancer is likely to affect them.

Yunnan is in the western borderland of China; this area is associated with more minorities and poorer medical conditions. Public health care should be provided first to college students, who would be the main force behind the transmission of health knowledge and behavior. However, the KAP of female college students about breast cancer in Yunnan was unknow. In this study, we aimed to investigate the KAP of female college students in Yunnan of breast cancer and investigate associated influential factors. Our findings should provide an appropriate foundation for the development of effective health education programs for young women in China with regard to breast cancer.

**MATERIALS AND METHODS**

***Participants***

Between October 2020 and February 2021, we randomly selected 1346 female college students from two university campuses in western Yunnan, including those studying different majors (medicine, non-medical science, non-medical arts) and those achieving different grades. All subjects provided informed consent and participated voluntarily. This study was approved by the Ethics Committee of the First Affiliated Hospital of Dali University (No. DFY20200712).

***Research methods***

**Design of the questionnaire:** Promoting our questionnaire included 5 items of basic information (age, nationality, registered residence, grade and major), 16 items related to preventative behaviors (including time, method, and motivation for breast self-examination), and eight items relating to the basic knowledge of breast cancer according to the KAP. "No", "Uncertain" and "Yes" were allocated scores of 0-2; "Oppose", "Uncertain", "Understand" and "Agree" were allocated scores of 0-3. The total score for the knowledge dimension (question numbers 1-2; question numbers 4-11) ranged from 0-20; the total scores for the attitude dimension (question numbers 14-18) ranged from 0-10; and the total scores for the practice dimension (question numbers 3, 12-13, and 19-20) ranged from 3-19. Forms were completed anonymously by the participants and then analyzed.

The content validity of the questionnaire was 0.780, the total Cronbach's alpha coefficient was 0.702, and the Cronbach's alpha coefficients for each dimension were 0.533, 0.697, and 0.563.

***Quality control***

The returned questionnaire was first coded and verified. Those that were missing > 10% of data were invalid. In total, 1390 questionnaire were sent out to students and 1346 valid questionnaire were returned. This represented an effective recovery rate of 96.83%.

***Statistical analysis***

Solutions SPSS version 25.0 software (IBM, Armonk, N.Y., United States) was used for real-time data entry and statistical analysis. A histogram was used to test the normality of raw data. Data were then described as means, standard deviations, standard errors, frequencies, and percentages. Statistical comparisons were carried out with the *t*-test and one-way analysis of variance. Multivariate linear regression analysis was also performed. Tests were two-way and *P* < 0.05 was statistically significant.

**RESULTS**

***KAP scores for breast cancer in college students***

The full marks of the three dimensions were different, in order to increase the reliability of the conclusion, the full marks for each dimension were standardized to 100 and then compared with the standardized mean. The scores for knowledge and practice for breast cancer in female college students in western Yunnan were significantly higher than the score for attitude (*P* < 0.05). As the age of the college students increased, the three items that make up the KAP score also increased significantly (*P* < 0.05). We also identified significant differences in the KAP scores when compared between students of different nationalities (*P* > 0.05). The KAP scores of senior students were significantly higher than those of junior students (*P* < 0.05). The scores for attitude and practice for urban students were significantly higher than those of rural students (*P* < 0.05); there was no significant difference with regards to knowledge score (*P* > 0.05). However, there was significant difference in terms of the attitude and practice scores between students with different majors (*P* < 0.05), although there were no significant differences in the knowledge scores (*P* > 0.05) (Tables 1 and 2).

***An analysis of factors that influence KAP scores for breast cancer***

When taking age as the measurement data and using multiple linear regression analysis, we found that the knowledge score could be predicted by the student’s grade (*P* < 0.05) with a regression coefficient of 0.635. We also found that attitude score could be predicted according to the student’s registered residence and grade (*P* < 0.05) with regression coefficients of -0.542 and 0.448 respectively. Practice score could be predicted according to the student’s age, registered residence, grade and major (*P* < 0.05); the regression coefficients were 0.156, -0.691, 0.522, and -0.217, respectively (Table 3).

When taking age as the ranked data and using multiple linear regression analysis, we found that knowledge score could be predicted according to the student’s grade (*P* < 0.05); the regression coefficient was 0.704. We also found that attitude score could be predicted according to the student’s registered residence and grade (*P* < 0.05); the regression coefficients were -0.542 and 0.473, respectively. Practice score could be predicted according to the student’s registered residence, grade and major (*P* < 0.05); the regression coefficients were -0.677, 0.583, and -0.193, respectively (Table 4).

***Information related to the KAP questionnaire for breast cancer***

Analysis showed that 29.7% of respondents were unwilling to communicate with their friends or family with regards to breast-related problems; 30.1% of respondents did not consider that the early onset of menstruation, or a later menopause, were associated with breast cancer; 19.8% did not consider that fertility or infertility was associated with breast cancer after 30 years of age, and 14.6% of respondents did not believe that breastfeeding could reduce the incidence of breast cancer. Analysis also showed that 54.5% of our respondents did not know about breast self-examination and that 76.3% of respondents did not examine their own breasts; 74.2% did not know the best time for self-examination; 72.8% respondents did not know the common technical examination for breast cancer; and 74.5% of respondents did not know how often adult women should undergo clinical examinations of their breasts. Furthermore, 56.3% of respondents did not know that mammography could detect early breast cancer that could not be detected by palpation and 50.0% of respondents had no access to healthcare knowledge related to breast cancer (Table 5).

**DISCUSSION**

The number of younger patients (≤ 35 year of age) accounts for 7% of patients with breast cancer. These younger patients with breast cancer are associated with high levels of malignancy, rapid progression, early metastasis, and a poor prognosis[12]. Screening and prevention strategies are known to exert a significant effect on reducing the incidence rate of breast cancer[3-5]. Research studies have also focus on the prevention of breast cancer in younger women[13].

In the present study, we demonstrated that the main factor that influences breast cancer knowledge in female college students in western Yunnan was their grades. We identified a correlation between age and grade, as reported previously by Zhou *et al*[3]. Irrespective of whether age was included in our calculations as ranked data or measurement data, the influence of grade, as an independent variable, on the knowledge score was statistically significant. Therefore, the imbalance in breast cancer knowledge and education among female college students between different ages and grades is a critical factor that needs to be addressed. Other population characteristics should also be considered; female college students with a low age, low grade, and a low educational background, can be regarded as a key population for health education. In addition, we found that 14.4%-24.1% of respondents were not sure about their breast history and their family history of breast cancer. Familial cases of breast cancer can result in changes in the KAP values of women from affected families when compared to unaffected families; this was not considered in the present study.

Furthermore, 30.1% of respondents did not believe that the early onset of menstruation and a later menopause was associated with breast cancer. Analysis also showed that 19.8% of respondents did not consider that fertility or infertility was associated with breast cancer after 30 years of age, and 14.6% did not believe that breastfeeding could reduce the incidence rate of breast cancer. The total awareness rate of breast cancer among female college students was 54.66%; this was higher than the rates that have been published previously (32.8%-51.38%)[14], but still demonstrated imbalance (20.1%-85.6%). In particular, the insufficient awareness of high-risk factors for breast cancer should represent a key aspect of primary prevention and needs to be addressed.

In this research study, we found that the main factors that influenced attitude scores were registered residence and grade. The attitude scores for senior and urban female college students were higher than those who were junior and rural; these findings were consistent with previous findings[9,15]. Female college students in western Yunnan are more considerate with regards to seeking health care for the precancerous signs of breast cancer, although 56.3%-74.5% of respondents lacked a positive attitude for common technical examination methods, examination times, and mammography examinations. With regards to the early screening of breast cancer, mammography is considered to be the only screening method that can reduce the mortality rate associated with breast cancer[16] as this method can accurately detect small lumps along with typical granular and tiny burry calcifications. However, mammography is highly sensitive to the location of pathological tissue and breast morphology, and is not unsuitable for Chinese women with dense glands and small breasts[17]. In a previous study, Guo *et al*[18] reported that breast ultrasound is an easy technique to carry out and is both safe and non-invasive; however, mammography is widely used due to its high levels of sensitivity and specificity. Both of these techniques have their own advantages and limitations. Therefore, we advocate that the combined application of mammography and ultrasound should be used to screen for early breast cancer. With regards to the female college students in western Yunnan, and especially for those with lower grades and who reside in rural areas, it is particularly important that we increase publicity relating to early breast cancer screening and introduce more rigorous preventive education strategies. For young women with a family history and the presence of a breast mass, we advocate the use of a combination of mammography and ultrasound as a routine physical examination.

In this research, we found that the main influencing factors for behavior included age, registered residence, grade and major. Therefore, the behavior of female college students in western Yunnan is both comprehensive and multifactorial. However, low age, a rural residence, a low grade, a non-medical major, and a reluctance to talk about breast cancer and self-examination are identified as key factors, particularly self-examination. Overall, 13.2% of our respondents knew more about breast self-examination; this was greater than the proportion reported by Wang *et al*[15] (12%) but less than that reported by Jiang *et al*[9] (41.10%). Analysis further showed that 14.8% of our respondents had examined their breasts; this was less than the proportion reported by Jiang *et al*[9] Moreover, 5.0% of respondents knew the best time for breast self-examination; this was less than the proportion reported previously by Lei *et al*[19] (6.7%). We also found that 29.7% of respondents were unwilling to communicate with friends or family about breast-related problems.

It is evident, therefore, that female college students in western Yunnan were seriously lacking in the knowledge and skills required for breast examination. It is suggested that publicity should be strengthened through audio-visual media, classroom education, practical training, and other methods. These students should also be encouraged to overcome their shyness and carry out early self-examination.

Over recent years, breast cancer has become a very common form of tumor. Differences in culture, lifestyle, and social demography, are known to affect the biological expression of breast cancer, thus leading to different incidences and mortality rates. The responses to our questionnaire demonstrated that female college students in western Yunnan have low awareness of breast cancer, cognitive deficiencies and imbalances, and a low rate of breast self-examination. To improve the physical qualities of our female population of students, it is vital that we improve breast cancer knowledge on university campuses and develop more ways to improve the understanding of breast cancer among young female college students; this will reduce incidence rates in the younger population. It is also important that we use plain language and concise words to carry out health education strategies for female college students relating to breast cancer, symptoms, therapeutic methods, and how to prevent this condition.

Familial cases of breast cancer can result in changes in the KAP values of women from affected families when compared to unaffected families; this was not considered in the present study.

**CONCLUSION**

In conclusion, there is an urgently needs to provide standardized publicity and educational strategies in order to improve the knowledge levels of breast cancer of college students so as to reduce the incidence of breast cancer.

**ARTICLE HIGHLIGHTS**

***Research background***

Morbidity of breast cancer become younger, many female college students have insufficient awareness of breast health care and breast cancer.

***Research motivation***

It’s not reported that knowledge of breast cancer and health care of female college students in western Yunnan.

***Research objectives***

We want to know about knowledge of breast cancer in female college students and take some measures.

***Research methods***

We designed the questionnaire and totally 1387 questionnaires were sent out.

***Research results***

Influence factor of breast cancer knowledge is grade, influence factors of breast cancer attitude are registered residence and grade, influence factors of breast cancer practice are registered residence, grade and major.

***Research conclusions***

The knowledge, attitude, and practice level of female college students in western Yunnan were low, health education and self-examination of breast cancer is necessary.

***Research perspectives***

Using specific questionnaires, we identified a low awareness for breast cancer in female college students in west Yunnan, along with cognitive loopholes and imbalance in different ages and different grades.

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**Footnotes**

**Institutional review board statement:** All subjects provided informed consent and participated voluntarily. This study was approved by the Ethics Committee of the first affiliated hospital of Dali University (No. DFY20200712).

**Informed consent statement:** All study participants, or their legal guardian, provided informed written consent prior to study enrollment.

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**Data sharing statement:** Technical appendix, statistical code, and dataset available from the corresponding author at [Haohao021021@foxmail.com](mailto:Haohao021021@foxmail.com).

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**Table 1 Knowledge, attitude, and practice scores for 1346 female college students with regards to breast cancer (*n* = 1346, mean ± SD)**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Dimension** | **Score** | **Lowest score** | **Highest score** | **Score** | **Standard score** |
| Knowledge | 0-20 | 0 | 20 | 9.86 ± 2.50 | 49.28 ± 12.48 |
| Attitude | 0-10 | 0 | 10 | 3.19 ± 2.01 | 31.95 ± 20.08 |
| Practice | 3-19 | 3 | 19 | 13.31 ± 2.49 | 63.36 ± 11.86 |

**Table 2 A comparison of knowledge, attitude, and practice scores for breast cancer among 1346 female college students (*n* = 1346, mean ± SD)**

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Project** |  | **Knowledge score** | ***t/F*** | ***P* value** | **Attitude score** | ***t/F*** | ***P* value** | **Practice score** | ***t/F*** | ***P* value** |
| Age | ≤ 20 | 9.72 ± 2.42 | 11.548 | 0.000 | 3.07 ± 1.93 | 10.460 | 0.014 | 13.14 ± 2.44 | 16.987 | 0.000 |
| 21-25 | 10.53 ± 2.72 | 3.82 ± 2.21 | 14.17 ± 2.55 |
| ≥ 25 | 12.67 ± 5.13 | 6.00 ± 4.00 | 15.33 ± 3.51 |
| Nationality | Han | 9.89 ± 2.45 | 1.131 | 0.335 | 3.18 ± 2.02 | 0.485 | 0.901 | 13.31 ± 2.51 | 0.916 | 0.522 |
| Yi | 9.42 ± 2.61 | 3.19 ± 2.00 | 13.48 ± 2.16 |
| Bai | 10.20 ± 2.74 | 3.39 ± 1.73 | 13.27 ± 1.97 |
| Hui | 10.11 ± 2.76 | 3.00 ± 2.50 | 13.22 ± 3.51 |
| Zhuang | 9.74 ± 3.29 | 2.80 ± 1.49 | 12.42 ± 2.38 |
| Ha Ni | 9.63 ± 2.11 | 3.74 ± 1.99 | 13.26 ± 2.09 |
| Dai | 10.82 ± 2.46 | 3.31 ± 2.06 | 13.59 ± 2.58 |
| Miao | 8.93 ± 2.25 | 3.47 ± 2.00 | 13.07 ± 1.62 |
| Li Su | 9.83 ± 2.33 | 2.83 ± 1.19 | 13.58 ± 2.87 |
| Na Xi | 10.36 ± 2.66 | 3.27 ± 1.62 | 14.63 ± 2.29 |
| Others | 9.67 ± 2.47 | 3.31 ± 2.19 | 13.10 ± 2.68 |
| Grade | First | 9.32 ± 2.30 | 45.996 | 0.000 | 2.80 ± 1.73 | 36.480 | 0.000 | 12.87 ± 2.29 | 39.017 | 0.000 |
| Second | 10.35 ± 2.39 | 3.51 ± 2.22 | 13.25 ± 2.72 |
| Third | 10.69 ± 2.64 | 3.84 ± 2.22 | 14.21 ± 2.53 |
| Registered residence | Urban | 9.84 ± 2.56 | 0.169 | 0.866 | 3.60 ± 2.23 | 3.647 | 0.000 | 13.79 ± 2.52 | 3.850 | 0.000 |
| Rural | 9.86 ± 2.48 | 3.08 ± 1.93 | 13.17 ± 2.46 |
| Major | Medicine | 9.88 ± 2.51 | 1.657 | 0.191 | 3.20 ± 1.98 | 3.781 | 0.024 | 13.44 ± 2.37 | 6.505 | 0.002 |
| Nonmedical science | 9.53 ± 2.27 | 2.85 ± 1.79 | 12.60 ± 2.79 |
| Nonmedical arts | 9.98 ± 2.59 | 3.39 ± 2.20 | 13.25 ± 2.68 |

**Table 3 Multiple linear regression analysis of the factors that influence knowledge, attitude, and practice scores for breast cancer, age was included directly in this analysis as a form of measurement data**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Project** |  | ***B*** | ***SE*** | ***β*** | ***t*** | ***P* value** |
| Knowledge | Constant term | 7.335 | 1.228 | - | 5.976 | 0.000 |
| Grade | 0.635 | 0.098 | 0.226 | 6.494 | 0.000 |
| Attitude | Constant term | 1.627 | 0.985 | - | 1.652 | 0.099 |
| Registered residence | -0.542 | 0.129 | -0.112 | -4.212 | 0.000 |
| Grade | 0.448 | 0.079 | 0.198 | 5.713 | 0.000 |
| Practice | Constant term | 11.005 | 1.218 | - | 9.038 | 0.000 |
| Age | 0.156 | 0.068 | 0.080 | 2.288 | 0.022 |
| Registered residence | -0.691 | 0.159 | -0.115 | -4.343 | 0.000 |
| Grade | 0.522 | 0.097 | 0.186 | 5.376 | 0.000 |
| Major | -0.217 | 0.084 | -0.068 | -2.569 | 0.010 |

**Table 4 Multiple linear regression analysis of the factors that influence knowledge, attitude, and practice scores for breast cancer, age was included directly in the analysis as ranked data**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Project** |  | ***B*** | ***SE*** | ***β*** | ***t*** | ***P* value** |
| Knowledge | Constant term | 8.646 | 0.379 | - | 22.791 | 0.000 |
| Grade | 0.704 | 0.087 | 0.250 | 8.096 | 0.000 |
| Attitude | Constant term | 2.977 | 0.304 | - | 9.788 | 0.000 |
| Registered residence | -0.537 | 0.128 | -0.111 | -4.180 | 0.000 |
| Grade | 0.473 | 0.070 | 0.209 | 6.777 | 0.000 |
| Practice | Constant term | 13.407 | 0.376 | - | 35.622 | 0.000 |
| Registered residence | -0.677 | 0.159 | -0.113 | -4.260 | 0.000 |
| Grade | 0.583 | 0.086 | 0.208 | 6.752 | 0.000 |
| Major | -0.193 | 0.084 | -0.061 | -2.292 | 0.002 |

**Table 5 Statistics related to the knowledge, attitude, and practice questionnaire for the breast cancer**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Subject** | **Number of people (%)** | | |  |
| **Yes** | **Uncertain** | **No** |
| Have a history of breast disease | 15 (1.1) | 200 (14.4) | 1172 (84.5) |  |
| Have had a breast mass | 57 (4.1) | 334 (24.1) | 996 (71.8) |  |
| Share breast-related issues with friends or family | 682 (49.2) | 293 (21.1) | 412 (29.7) |  |
| Have a family history of breast cancer (Female relatives in the family have or have had breast cancer) | 53 (3.8) | 204 (14.7) | 1130 (81.5) |  |
| Early menarche and late menopause associated with breast cancer | 301 (21.7) | 669 (48.2) | 417 (30.1) |  |
| Fertility or infertility after 30 years old related to breast cancer | 279 (20.1) | 833 (60.1) | 275 (19.8) |  |
| Breastfeeding reduce the incidence rate of breast cancer | 369 (26.6) | 816 (58.8) | 202 (14.6) |  |
| No mass in the breast but in the armpit be highly vigilant | 1053 (75.9) | 305 (22.0) | 29 (2.1) |  |
| Bloody secretions from the breast a bad sign of breast cancer | 684 (49.3) | 660 (47.6) | 43 (3.1) |  |
| If breast pain and/or breast skin changes is breast cancer performance | 481 (34.7) | 819 (59.0) | 87 (6.3) |  |
| If nipple invagination should remain viligant | 992 (71.5) | 326 (23.5) | 69 (5.0) |  |
| Know about breast self-examination | 183 (13.2) | 448 (32.3) | 756 (54.5) |  |
| Have done breast self-examination | 70 (5.0) | 288 (20.8) | 1029 (74.2) |  |
| Know the common technical examination methods of breast | 118 (8.5) | 259 (18.7) | 1010 (72.8) |  |
| Know how often adult women do breast clinical examination at least | 70 (5.0) | 284 (20.5) | 1033 (74.5) |  |
| Accept genetic screening if genetic testing can predict breast cancer | 1085 (78.2) | 208 (15.0) | 94 (6.8) |  |
| Know mammography can detect early breast cancer but cannot be detected by palpation | 187 (13.5) | 419 (30.2) | 781 (56.3) |  |
| Willing to accept breast disease prevention guidance and take the initiative to carry out breast self-examination | 1172 (84.5) | 151 (10.9) | 64 (4.6) |  |
| Find breast abnormality or discomfort, take the initiative to seek medical treatment in time | 1025 (73.9) | 253 (18.2) | 109 (7.9) |  |
| A way to acquire breast health knowledge | 413 (29.8) | 281 (20.3) | 693 (50.0) |  |
|  | Agree | Understand | Uncertain | Oppose |
| Women should receive health education on breast cancer | 1279 (92.2) | 85 (6.1) | 19 (1.4) | 4 (0.3) |
| Take the initiative to prevent breast cancer in daily life | 1308 (94.3) | 46 (3.3) | 31 (2.2) | 2 (0.1) |
| Accept breast resection to save life | 820 (59.1) | 227 (16.4) | 288 (20.8) | 52 (3.7) |