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Short Communication
Association of Increasing Age-Specific Breast Cancer Incidence Rates with Drinking Habits but Not Obesity Prevalence, Based on National Data in Japan

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Abstract

Background and Objective: Breast cancer incidence rates are increasing in East and Southeast Asia due to the westernization of lifestyle. This study aimed to assess the association of age-specific breast cancer incidence rates with drinking habits and obesity among Japanese women. **Materials and Methods:** Data on age-specific cancer incidence rates, drinking habits and prevalence of obesity were obtained from the open data published by Cancer Information Services or National Institute of Health and Nutrition, Japan. Linear associations between the age-specific cancer incidence rates, drinking habits (alcohol, 20 g and over 3 times or more a week) and prevalence of obesity (body mass index, 25 and over) were assessed by Pearson's correlation coefficient. **Results:** The age-specific incidence rates of breast cancer in 5-year age groups increased during the 10 years (from 2005 to 2015) in a bimodal pattern; cancer of corpus uteri increased in a bell-shaped pattern; and colon cancer increased with age in a similar pattern. Drinking habits were significantly correlated with the increasing incidence rates of three types of cancer (breast, corpus uteri and colon cancers), especially with breast cancer at the age of 50-79 years. No positive correlations were observed between these three types of cancer and prevalence of obesity. **Conclusion:** The present study indicated that westernized drinking-related lifestyle among Japanese women is associated with a higher rate of age-specific breast cancer incidence. Counseling program on lifestyle modification can be beneficial for women.

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INTRODUCTION

Breast cancer incidence is generally high in Northern America and Western Europe and low in most of the African and Asian countries[1,2]. Breast cancer incidence rates are thought to be increasing in East and Southeast Asia, along with the westernization of reproductive and lifestyle patterns[3,4]. Estrogen is known to play an important role in the development of breast cancer[5]. In our previous report[6], we compared breast cancer incidence rates with corpus uteri and colon cancers among Japanese women in 2005, 2010 and 2015 and noted that the age-specific incidence rates of breast cancer (in 5-year age groups) increased from the year 2005 to 2015 in a bimodal distribution pattern. Such increasing rates differed from those of corpus uteri cancer, which are also affected by estrogen[7], or those of colon cancer which are affected by the westernization of lifestyle, which was demonstrated by the migration study among Japanese in Hawaii[8]. In this short communication, we assessed the three distinct patterns of age-specific cancer incidence rates in relation to drinking habits and prevalence of obesity, supposedly due to westernization of lifestyle among Japanese women.

MATERIALS AND METHODS

Data on age-specific breast, corpus uteri and colon cancer incidence rates (5-year age groups) among Japanese women in 2005 through 2015 were obtained from the open data published by Cancer Information Services, National Cancer Center, Japan (http://gdb.ganjoho.jp/graph_db/). Data on drinking habit (alcohol, 20 g and over per day 3 times or more a week) in 10-year age groups and the oldest group of 70 years and over and prevalence of obesity (body mass index, 25 and over) in 10-year age groups among Japanese women in 1995 through 2015 were obtained from the open data published by National Institute of Health and Nutrition (National Health and Nutritional Survey), Ministry of Health, Labour and Welfare, Japan (https://www.mhlw.go.jp/bunya/kenkou/kenkou_eiyou_chousa.html).

Statistical analysis: Pearson's correlation coefficient was used to assess linear associations between age-specific cancer incidence rates and drinking habit or prevalence of obesity. All tests were two-tailed and statistical significance was set at p<0.05.

RESULTS

Figure 1 shows age-specific breast, corpus uteri and colon cancer incidence rates (per 100,000 population) in 2005, 2010 and 2015 (left panel) or annual changes in those from 2005 to 2015 (right panel). As demonstrated in our previous report[6], the age-specific incidence rates of breast cancer in 5-year age groups increased in a bimodal pattern; similarly corpus uteri cancer increased in a bell-shaped pattern; and colon cancer increased with age in a similar pattern during the 10 years (from 2005 to 2015). According to the data of drinking habits and prevalence of obesity, the incidence rates of the three age-specific respective cancers were regrouped by a 10-year period instead of a 5-year period and were shown in the right panel as annual changes from 2005 to 2015 in each 10-year age group.

Figure 2 shows linear correlations in each 10-year age group between age-specific breast, corpus uteri or colon cancer incidence rates (per 100,000 population) and age-specific drinking habits (%) or prevalence of obesity (%) in the same year or 10 years before. For example, breast cancer incidence rates at the age of 30-39 years in 2005 were paired with drinking habits or prevalence of obesity at the age of 30-39 years in 2005 (in the same year) or at the age of 20-29 years in 1995 (10 years before). Eleven pairs, from 2005 to 2015 or from 1995 to 2005 were used for each Pearson's correlation coefficient test. Data on drinking habits in 2013 were lacking and 10 pairs were used for the test in that case. Significant positive correlations were seen between the breast cancer incidence rates and drinking habits at the age of 50-59, 60-69 and 70-79 years (in the same year) and between the breast cancer incidence rates and drinking habits at the age of 50-59 years (10 years before). Similarly, significant positive correlations were seen between the corpus uteri cancer incidence rates and drinking habits at the age of 50-59 and 60-69 years (in the same year) and between the corpus uteri cancer incidence rates and drinking habits at the age of 50-59 years (10 years before). Significant positive correlations were seen between the colon cancer incidence rates and drinking habits at the age of 70-79 years (in the same year) and between the colon cancer incidence rates and drinking habits at the age of 50-59 years (10 years before).

On the contrary, significant negative correlations were seen between the breast cancer incidence rates and drinking habits at the age of 30-39 years (in the same year) and between the breast cancer incidence rates and obesity at the age of 60-69 years (in the same year or 10 years before).
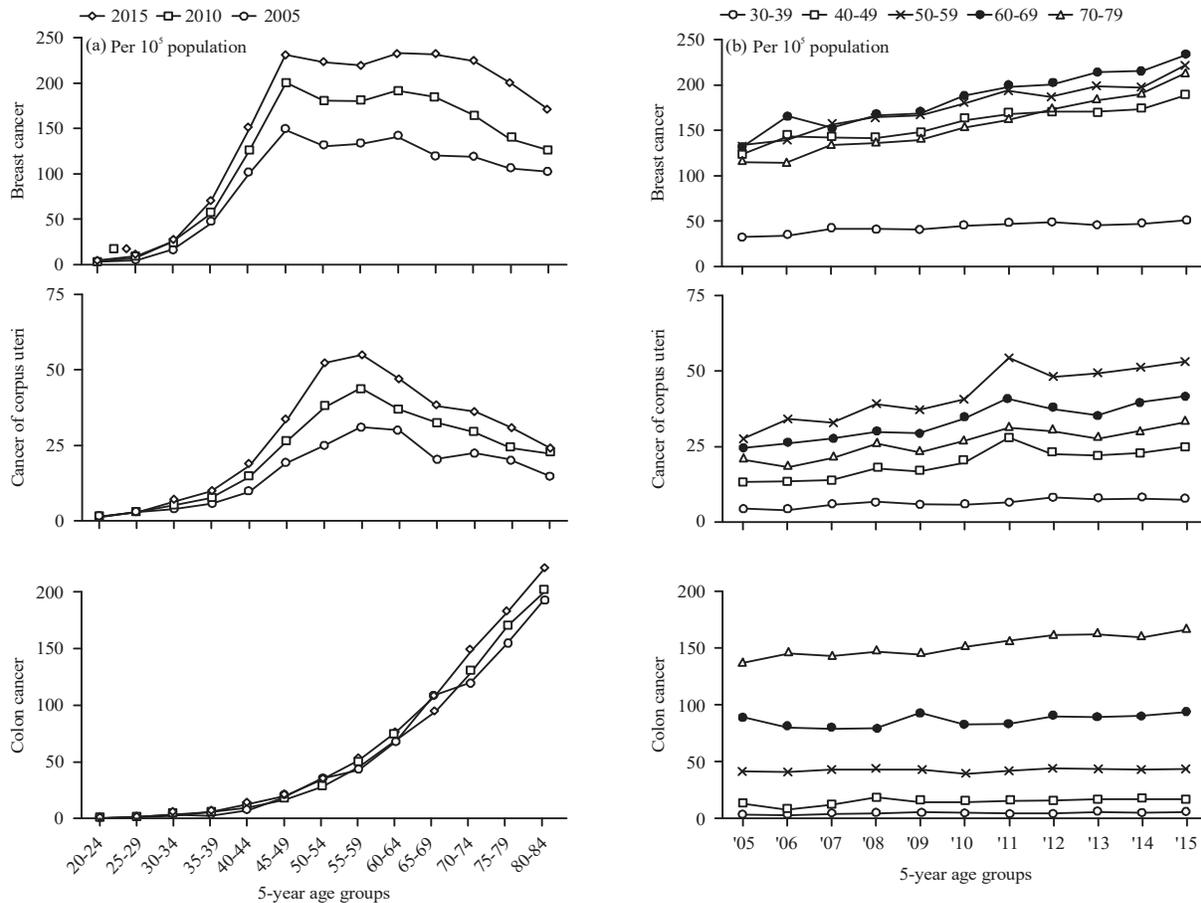
Fig. 1: Age-specific breast, corpus uteri and colon cancer incidence rates (per 100,000 population) in 2005, 2010 and 2015 in 5-year age groups (left panel) or annual changes in those from 2005 to 2015 in 10-year age groups (right panel)

Similarly, significant negative correlations were seen between the corpus uteri cancer incidence rates and drinking habits at the age of 30-39 years (in the same year), between the corpus uteri cancer incidence rates and obesity at the age of 60-69 years (in the same year) and between the corpus uteri cancer incidence rates and obesity at the age of 50-59 years (10 years before). Significant negative correlations were seen between the colon cancer incidence rates and drinking habits at the age of 30-39 years (in the same year).

DISCUSSION

Data on age-specific breast, corpus uteri and colon cancer incidence rates among Japanese women showed three distinct patterns. The age-specific breast cancer incidence showed a bell-shaped pattern before 2002[2], which is similar to that of corpus uteri cancer presented in the present study.

Breast and corpus uteri cancers are affected by estrogen, the recent bimodal pattern of breast cancer with two peaks at the age groups of 45 to 49 years and 60 to 64 years (premenopausal and postmenopausal) indicate some factors (in addition to estrogen) which promote the incidence of breast cancer. The patterns of age-specific breast and corpus uteri cancer incidence rates were apparently different from that of colon cancer regarded as a typical case of cancers affected by the westernization of lifestyle[8]. Kuriki and Tajima[9] predicted that the increase of colon cancer incidence appeared to be contained, but the incidence rate was still increasing in aged people.

Linear correlation between age-specific cancer incidence rates and age-specific drinking habits or prevalence of obesity in the same year or 10 years before was assessed. Interestingly, age-specific drinking habits were significantly associated with the increasing incidence rates of the three cancers, especially with those of breast cancer at the age of 50-79 years in the

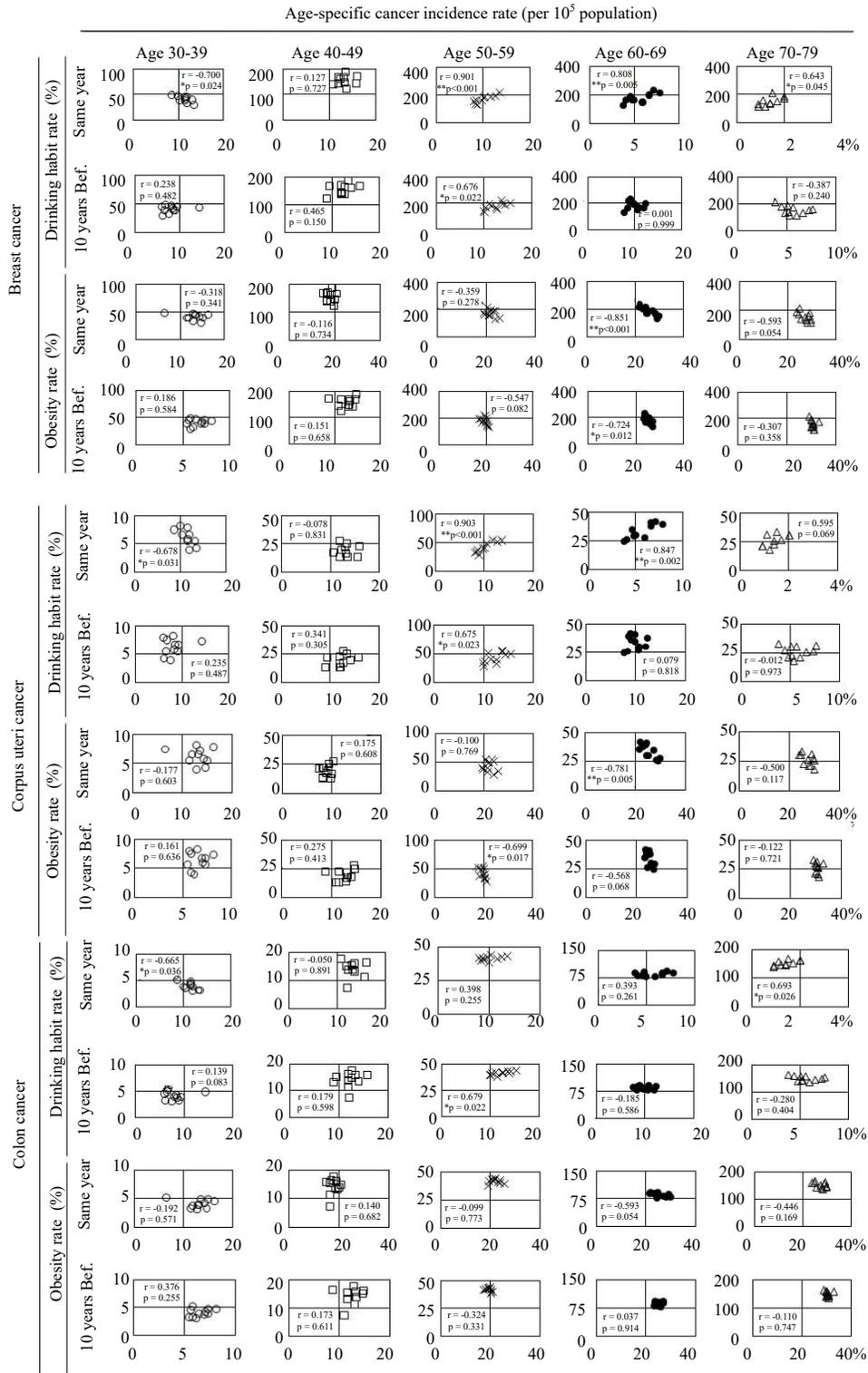Age-specific cancer incidence rate (per 10^5 population)

Fig. 2: Linear correlations in each 10-year age group between age-specific breast, corpus uteri or colon cancer incidence rates (per 100,000 population) and percentages of age-specific drinking habits (alcohol, 20 g and over per day 3 times or more a week) or obesity (body mass index, 25 and over) in the same year or 10 years before the cancer incidence

same year rather than 10 years before cancer incidence. The significant associations were seen in the corpus uteri cancer at the age of 50-69 years and in the colon cancer at the age of 70-79 years. The significant associations between drinking habits and the three types of cancer were observed only at the age of 50-59 years (10 years before the cancer incidence). Conversely, age-specific prevalence of obesity was found to be negatively associated with the incidence of breast and corpus uteri cancer in a few age groups.

Thus, the present ecological study indicated that age-specific drinking habits or drinking-related westernized lifestyle was associated with the increasing risk of age-specific breast cancer incidence among Japanese women. In a large sample, it has been demonstrated that a westernized dietary pattern with high intake of meat, processed meat, bread, dairy products, coffee, soft drinks, tea, sauces and alcohol was associated with a higher risk of breast cancer among postmenopausal Japanese women (estrogen-/progesterone-receptor positive)[10]. The consumption of alcohol beverages has been classified as carcinogenic to humans[11,12] and is known to increase breast cancer incidence[13]. In Japan, a pooled analysis of eight large-scale population-based prospective cohort studies have demonstrated that alcohol consumption had a significant association with a higher risk of breast cancer among premenopausal women[14]. A recent review paper[15] described that alcohol consumption was associated with a higher risk of breast cancer. This association was observed in both premenopausal and postmenopausal women, with a strong causal relationship in premenopausal women[15]. Although obesity[16] or weight gain[17,18] is known to be linked with breast cancer among postmenopausal women. Very low prevalence of obesity was seen among Japanese women[19], a negative correlation was observed between obesity and breast cancer incidence rates at the age of 50-69 years as speculated in our previous study[6].

CONCLUSION

The present study indicated that age-specific breast cancer incidence rates among Japanese were increased due to westernized drinking-related lifestyle. As the breast cancer incidence rates are affected by the present lifestyle rather than the past one, counseling program on lifestyle modification can be beneficial for women.

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