RESEARCH ARTICLE

# Correlation Study of Knowledge and Behavior Regarding Breast Care among Female Undergraduate Students in China

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## Abstract

**Background: This study aimed to understand the relationship between knowledge level and behavior on breast care in Chinese students, so as to provide strategies for improving the health education of breast care and subsequently for aiding in breast cancer prevention. Materials and Methods: A self-designed questionnaire was used to evaluate breast care knowledge level and characterize related behavior. Correlation analysis was conducted for the knowledge level and behavior. The study was carried out using 597 female undergraduate students in medical and non-medical colleges in Wuhu, China. Results: The average score of breast care knowledge was 5.32±1.68 (5.62±1.68 and 5.00±1.68 for medical and non-medical students, respectively), with a greater score value for sophomores (5.59±1.72) than freshmen (5.18±1.65). The average score of breast care behavior was 2.21±1.13, again with a greater value in sophomores (2.37±1.15) than freshmen (2.21±1.13). A significant positive correlation (r=0.231, *p*<0.01) between knowledge scores and behavior scores was observed. In addition, various factors, including paying attention to breast care information, receiving breast self-examination guidance, TV program and Internet, were found to influence breast care knowledge. Conclusions: In general, female undergraduate students lack of self-awareness of breast care with a low rate of breast self-examination. It is necessary to carry out health education to improve early detection of breast cancer.**

**Keywords:** China - undergraduate students - breast care - knowledge - behavior

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## Introduction

Breast cancer is the most common cause of cancer deaths for women worldwide (Echavarria et al., 2014). In China, the overall crude incidence rate for breast cancer was 32.43 per 100,000, ranking first and accounting for 16.20% of all cancer cases in women, and the overall crude mortality rate was 8.65 per 100,000, ranking fifth and accounting for 7.90% of all cancer deaths in women (Zeng et al., 2014). In addition, various breast conditions, such as cystic disease, ductal dilatation, sclerosing adenosis, sclerosis and fiber adenoma canceration, can increase the risk of breast cancer and play an important role in the change of carcinogenesis. For instance, studies have showed that women with a history of atypical hyperplasias and in situ carcinomas had approximately 5- and 10-fold increased relative risks, respectively, of eventually developing invasive breast cancers (London et al., 1992; Dupont et al., 1993).

The age of onset of breast diseases becomes smaller in the past few years. Studies have shown that emergence of breast diseases and their subsequent development into cancer tend to be more aggressive in younger women (Anders et al., 2008). Thus, early detection of breast cancers are important, improving chances of successful treatment and subsequently improving survival rate and quality of life (Vahdaninia et al., 2010). Various approaches, including breast self-examination (BSE), regular mammography, and clinical breast examination (CBE) (Avci 2008), have been adopted for improving early detection rate. However, regular mammography and CBE may not be practical in developing countries, as there are still lacking of health insurances and having a low rate of regular mammography (Memon et al., 2013; Vithana et al., 2013; Yoo et al., 2013), making BSE as the alternative approach.

Various factors need to be considered in order to promote breast self-examination, despite there is a debate surrounding the efficacy of routine BSE in early detection of breast cancer (Babu et al., 2001). Leslie et al. (2003) found that women who had received health care and cancer-screening instruction by health care providers had greater knowledge of breast cancer and detection practices. Accordingly, correct knowledge about early warning

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signs and screening methods of disease play an effective role towards developing and employing early detection programs in a community. Medical students may possess more knowledge relevant to BSE and thus a greater rate in conducting BSE. Although health promotion behaviors often are taught in high schools, female students may be still lack of knowledge of breast care (Ludwick et al., 2001). For instance, 14.3% of participants were graded as "Good" and above, only 48.3% practiced BSE (Alwan et al., 2012).

Researches on breast care in female college students are rare, especially in medical students. Thus, this study aimed to characterize breast care knowledge and health behaviors in college students with different specialties and grades, to investigate the relationship between the two characters, and to identify influencing factors for breast care among female college students in China. This study may thus provide feasible suggestions and scientific basis for the health education course in colleges and universities so as to improve the health behaviors of female college students and prevent breast cancer.

## Materials and Methods

*Study design*

A cross sectional study was carried out from October 2013 to December 2013, with study subjects being female undergraduate students enrolling in Wannan Medical College (WMC) and Anhui Normal University (ANU) in Wuhu, a city in the area of Central China. Dormitories were randomly chosen as cluster sample units, either from the five female dormitory buildings in WMC or from the ten dormitory buildings in ANU.

*Sample*

The inclusion criteria of the study subjects include being Wuhu students, being freshman or sophomore, and being not pregnant or currently breastfeeding. Overall, 600 female undergraduate students were recruited: 312 (89.14%) out of 350 female students in WMC agreed to participate, and 288 (57.60%) out of 500 female students in ANU agreed to participate. The major reason given for not participate the study is lack of time due to classes and extracurricular activities.

*Questionnaire*

Our questionnaire was primarily developed by the authors based on an extensive review of the literature with modification suggestions by maternal, child health and epidemiology experts, and then further improved after a field pilot survey (Parsa et al., 2008; Boulos et al., 2013).

The questionnaire consisted of two parts: the first part was designed to obtain the information about the participants' socio-demographic characteristics including age, grade, household register, specialty and monthly income and so on; and the second part included the knowledge of breast care and behavior of breast care. The second part included fourteen questions about breast care knowledge and eleven questions about breast care behavior. All questions for breast care knowledge are single-choice questions with one point for each correct answer and zero for each incorrect answer or unanswered question. The possible knowledge score was from zero to fourteen. The possible behavior score was from zero to eleven.

The questionnaire took an average of fifteen minutes. When the interview was completed, shower cards were given as incentives to help the students remember to perform BSE.

*Informed consent*

Before each interview, a participant was given detailed information about the survey's objectives and was clearly informed about their right to stop and/or leave the interview without providing any justification. The participants had been informed that all information would be kept secret and anonymous.

*Date analysis*

t-tests were used to compare knowledge or behavior scores in different specialties and/or grades. Logistic regression was used to identify factors associated with knowledge scores, where the factors were derived from the questionnaire items. Variables with a $p$ value less than 0.20 in univariate analyses were considered eligible for the multivariate analysis. A backward procedure based on the Wald test was used to select significant variables in the multiple logistic regression models. Due to the relatively small sample size, the significance level was fixed at a=0.10.

## Results

*Socio-demographic characteristics*

At last, excluding 3 respondents who did not finish the questionnaires, there was 597 participants successfully finished the questionnaires. Socio-demographic characteristics of study subjects were presented in Table 1. For specialty and household register, the subjects were about evenly distributed into the two categories of each of the two characteristics. For grade, there are more freshman participants than sophomore participants (65% *vs* 35%), possibly due to heavier course load and more extracurricular activities for sophomores than for freshmen. The distribution of household follows a bell-shaped distribution. The ages of respondents ranged between 17-25 years old, averaging at 19.90 years with a standard deviation of 1.09.

**Table 1. Characteristics of the Respondents (n=597)**

| Characteristics | | Frequency | Percentage (%) |
|---|---|---|---|
| Grade | Freshman | 389 | 65.16 |
| | Sophomore | 208 | 34.84 |
| Specialty | Medicine | 311 | 52.09 |
| | Non-Medicine | 286 | 47.91 |
| Household Register | | | |
| | Rural | 329 | 58.46 |
| | Urban | 248 | 41.54 |
| Monthly Income | <500RMB | 77 | 12.90 |
| | 500-1000RMB | 466 | 78.06 |
| | >1000RMB | 54 | 9.05 |

**Table 2. The Knowledge Score and Behaviors Score of Breast Care in different Specialties and Grades (n=597)**

| Projects | Specialty | | Grade | | Total |
|---|---|---|---|---|---|
| | Medical student (n=311) | Non-medical student (n=286) | Freshman (n=389) | Sophomore (n=208) | |
| Knowledge score | 5.62±1.68 | 5.00±1.68* | 5.18±1.65 | 5.59±1.72** | 5.32±1.68 |
| Behavior score | 2.29±1.06 | 2.12±1.21 | 2.13±2.20 | 2.37±1.15* | 2.21±1.13 |

The values in cells are the means and the corresponding standard deviations for the two scores in different specialty or grade categories; *$p$<0.05; **Significant at level $p$<0.01

**Table 3. Characteristics of Knowledge of Breast Care (n=597)**

| Item | | Frequency | Percentage(%) |
|---|---|---|---|
| Regarding breast discomfort in premenstrual is abnormal phenomenon | Correct | 150 | 25.13 |
| | Incorrect or unknown | 447 | 74.87 |
| Emotions and pressure have effect on the breast health | Correct | 376 | 62.98 |
| | Incorrect or unknown | 221 | 37.02 |
| Smoking and drinking are not conducive to breast health | Correct | 582 | 97.49 |
| | Incorrect or unknown | 15 | 2.51 |
| Low fat-diet can promote breast health | Correct | 220 | 36.85 |
| | Incorrect or unknown | 377 | 63.15 |
| The best time for doing BSE | Known | 41 | 6.87 |
| | Unknown | 556 | 93.13 |
| Which of sleeping postures is good for breast health | Known | 314 | 52.60 |
| | Unknown | 283 | 47.40 |
| Which of setting postures is beneficial for breast health | Known | 557 | 93.30 |
| | Unknown | 40 | 6.70 |
| How often to receive special health check in hospital | Known | 80 | 13.40 |
| | Unknown | 517 | 86.60 |

*Knowledge score and behavior score*

Table 2 presented the average scores of breast care knowledge and related behavior. The overall average score for breast care knowledge was 5.32±1.68, with the scores in medical students significantly greater ($p$<0.05)) than those in non-medical students. The scores in sophomores were significantly greater ($p$<0.05) than those in freshmen. Similar trends were also observed for the behavior scores. These results illustrate that better knowledge in breast care could lead to more responsible behaviors in breast care.

*The cognition of breast care knowledge*

Table 3 listed some of questionnaire questions and the corresponding responding results. It showed that the proportion of correctly answering a question varied dramatically across questions. For example, 97.5% of participants knew smoking and drinking increased breast cancer; however, less than 7% of participants knew the right time to conduct BSE.

Overall, for 8 out of 14 questions in the breast care knowledge questionnaire, ~50% or more of the participants failed to give or did not know the correct answers, indicating the need of improved health education in breast care for young women.

*Behaviors related breast care*

Characteristics of breast care behavior were shown in Table 4. For five issues closed related to the recommended activities for breast care, very low rates of respondents had experiences. For example, less than 3% of respondents conducted BSE every half a month. The data clearly indicate again the great need of better breast care education for young women.

**Table 4. Characteristics of Behavior of Breast Care (%) (n=597)**

| Item | | Frequency | Percentage (%) |
|---|---|---|---|
| Observing breast frequently | Yes | 44 | 7.37 |
| | No | 553 | 92.63 |
| Paying attention to the information of breast health | Yes | 7 | 1.17 |
| | No | 590 | 98.83 |
| Having received breast routine examination in hospital | Yes | 17 | 2.85 |
| | No | 580 | 97.15 |
| Doing BSE half a month | Yes | 16 | 2.68 |
| | No | 581 | 97.32 |
| Having received BSE guidance | Yes | 20 | 3.35 |
| | No | 577 | 96.65 |

*Analysis of influence factors of breast health knowledge*

To search for factors affecting breast health knowledge, we classified the respondents into two categories based on the breast health knowledge scores: good group (≥5 points) and poor group (<5 points). The value 5 was selected partially because that the median of the scores was 5. The two groups then were coded as 1 (good) or 0 (poor) in subsequent analyses.

The results were presented in Table 5. A number of factors, including Specialty (medical vs non-medical) and paying attention to breast care information or not, were identified to have positive effects on breast health knowledge, providing potential approaches to be used in future improvement of breath health education.

*The relationship between knowledge scores and behavior scores*

Knowledge score and behavior score in breast care showed a significant positive correlation (r=0.231, $p$<0.01)

**Table 5. Multiple Logistic Analysis of Breast Health Knowledge (n=597)**

| Factors | β | S.E. | B | Wald$\chi^2$ | *p* value | OR(95%CI) |
|---|---|---|---|---|---|---|
| Specialty | 0.772 | 0.204 | 0.213 | 16.22 | 0 | 2.164 (1.486, 3.152) |
| Having Received breast examination in hospital | 1.588 | 0.192 | 0.146 | 4.18 | 0.041 | 4.893 (1.068, 22.426) |
| Paying attention to breast care information | 1.05 | 0.777 | 0.141 | 4.35 | 0.037 | 2.855 (1.065, 7.653) |
| TV program | 0.833 | 0.503 | 0.221 | 19 | 0 | 2.301 (1.582, 3.346) |
| Internet | 1.042 | 0.202 | 0.283 | 26.51 | 0 | 2.834 (1.906, 4.213) |

*$p<0.05$; B: Coefficient; OR: Odds Ratio; CI: Confidence Interval

**Table 6. The Relationship between Knowledge Score and Behavior Score**

| Behavior score | Knowledge score | | $\chi^2$ | *p* value |
|---|---|---|---|---|
| | <5 | ≥5 | | |
| <2 | 80 | 77 | 33.79 | 0 |
| ≥2 | 113 | 327 | | |

(Table 6), indicating the potential importance of improved knowledge in breast care for better breast health in young women.

## Discussion

In this study, we explored the relationship between breath health knowledge and related behaviors through administering a two-part questionnaire in female undergraduate students. We found a significant correlation between the knowledge scores and the behavior scores. Using different ways to classify the study subjects, we found grade (sophomore *vs* freshman) and specialty (medical *vs* non-medical) had significant effects: sophomores significantly scored higher than freshmen and the same relationship for medical *vs* non-medical students. This may be due to the fact that female students paid more attention to self-health as the growth of the age. The study will potentially help in future strategy designs and implementation in improving breast health in young women.

It is also showed that cognitive rates on the breast care knowledge of female university students are still very low. For example, only 25.13% of them regarding breast discomfort in premenstrual as abnormal phenomenon in this survey. It confirmed the previous studies, e.g. Boulos found (Boulos et al., 2013), that 25.6% of participants known change in shape and/or retraction of nipple was a warning sign of breast cancer, as well as, Tazhibi et al. (2014) reported that 73.67% of female college students had the correct awareness of breast or nipple pain. The low breast health awareness of female college students could be due to their ignorance of breast care. In present study, only 1.17% of participates paid attention to the information of breast health constantly in the present study. In addition, the evidence from epidemiological studies (Brennan et al., 2010; Gao et al., 2013) showed that healthy diet and lifestyle can prevent breast cancer. Long time unhealthy mental status or emotional tension for long time could result in a series of gynecological diseases in female (Sundström et al., 2001). It should be noted that only 62.98% of students in our study confirmed that the emotions and the mental pressure could impact on the breast health. Thus, understand and cope with these common breast diseases is the key to its treatment and reducing its interference to the life.

In present study, the knowledge of diet and behaviors of smoking and drinking were significantly low. Of note, high fat diet (Sangrajrang et al., 2013; Mobarakeh et al., 2014;), smoking (Llic et al., 2013), and drinking (Key et al., 2006; Gou et al., 2013) are the risk of breast cancer. Therefore, encouraging the population to seek health knowledge and to minimize the risk factors is urgent

In addition, our study found that female undergraduate students did not conduct good breast care behaviors, e.g. 7.37% participant observed breast frequently, 6.87% knew the best time to conduct BSE, 3.35% received BSE guidance, and 2.67% did BSE half a month Our results confirmed the previous findings, for example Shalini et al. (Shalini et al., 2011) reported that only 35% of participant were heard about BSE and Ludwick et al. (Ludwick et al., 2001) found approximately 66% of students never examined the breast. It is 1999 that Cancer Society of USA recommended the monthly BSE for women over twenty years (Erblich et al., 2000). However, the effect of BSE in the early diagnosis of breast cancer is still controversial (Baxter, 2001), without medical staff's professional guidance, it could be difficult to master this skill. However, BSE is still an important screening tool for early detection of breast cancer in developing countries, since it is cheap, widely available (Babu et al., 2001). In the developing country, correcting the social beliefs is still a challenge (Khakbazan et al., 2014). It suggested that the health education of breast care should be paid more attention, including the skill of BSE.

Our results showed that there was a positive correlation between knowledge score and behavior score (r=0.231). Lacking knowledge of how to perform the technique correctly was most common reason for low proportion of practiced BSE (Alwan et al., 2012). Accordingly, the right knowledge on breast disease plays the key role in developing practices of BSE. In addition, multiple logistic regressions' results indicated that the influencing factors of the breast health knowledge included paying attention to breast care information, receiving BSE guidance, TV program and Internet. Hence, offering breast health courses and strengthening health education are needed. Other measures such as inviting breast care specialists to train the population, providing more information resources, e.g.TV and Internet, and friending environment, e.g. hang a mirror in female dormitory are encouraged.

Our study had several limitations. Firstly, the participation rate in non-medical college students is much lower than that of medical students. This could be explained by volunteer bias that participants are more concern about their health than non-participants. Secondly,

the data was self-reported which can be imprecise and subject to reporting biases. The objective-measured study would help to confirm the association. Thirdly, residual confounding, such as body image (Samah et al., 2014), family history of breast cancer and beliefs (Celik et al., 2014) etc, might also affect the results. However, the information was not available in the present study. Of note, breast cancer incidence is low in Anhui province (Shen Q et al., 2009). Further studies with such information are warranted.

In conclusion, the results indicated that understanding on breast care and the practices of BSE are inadequate among the female undergraduate students. There is a need for further studies to promote BSE during the breast awareness campaign should address understanding on breast care and the benefit of BSE and encourage the confidence to carry on with BSE.

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