# Association between cancer screening behavior and family history among Japanese women

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## ARTICLE INFO

## ABSTRACT

*Objective.* To examine lifestyle habits and cancer screening behavior in relation to a family history of cancer among Japanese women.

*Methods.* A cross-sectional study was conducted based on baseline data from the Japan Nurses' Health Study collected from June 2001 to March 2007. Participants were 47,347 female nurses aged 30–59 years residing in 47 prefectures in Japan. We compared lifestyle habits and the utilization of cancer screenings (cervical and breast) between women with and without a family history of the relevant cancer.

*Results.* Although there were no differences in lifestyle habits with the exception of smoking status, women with a family history of uterine cancer were more likely to have undergone cervical cancer screenings (p<0.01). Women with a family history of breast cancer were also more likely to have undergone breast cancer screenings regardless of their age (p<0.01), but lifestyle behaviors did not differ. Among women with a family history of uterine cancer, those with a sister history were more likely to have undergone not only cervical (OR, 1.89; 95% CIs, 1.39–2.58), but also breast cancer screenings (OR, 1.54; 95% CIs 1.13–2.09).

*Conclusion.* Having a family history of cancer was associated with cancer screening behavior, but not health promotive behaviors.

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## Introduction

Many studies have reported that having a family history of breast or endometrial cancer particularly among first-degree relatives was associated with an increased risk of developing those cancers (Beral et al., 2001; Colditz et al., 1993; Lucenteforte et al., 2009; Poole et al., 1998). In addition, public health and preventive medicine have become focused on the use of family history for breast cancer prevention (Audrain-McGovern et al., 2003; Yoon et al., 2002, 2003). Because a family history of breast cancer is among the known risk factors of the disease, women at risk due to their family history should be more motivated to participate in cancer screenings and encouraged to make changes in lifestyle habits to promote health than those without such a family history. However, little is known about whether Japanese women with a family history of cancer utilize cancer screening opportunities, and to what extent having a family history of cancer may influence a woman's health behaviors. The purpose of the present study was to examine lifestyle habits and cancer screening behavior in relation to their family history of cancer among Japanese women.

## Methods

### Study population

We conducted a cross-sectional study based on baseline data from the Japan Nurses' Health Study (JNHS). While public awareness of women's health has increased, there has been little research documenting the health status and behaviors of Japanese women. The JNHS is the first large-scale cohort study aiming to acquire epidemiological data which may shed light on the lifestyle habits, health practices, and health status of Japanese female nurses and to examine the extent to which these health behaviors differ from those found in other countries (Fujita et al., 2007; Hayashi et al., 2007). The study protocol was approved by the institutional review board at Gunma University and the ethics review board at the National Institute of Public Health.

During a 6-year entry period after the inception of the study in 2001, a total of 49,927 female nurses from all 47 prefectures in Japan completed the baseline questionnaire. We limited the current analytic data set to women 30 to 59 years of age because at that time, cervical and breast cancer screenings in population-based programs targeted women at least aged 30 years for initial screenings (Hamashima et al., 2010; Hisamichi, 2001; MHLW, 2004; Morimoto, 2009). The total of 47,347 female nurses

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included in the primary analyses comprised 21,350 (45.1%) of the women aged 30–39 years, 17,832 (37.7%) of those aged 40–49 years, and 8165 (17.2%) of those aged 50–59 years. The mean age was $41.3 \pm 7.54$ (SD) years, 82.0% were registered nurses, and 68.6% were married.

To note, when examining the association of uterine cancer family history with lifestyle habits and cervical cancer screening practice, we excluded 2008 women who had reported a previous diagnosis of uterine (endometrial or cervical) cancer and/or a hysterectomy, leaving a total of 45,339 women eligible for the analyses. Similarly, after excluding 362 women who had developed breast cancer, we analyzed 46,985 women to estimate the association of breast cancer family history with lifestyle habits and breast cancer screening practice.

*Measures and assessments*

We obtained information on family histories of cancers, selected lifestyle habits, and the utilization of cancer screenings from the self-administered questionnaires. The family cancer histories examined in the present study included breast and uterine cancers (endometrial or cervical cancer was not specified), and the family members we inquired about included the participants' mothers, sisters, and their maternal and paternal grandmothers. We defined women with a family history of uterine or breast cancer as those who had any female family members with a previous diagnosis of each cancer, regardless of the age at which female relatives were diagnosed.

Participants were asked to provide the total time spent engaging in three levels of physical activity outside of work. Those who engaged in light or moderate activity for 150 min or more per week, or vigorous activity for 60 min or more per week were considered to be physically active individuals. These recommended time estimates were used based on the criteria for reducing the risk of cancers established by the National Cancer Institute in the United States (NCI, 2009). Breakfast consumption habits were derived from the following response options: "Never," "Once a week," "2–3 days per week," "4–5 days per week," and "Daily." The responses were categorized into three groups: "Never," "Sometimes," and "Every day." Smoking history was ascertained through the question: "Have you ever smoked more than 20 packs of cigarettes?" with the following response options: "No," "Yes: smoked in the past, but quit," and "Yes: currently smoke." Responses were coded as: "Never," "Former," and "Current" smokers. Additionally, the frequency of alcohol consumption was categorized into three groups: "Non-drinker," "Drinker (<3 days per week)," and "Drinker (≥3 days per week)."

Participants were asked to report on the utilization of cervical cancer screening (Pap smear) and breast cancer screening (mammography or ultrasound examination), regardless of the screening programs they had attended, along with a summary question: "During the past 5 years, did you undergo each cancer screening?" The responses were coded as binary (yes, no) variables.

*Statistical analysis*

All analyses were conducted without substituting missing values. First, health behavioral characteristics of participants in relation to a family history of cancer were descriptively summarized using frequencies. The differences in lifestyle habits and cancer screening behavior between family history groups–1) women with and without a family history of cancer among female relatives and 2) women with and without a family history of cancer among first-degree relatives–were determined by chi-square tests for variables with two categories and by two-sided Wilcoxon's rank sum tests for variables with more than two levels. Next, odds ratios (OR) and 95% confidence intervals (CIs) were calculated to estimate the magnitude of the association between cancer screening practice and a family history of cancer for each female relative. In multivariate logistic regression analyses, covariates simultaneously adjusted for in the model included body mass index (BMI; <18.5, 18.5–<25, 25–<30, or ≥30 kg/m$^2$), physical activity (active or inactive), breakfast intake (every day, sometimes, or never), smoking status (never, former, or current), alcohol consumption (never, <3 days/week, or ≥3 days/week), family history of cancer in interest among other family members (yes or no), and age at taking the questionnaire (years). The level of significance was set at $p = 0.05$. All analyses were performed using the SAS 9.2.statistical software.

## Results

Table 1 presents the comparisons of lifestyle habits and cervical cancer screening behavior between women with and without a family history of uterine cancer. Among 45,339 women who did not have a diagnosis of uterine (endometrial or cervical) cancer and/or a hysterectomy, 2681 women had reported having a family history of uterine cancer. Although there were no differences between the groups with regard to physical activity, breakfast intake, and alcohol consumption, women without a family history of uterine cancer were less likely to be current smokers than those with such a family history (17.2% versus 19.0%, p<0.01). Also, women with a family history of uterine cancer were more likely to have undergone cervical cancer screenings than those without such a family history (60.6% versus 53.6%, p<0.01). In analyses stratified by age group, women in all age groups with a family history of uterine cancer were more likely to have undergone cervical cancer screenings (52.0% versus 45.3% of the women aged 30–39 years, p<0.01, 67.0% versus 60.0% of those aged 40–49 years, p<0.01, and 68.3% versus 63.3% of those aged 50–59 years, p = 0.03). These associations did not differ appreciably when we compared women with and without a family history of uterine cancer among their first-degree relatives.

The comparisons of lifestyle habits and breast cancer screening behavior between women with and without a family history of breast cancer are presented in Table 2. Among 46,985 women who did not have a diagnosis of breast cancer, 2217 women had reported having a family history of breast cancer. Lifestyle behaviors including smoking status did not differ between the groups. However, women were more likely to have undergone breast cancer screenings if they had a family history of the disease (23.0% versus 16.6%, p<0.01). When the data were analyzed using age-stratification, women with a family history of breast cancer were more likely to have undergone breast cancer screenings regardless of their age (13.8% versus 8.4% of the women aged 30–39 years, p<0.01, 27.6% versus 21.9% of those aged 40–49 years, p<0.01, and 35.6% versus 26.9% of those aged 50–59 years, p<0.01). The results remained unchanged when we compared women with and without a family history of breast cancer among their first-degree relatives.

Table 3 presents the association of cancer screening practice with a family history of uterine cancer for each female relative. Women with a family history of uterine cancer were more likely to have undergone cervical cancer screenings than those without a family history of the disease, regardless of a degree of relationship. Of those, women who had sisters with a diagnosis of uterine cancer had the highest odds of having undergone cervical cancer screenings (OR, 1.89; 95% CIs, 1.39 to 2.58). They were also found to have undergone breast cancer screenings (OR, 1.54; 95% CIs, 1.13 to 2.09).

Table 4 presents the association of cancer screening practice with a family history of breast cancer. For each family member, women with a family history of breast cancer were more likely to have undergone breast cancer screenings than those without such a family history. Of those, women with a maternal history had as high odds of having undergone breast cancer screenings as those with a sister history (OR, 1.47; 95% CIs, 1.23 to1.78, OR, 1.43; 95% CIs, 1.13 to 1.80, respectively). When stratified by age group, women both aged 30–39 years and 40–49 years with a sister history were more likely to have undergone breast cancer screenings than those with a maternal history (Table 5). Having a family history of breast cancer was not associated with cervical cancer screening practice.

## Discussion

Overall, 54.0% (45.7% of the women aged 30–39 years, 60.4% of those aged 40–49 years, and 63.6% of those aged 50–59 years) of Japanese women who participated in the present study had undergone cervical cancer screenings and 16.9% (8.7%, 22.1%, and 27.3%,