



## Female College Students' Attitudes Towards Healthy Eating Habits in the Rising Incidence of Breast Cancer in Japan

Riona Ushiyama<sup>1</sup>, Minami Yoshiike<sup>1</sup>, Eri Tonsho<sup>2</sup>, Kanami Suzuki<sup>1</sup>, Kai Kuribayashi<sup>1</sup> and Yuji Aoki<sup>2\*</sup>

<sup>1</sup>Department of Health and Nutritional Science, Matsumoto University, Japan

<sup>2</sup>Matsumoto University Graduate School of Health Science, Japan

\*Corresponding Author: Yuji Aoki, Matsumoto University Graduate School of Health Science, Japan

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### Abstract

We have recently reported that age-specific incidence rates of breast cancer among Japanese women clearly increased from 2000 to 2015 in a bimodal distribution pattern. As for the premenopausal breast cancer in Japan, the incidence rates have become comparable to those in western countries. The westernization of lifestyle including eating habits needs to be considered as a modifiable risk factor. In this report, we assessed female college students' attitudes towards healthy eating habits using 7 questions raised for the promotion of food and nutrition education (*shokuiku* in Japanese) among the younger generation. By a web questionnaire survey, it was suggested that female college students who learned nutrition and health had insufficient attitudes towards healthy eating habits, although their attitudes were better than those of female junior college students who did not learn nutrition as a specialized subject. The largest difference between the two groups of students was found in the question "I buy foods without reading nutrition labels". The female junior college students who selected "Yes" for it were likely to have worse attitudes for healthy eating habits. The female college students learning nutrition had knowledge on nutrition labels, which was not necessarily linked with attitudes towards healthy eating habits. Nutrition awareness campaigns using well designed nutrition labels may be effective to improve the college students' attitudes.

**Keywords:** Breast Cancer; Westernization of Lifestyle; College Students; Eating Habits; Nutrition Labels

### Introduction

The potential impact of dietary habits or suboptimal diet on non-communicable diseases including some cancers has been reported [1-3]. We have recently reported that age-specific incidence rates of breast cancer among Japanese women clearly increased from 2000 to 2015 in a bimodal distribution pattern with two peaks at the age groups of 45 to 49 and 60 to 64 years (premenopausal and postmenopausal groups) [4]. As for the premenopausal breast cancer in Japan, the incidence rates have become comparable to those in western countries. Although the relationship between diet and premenopausal breast cancer has not been clarified in Japan [5], its incidence has been reported to associate with

consumption of unhealthy foods such as soft drink, sweets and fried foods in Iran [6], and with irregular eating habits (one regular meal or less a day) in Korea [7].

College students beginning to live independently usually shape or change their eating habits and physical activity during their college years, which is critical because these behaviors often continue through adulthood [8,9]. In the third basic plan, covering five years from fiscal 2016 to 2020, for the promotion of food and nutrition education (*shokuiku* in Japanese) by the Ministry of Agriculture, Forestry and Fisheries of Japan, *shokuiku* among the younger generation (people in their 20s and 30s) is set as one of priority issues

[10]. In the enlightenment leaflet in Japanese, 7 points to check are raised for the *shokuiku* among the younger generation including college students. In this report, we assessed female college students' attitudes towards healthy eating habits using the 7 points as a questionnaire survey in the rising incidence of premenopausal breast cancer.

**Methods**

**Data on breast cancer incidence rates in United States and in Japan**

Age-specific female breast cancer incidence rates from 2012 to 2016 by race/ethnicity in United States shown in Breast Cancer Facts and Figures 2019-2020 [11] and those from 2005 to 2015 in Japan shown in our paper [4] were used.

**Web questionnaire survey**

On November through December in 2020, 297 college students (245 females, 52 males) in Department of Health and Nutritional Science and 407 junior college students (298 females and 109 males) were surveyed by a web questionnaire using Google Forms. Seven survey questions to select "Yes" or "No" are the 7 points to check for the *shokuiku* among the younger generation translated into English, which are as follows:

1. I prefer to stay in bed instead of having breakfast.
2. It's a meal time whenever I feel hungry.
3. I rather choose a single dish such as rice and curry, pasta and a bowl of rice with topping.
4. I think snack or instant foods can be a meal.
5. I usually eat a meal alone.
6. I buy foods without reading nutrition labels.
7. I'm lacking knowledge on local products and dishes.

When students selected "Yes" for each question item, their attitudes for healthy eating habits were supposed to be worse.

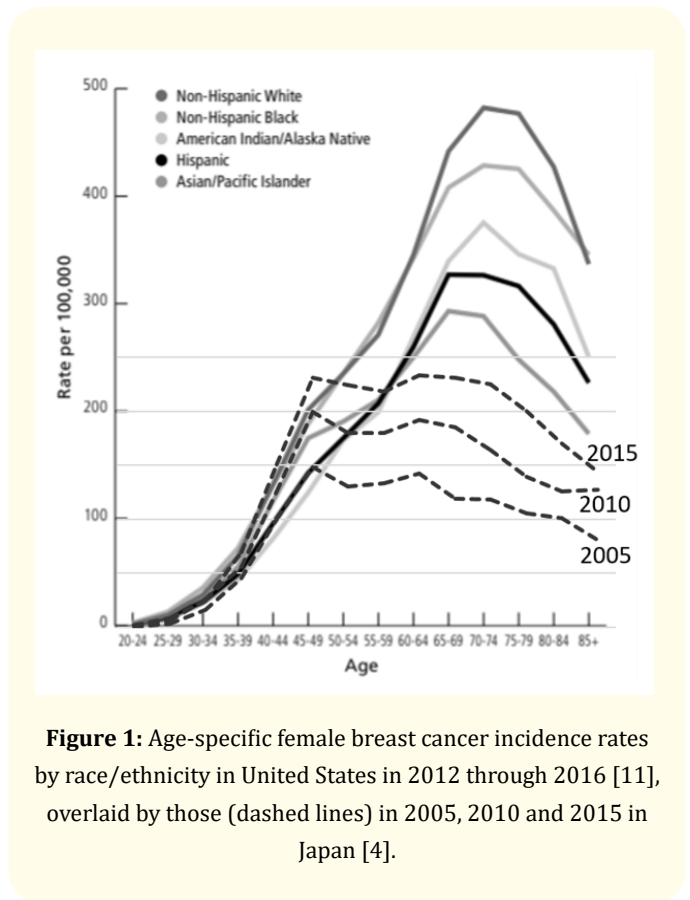
Differences or associations between two student groups or two question items were analyzed by the  $\chi^2$  test for 2 by 2 contingency tables. All tests were two-tailed, and  $P < 0.05$  was taken to indicate statistical significance.

**Results**

**Comparison between breast cancer incidence rates in United States and in Japan**

Figure 1 shows a line graph of age-specific female breast cancer incidence rates by race/ethnicity in United States in 2012 through

2016 (age-adjusted to the 2000 United States standard), which is overlaid by those (dashed lines) in 2005, 2010 and 2015 in Japan. It is noticed that the age-specific incidence rate of premenopausal breast cancer in Japan was increasing up to or beyond the rate of non-Hispanic White during the period of 10 years.

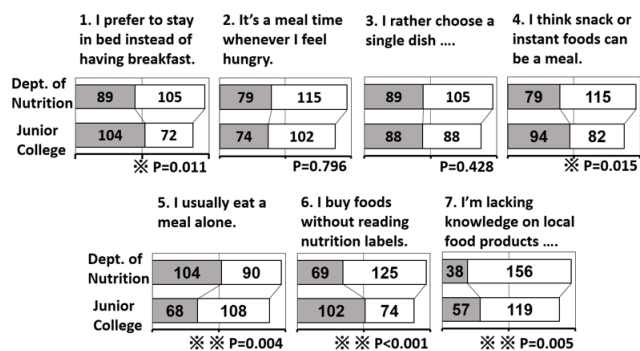


**Figure 1:** Age-specific female breast cancer incidence rates by race/ethnicity in United States in 2012 through 2016 [11], overlaid by those (dashed lines) in 2005, 2010 and 2015 in Japan [4].

**Seven points to check for the *shokuiku* among female college students**

The survey response rates were 74.7 % for the college students and 52.1% for the junior college students. Out of the responders, only females (194 college students and 176 junior college students) were assessed. The percentage of female college students who selected "Yes" for each question item were approximately 20 to 54 %, suggesting insufficient attitudes towards healthy eating habits. As shown in figure 2, there were significant differences between the female college students and junior college students in the questions 1, 4, 5, 6 and 7. The junior college students were less likely to eat a meal alone (question 5), because the majority of them were from the local indigenous community. The percentage of students who selected "No" for the questions 1, 4, 6 and 7 was

significantly larger in the college students than in the junior college students, suggesting better attitudes of the college students for healthy eating habits. The largest difference was found in the question 6 "I buy foods without reading nutrition labels".



**Figure 2:** Comparisons between female college students in Department of Health and Nutritional Science and female junior college students concerning the 7 questions for the *shokuiku* among the younger generation ("Yes" in gray bars, "No" in white bars). P values by the  $\chi^2$  test for 2 by 2 contingency tables.

Table 1 shows a matrix of P values of the  $\chi^2$  test to assess associations between two question items out of the 7 question items in the female college students in Department of Health and Nutritional Science. There were significant associations between the questions 1 and 2, and between the questions 2 and 3. Similarly, as shown in table 2, there were significant associations between the questions 1 and 6, between the questions 2 and 4, between the questions 3 and 5, between the questions 3 and 6, between the questions 4 and 5, between the questions 4 and 6, and between the questions 6 and 7 in the female junior college students who did not learn nutrition as a specialized subject. As the question 6 was significantly associated with 4 other questions, the junior college students who selected "Yes" for "I buy foods without reading nutrition labels" were likely to have worse attitudes for healthy eating habits.

**Discussion**

With regard to the rising incidence of premenopausal breast cancer in Japan, the westernization of lifestyle including eating habits needs to be considered as modifiable factors [4], keeping in mind the influence of estrogen and screening mammography [12,13]. As follow-up periods of epidemiological cancer studies are usually more than 10 years, eating habits among the younger gen-

	1. I prefer to stay in bed ....	2. It's a meal time whenever	3. I rather choose a single ....	4. I think snack or instant ....	5. I usually eat a meal alone.	6. I buy foods without ....	7. I'm lacking knowledge
1. I prefer to stay in bed ....	—	*P = 0.010	P = 0.074	P = 0.606	P = 0.284	P = 0.089	P = 0.377
2. It's a meal time whenever	*P = 0.010	—	**P = 0.004	P = 0.083	P = 0.918	P = 0.376	P = 0.846
3. I rather choose a single ....	P = 0.074	**P = 0.004	—	P = 0.091	P = 0.342	P = 0.314	P = 0.097
4. I think snack or instant ....	P = 0.606	P = 0.083	P = 0.091	—	P = 0.438	P = 0.135	P = 0.846
5. I usually eat a meal alone.	P = 0.284	P = 0.918	P = 0.342	P = 0.438	—	P = 0.365	P = 0.555
6. I buy foods without ....	P = 0.089	P = 0.376	P = 0.314	P = 0.135	P = 0.365	—	P = 0.090
7. I'm lacking knowledge	P = 0.377	P = 0.846	P = 0.097	P = 0.846	P = 0.555	P = 0.090	—

**Table 1:** A matrix of P values by the  $\chi^2$  test for 2 by 2 contingency tables among the 7 questions in female college students in Department of Health and Nutritional Science.

	1. I prefer to stay in bed ....	2. It's a meal time whenever	3. I rather choose a single ....	4. I think snack or instant ....	5. I usually eat a meal alone.	6. I buy foods without ....	7. I'm lacking knowledge
1. I prefer to stay in bed ....	—	P = 0.102	P = 1.000	P = 0.889	P = 0.567	*P = 0.016	P = 0.823
2. It's a meal time whenever	P = 0.102	—	P = 1.000	*P = 0.022	P = 0.088	P = 0.203	P = 0.736
3. I rather choose a single ....	P = 1.000	P = 1.000	—	P = 0.227	*P = 0.030	*P = 0.015	P = 0.260
4. I think snack or instant ....	P = 0.889	*P = 0.022	P = 0.227	—	*P = 0.017	*P = 0.046	P = 0.251
5. I usually eat a meal alone.	P = 0.567	P = 0.088	*P = 0.030	*P = 0.017	—	P = 0.174	P = 0.735
6. I buy foods without ....	*P = 0.016	P = 0.203	*P = 0.015	*P = 0.046	P = 0.174	—	**P = 0.009
7. I'm lacking knowledge	P = 0.823	P = 0.736	P = 0.260	P = 0.251	P = 0.735	**P = 0.009	—

**Table 2:** A matrix of P values by the  $\chi^2$  test for 2 by 2 contingency tables among the 7 questions in female junior college students.

eration including college students would be contributable even to the peak of premenopausal breast cancer at the age group of 45 to 49. In the present study, it was suggested that the female college students who learned nutrition and health had insufficient attitudes towards healthy eating habits, although their attitudes were better than those of the female junior college students who did not learn nutrition as a specialized subject. Interestingly, the largest difference was found in the question item "I buy foods without reading nutrition labels", which seems to be affected by learning or knowledge. Besides, the junior college students who selected "Yes" for "I buy foods without reading nutrition labels" were likely to select "Yes" for "I prefer to stay in bed instead of having breakfast", "I rather choose a single dish such as rice and curry, pasta and a bowl of rice with topping" and "I think snack or instant foods can be a meal" as shown in table 2. Although the majority of the junior college students were from the local indigenous community, there is a report that parental food behavior was considered to have both positive and negative influences on individual eating habits [14].

Nutrition labels are useful for consumers to obtain nutrition- and health-related information on food products and to guide their

selection of them [15]. A systematic review and meta-analysis concluded that nutrition labels had a moderate but positive effect on dietary intake among college students [16]. A study on food labels among medical college students demonstrated that the use of food labels had an impact on food choices while shopping needs for a long time to read and interpret the information, which was the main barrier to use [17]. Another meta-analysis reported that standard calorie labeling did not affect calorie selection or consumption, but labels including contextual information such as daily intake or traffic light symbols were effective on both outcomes [18]. As suggested in the present study, knowledge on nutrition labels are not necessarily linked with attitudes towards healthy eating habits. Nutrition awareness campaigns using well designed nutrition labels may be effective to improve college students' attitudes toward healthy eating habits.

**Conclusion**

In the rising incidence of breast cancer in Japan, unhealthy eating habits as a modifiable risk factor among college students would be important. Female college students learning nutrition had knowledge on nutrition labels, which was not necessarily linked

with attitudes towards healthy eating habits. Nutrition awareness campaigns using well designed nutrition labels may be effective to improve the college students' attitudes.

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### Conflicts of Interest

The authors have indicated no potential conflicts of interest.

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